GOVERNMENT OF
WESTERN AUSTRALIA

Department of
**Primary Industries and
Regional Development**

Draft West Coast Demersal Scalefish Resource Harvest Strategy 2021-2025

January 2021

CONTENTS

LIST OF ACRONYMS

ARMA	*Aquatic Resources Management Act 2016*
CSLPMF	Cockburn Sound Line and Pot Managed Fishery
DPIRD	Department of Primary Industries and Regional Development
EBFM	Ecosystem Based Fisheries Management
EPBC (Act)	*Environment Protection and Biodiversity Conservation Act 1999*
ERA	Ecological Risk Assessment
ESD	Ecologically Sustainable Development
ETP	Endangered, Threatened and Protected (species)
FRMA	*Fish Resources Management Act 1994*
FRMR	*Fish Resources Management Regulations 1995*
HCR	Harvest Control Rule
IFM	Integrated Fisheries Management
MSY	Maximum Sustainable Yield
OCP	Operational Compliance Plan
RFBL	Recreational Fishing from Boat Licence
SWTMF	South West Trawl Managed Fishery
TSF	Temperate Shark Fisheries
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WCB	West Coast Bioregion
WCDSR	West Coast Demersal Scalefish Resource
WCDSIMF	West Coast Demersal Scalefish Interim Managed Fishery
WCRLMF	West Coast Rock Lobster Managed Fishery

1.0 INTRODUCTION

Harvest strategies for aquatic resources in Western Australian (WA) that are managed by the Department of Primary Industries and Regional Development (DPIRD) are formal documents that support the decision-making processes and ensure these processes are consistent with the principles of Ecologically Sustainable Development (ESD; Fletcher et al. 2002) and Ecosystem Based Fisheries Management (EBFM; Fletcher et al. 2012). The objectives of ESD are reflected in the objects of the *Fish Resources Management Act 1994* (FRMA) and the *Aquatic Resources Management Act 2016* (ARMA) which will replace the FRMA once enacted.

This harvest strategy has been developed in-line with DPIRD's over-arching *Harvest Strategy Policy for Aquatic Resources* (Department of Fisheries 2015a) and is consistent with relevant national harvest strategy policies and guidelines (e.g. Sloan et al. 2014; Department of Agriculture and Water Resources 2018a). It makes explicit the performance indicators, reference levels, and harvest control rules designed to achieve the specific long- and short-term management objectives for the resource, and the broader goals of ESD, EBFM and Integrated Fisheries Management (IFM).

The publication of this harvest strategy 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).

This strategy provides guidance for decision-makers, but does not derogate from or limit the exercise of discretion required for independent decision-making under the FRMA by either the Minister for Fisheries, the Director General of the DPIRD (as Chief Executive Officer) or other delegated decision-makers in order to meet the objects of the FRMA or ARMA.

This document has been developed by a stakeholder-based harvest strategy working group with representation from Recfishwest, the Western Australian Fishing Industry Council (WAFIC), Marine Tourism WA, commercial fishers, charter fishers, recreational fishers and DPIRD.

1.1 Review Process

The WA 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, this document may be subject to review and amended as appropriate within this five-year period.

2.0 SCOPE

This harvest strategy relates to the West Coast Demersal Scalefish Resource (WCDSR) of WA and all fishing activities that impact this resource. The WCDSR comprises over 100 demersal scalefish species[1] that inhabit the inshore and offshore waters of the West Coast Demersal Scalefish Interim Managed Fishery (WCDSIMF; Figure 1).

Demersal scalefish in open marine waters are primarily harvested by the commercial sector within the WCDSIMF, and the recreational (including charter) sector within the West Coast Bioregion (WCB) under a formal catch share arrangement. In December 2012, the Minister for Fisheries determined sectoral IFM allocations for the WCDSR and sectoral proportional allocation guidelines for key species (see section 2.5 and section 6.1 for additional information).

Fishers mainly target three demersal species including pink snapper (*Chrysophrys auratus*) West Australian dhufish (dhufish; *Glaucosoma hebraicum*) and baldchin groper (*Choerodon rubescens*). Redthroat emperor (*Lethrinus miniatus*) and bight redfish (*Centroberyx gerrardi*) also comprise a significant proportion of commercial catch and breaksea cod (*Epinephelides armatus*) comprise a significant proportion of recreational catch in certain Areas of the WCDSR.

In addition, five state-managed fisheries retain demersal scalefish in the WCB; including the:

- the Temperate Shark Fisheries (TSFs) incorporating the *West Coast Demersal Gillnet and Demersal Longline Managed Fishery and Southern Demersal Gillnet and Demersal Longline Managed Fishery*;
- *West Coast Rock Lobster Managed Fishery* (WCRLMF);
- *Cockburn Sound Line and Pot Managed Fishery* (CSLPMF); and
- *South West Trawl Managed Fishery* (SWTMF).

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 deep-water crustaceans. All catches from this Commonwealth fishery are accounted for in another harvest strategy (Australian Fisheries Management Authority 2011).

Monitoring and assessment of the WCDSR is based on identification and sustainability evaluation of indicator species (Newman et al. 2018; 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 or 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 and offshore demersal scalefish exploited in that

[1] See Appendix 5 of Fisheries Management Paper No.249 for WCDSR species list.

region. In accordance with this approach, the focus of this harvest strategy is based on the indicator species for the inshore demersal scalefish suite of species (dhufish, pink snapper and baldchin groper) and offshore demersal suite of species (hapuku, bass groper and blue-eye trevalla) that comprise the WCDSR. 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.

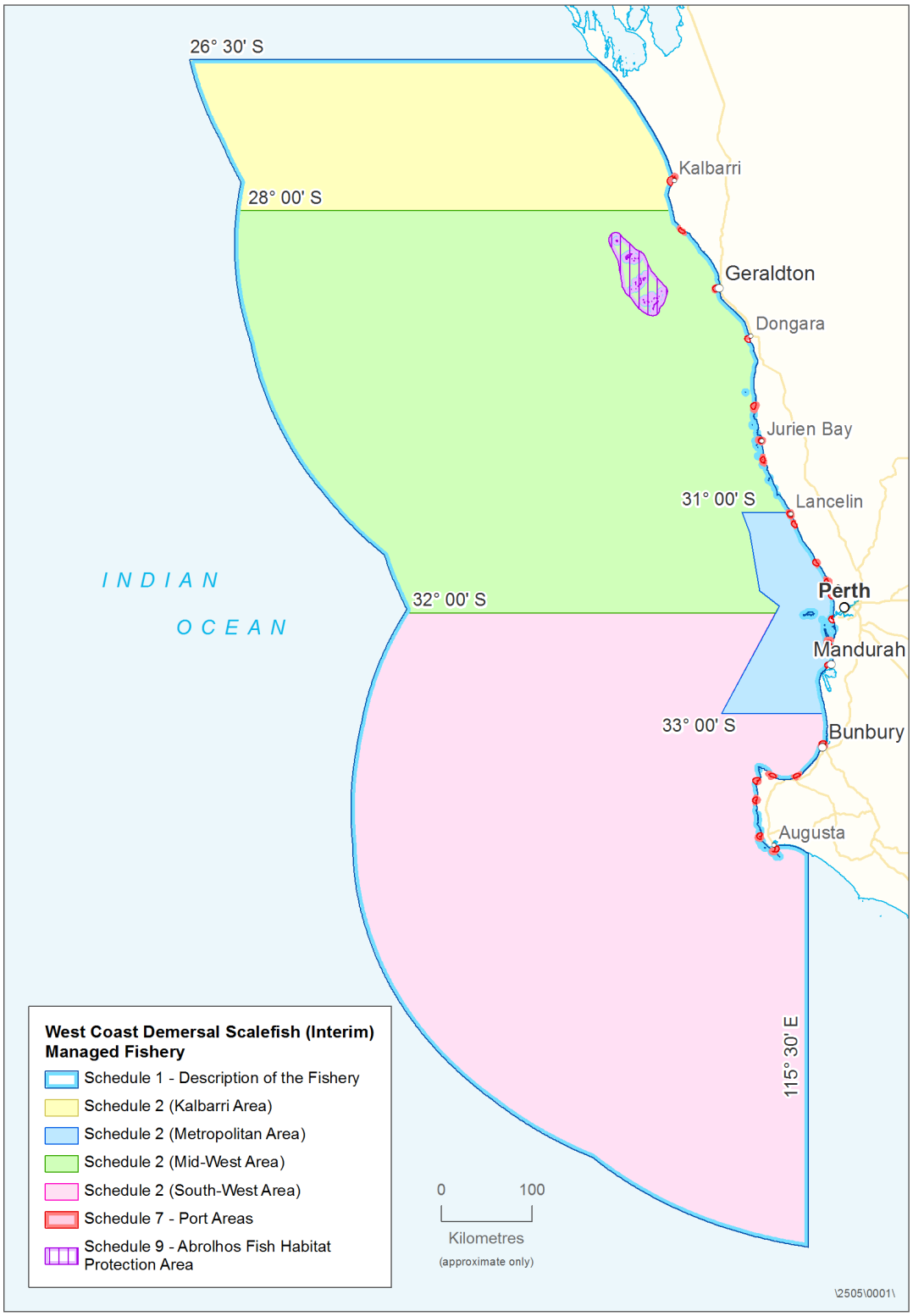

Figure 1. Boundaries and management areas of the WCDSR.

The use of indicator species as the basis for developing harvest strategies of an entire resource has facilitated the successful management of multi-species fisheries in WA (e.g. Wise et al., 2007). The precautionary element of this approach means that should an indicator species breach a threshold or limit reference level, the entire suite of species covered by that indicator species will be deemed to have breached this level. Therefore, to enable recovery of an overfished species an overall reduction in fishing intensity across the entire resource is often required.

In addition to considering fishing impacts from all fishing activities on the retained species, this harvest strategy also covers impacts on bycatch[2], endangered, threatened and protected (ETP) species, habitats and other ecological components to ensure any risks to these elements are managed effectively. Likewise, the impacts on the ecological components other than the retained demersal scalefish species from other state-managed commercial fisheries (i.e. the TSFs, the WCRLMF, the CSLPMF and the SWTMF) are not within the scope of this document. Future versions may be expanded to include these impacts where relevant.

2.1 Environmental Context

The WCDSR includes demersal species that inhabit inshore (shelf) waters of 20-250 m depth and offshore >250 m depth in the WCB. The marine environment of the WCB is predominantly a temperate oceanic zone. The West Coast is characterised by exposed sandy beaches and a limestone reef system that creates surface reef lines, often about 5 kilometres off the coast. Further offshore, the continental shelf habitats are typically composed of coarse sand. Southward of Cape Naturaliste, the coastline changes from limestone to predominantly granite and becomes more exposed to the influences of the Southern Ocean.

The waters off the WCB 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 WA coast to a globally modest level (Molony et al. 2011). Weaker counter-currents on the continental shelf (shoreward of the Leeuwin Current), such as the Capes Current that flows northward from Cape Leeuwin as far as Shark Bay, occur during summer and influence the distribution of many of the coastal finfish species.

Two significant marine embayment's in the WCB are Cockburn Sound and Geographe Bay. The Abrolhos Islands also represent a significant area for its biological and social significance.

2.2 Indicator Species

The two indicator species selected for assessing the inshore demersal scalefish suite of species of the WCDSR are West Australian dhufish (dhufish - *Glaucosoma hebraicum*) and pink snapper (*Pagrus auratus*). Baldchin groper (*Choerodon rubescens*) is an indicator for Baldchin groper in only the Mid-West Area of the WCDSR. The three indicator species selected for

[2] *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.

assessing the offshore demersal scalefish suite of species of the WCDSR are hapuku (*Polyprion oxygeneios*), bass groper (*Polyprion americanus*) and blue-eye trevalla (*Hyperoglyphe antarctica*). These inshore and offshore demersal scalefish indicator species represent approximately 75% of the total demersal scalefish catch taken by all sectors from the WCDSR in 2017/18.

The performance of the fisheries against catch-management objectives and of the stocks against spawning biomass (*B*) and fishing mortality (*F*) based objectives in both the recovery and post-recovery harvest strategies are evaluated at the bioregion level for dhufish and pink snapper. Briefly, these two species are important in the fishery across all or most of the WCB. Thus catches and stock status are monitored at the bioregion (stock) level. Performance will also be assessed at the management area (assemblage) level if control rules around either the threshold or limit reference points are triggered, allowing status of assemblages at the smaller scale to be estimated. This is necessary because the commercial fisheries (i.e. WCDSIMF and TSFs) are prohibited from fishing in the Metropolitan Area and the size of the recreational sector differs among areas, resulting in different combinations of total fishing effort in each area.

The performance of the fisheries against catch-management objectives and of the stocks against spawning biomass (*B*) and fishing mortality (*F*) based objectives in both the recovery and post-recovery harvest strategies are evaluated at the Mid-West level for baldchin groper. Thus stock status is monitored at the Mid-West level while catches are monitored at the WCB and Mid-West levels. This is due to baldchin groper abundance being focussed in the Mid-West Area, including at the Abrolhos Islands.

2.2.1 Pink snapper

Pink snapper are distributed around southern Australia from northern Queensland to north-west WA (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 WA where six biological stocks/management units are currently recognised (Jackson et al. 2012). 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 41 years in the WCB), mature around 3-5 years of age and form spawning aggregations in embayment and coastal areas in the WCB (i.e. Cockburn Sound, Owen Anchorage and Warnbro Sound) and nearshore reefs during spring and summer. Under the Marine Stewardship Council (MSC) Standard, one generation time for pink snapper in the WCDSR is 14 years.

2.2.2 Dhufish

Dhufish are endemic to the south-western coast of WA, between Shark Bay and the Recherche Archipelago (~26ºS to 123ºE) (McKay 1997; Hutchins and Swainston 1999). Within this range, dhufish is most abundant in the WCB between the Abrolhos Islands and Cape Naturaliste (Lenanton et al. 2009). The stock structure of dhufish indicates geographic residency of adult dhufish in the different management areas of the WCB, with recruitment occurring primarily from adjacent multiple nurseries within this region (Fairclough et al. 2013). Small juveniles typically inhabit areas of sand inundated low profile reef (<50m depth) with larger juveniles

found over low-lying reef and will have recruited to the area where they will remain as adults (Fairclough et al. 2013). Dhufish are long-lived (~40 years), mature around 3-4 years of age and form complex social systems, spawning in pairs or small groups over reef from November to April (Lenanton et al., 2009; Mackie et al., 2009). Under the MSC Standard, one generation time for dhufish in the WCDSR is 12.5 years.

2.2.3 Baldchin groper

Baldchin grouper are endemic to WA, between Geographe Bay to Coral Bay (Allen, 2009). The stock structure of baldchin grouper consists of a single or a series of overlapping stocks within the WCB, with limited movement of adults and juveniles over one years old (Fairclough et al. 2011b). Baldchin grouper typically occur on, or in the vicinity of, benthic reef habitat. Baldchin grouper are a long-lived (~20 years) functional protogynous hermaphrodite, maturing as females around 3-4 years of age and undergoing sex change at 10-12 years (Fairclough 2005; Nardi et al. 2006). Spawning in the WCB occurs from July to January, peaking in November at the Abrolhos Islands (Fairclough 2005; Nardi et al. 2006). Under the MSC Standard, one generation time for baldchin groper in the WCDSR is 8.9 years.

2.3 Other Retained (Non-Indicator) Species

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 WCDSR is targeted by the commercial, recreational (including charter) and customary fishing sectors. These fishing sectors are managed by DPIRD under the following legislation:

- FRMA (will be replaced by the ARMA once enacted);
- *Fish Resources Management Regulations 1995* (FRMR);
- FRMA Part 6 — *West Coast Demersal Scalefish (Interim) Management Plan 2007*; *Cockburn Sound (Line and Pot) Limited Entry Fishery Notice 1995*; *Southern Demersal Gillnet and Longline Managed Fishery Management Plan 2018*; and *West Coast Demersal Gillnet and Demersal Longline Interim Managed Fishery Management Plan 1997*;
- Vessel Monitoring System (VMS) Approved Directions – *West Coast Demersal Scalefish Interim Managed Fishery Vessel Monitoring System Approved Directions*; *Southern Demersal Gillnet and Longline Managed Fishery Vessel Monitoring System Approved Directions*; and *West Coast Demersal Gillnet and Longline Interim Managed Fishery Vessel Monitoring System Approved Directions*;

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

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);

- WA *Marine Act 1982*;
- WA *Biodiversity Conservation Act 2016*; and
- WA *Conservation and Land Management Act 1984*.

2.4.2 Commercial fishing

Commercial line fishing in WCB is managed under the WCDSIMF. Demersal scalefish are caught using hydraulic or electric powered reels (up to 10 per vessels) rigged with up to 30 snoods and circle hook(s) baited with herring, mullet, sardines and squid.

The WCDSIMF commenced in 2008, following restructuring of the previous open access wetline fishery. The WCDSIMF operates between 26°30' south (north of Kalbarri) and 115°30' east (east of Augusta) (Fig. 3) and comprises four management areas, i.e. Kalbarri, Mid-West, Metropolitan and South-West. These Areas extend from the coast outwards to the boundary of the Australian Fishing Zone, with the exception of the Metropolitan Area which extends to a line which approximates the 200 m depth contour. The WCDSIMF was developed as a limited entry fishery, with initially only 61 permits allowed access to the fishery. Each of the four management areas is allocated a maximum number of annual hours of fishing time, with the Metropolitan Area currently allocated zero hours (i.e. fishing is not permitted). Units are allocated to permits and provide entitlement in "hours" of fishing time. The use of a VMS allows fishing effort to be monitored and entitlement use acquitted. The total capacity of the fishery, which can be adjusted by altering unit values as required, restricts fishing effort in the fishery. Gear and other restrictions apply (in the form of maximum numbers of lines and hooks that may be used and arrangements regulating the carriage of lines and fish), including minimum legal lengths for retention of species.

2.4.3 Recreational fishing

Recreational (and charter) fishing for demersal scalefish in the WCB is mostly line-based fishing from boats however, a small quantity is also taken by spear fishers. Fishers operate out of a large number of West Coast locations including Kalbarri, Geraldton, Dongara, Jurien Bay, Cervantes, Lancelin, Perth Metropolitan harbours, Mandurah, Bunbury, Busselton and Augusta and catch a similar range of demersal species as the commercial WCDSIMF.

Between 2011/12 and 2017/18, estimated recreational boat-fishing effort in the West Coast has ranged between approximately 717,000 hours and 821,000 hours fished (Ryan et al. 2020).

The WCB has the highest number of charter operators in WA, with limited entry arrangements introduced in 2001 (Department of Fisheries, 2012; Fletcher and Santoro, 2012). Logbooks became compulsory in 2002/03 and demonstrate an overall contraction in total charter effort and operational area of charter activity in the WCB since then. However, charter effort has been consistently high off Perth, Kalbarri and at the Abrolhos Islands.

2.4.4 Customary fishing

Limited information is available on the customary fishing for demersal scalefish in the WCB however, catches of demersal scalefish from oceanic waters are likely to be low.

2.5 Catch-Share Allocations

The allocation of aquatic fisheries resources in WA is currently undertaken in accordance with the Integrated Fisheries Management (IFM) Government Policy 2009 (IFM Policy). The IFM Policy sets out the information requirements, harvest levels, management, allocation processes compensation and funding. The IFM Policy also sets out nine guiding principles adopted as the basis for the IFM Policy and guide the allocation (or any reallocation) of an aquatic fisheries resource.

The WCDSR is fished by commercial and recreational (including charter) sectors under an explicit catch share allocation determined by the Minister for Fisheries on 12 December 2012 (Appendix 1; Figure 2). In accordance with the IFM Policy, this initial allocation is subject to review and reallocation from time to time. Business rules regarding the management of each sector within their allocation are outlined in Section 3.8.1.

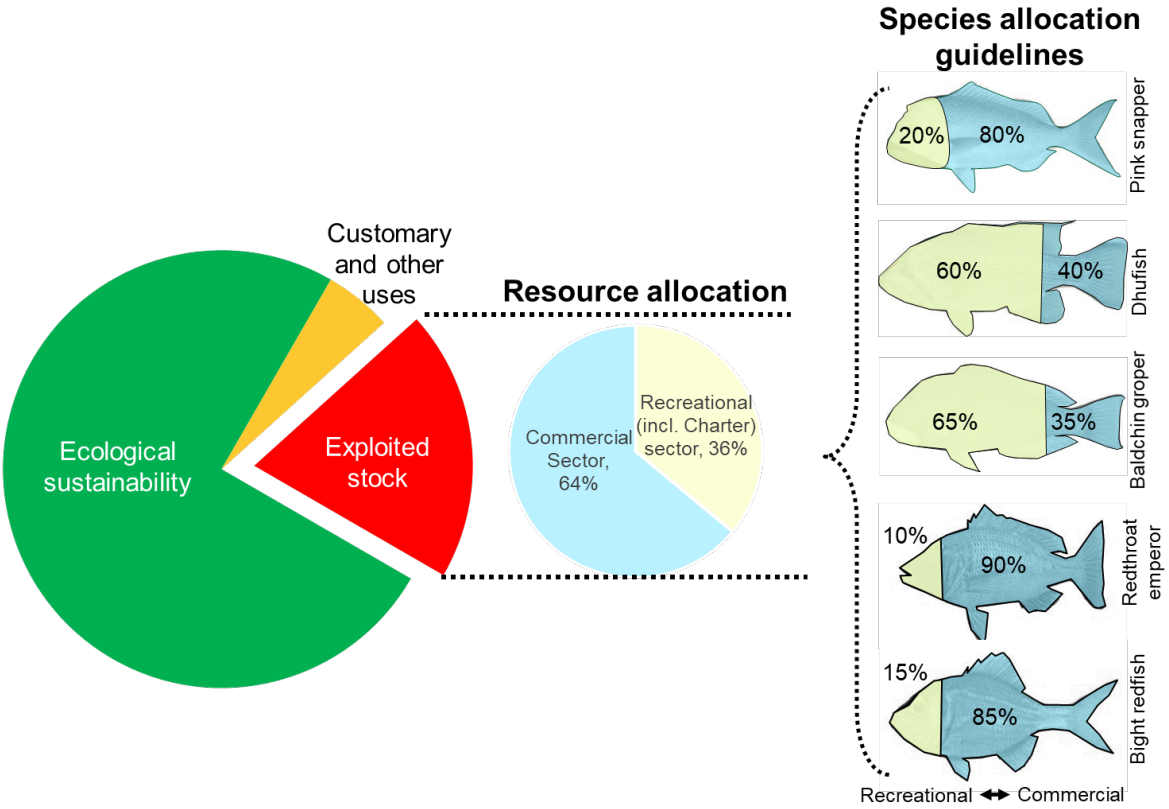

Figure 2. Current WCDSR resource allocation and key species allocation guidelines for the WCDSR as approved by the Minister for Fisheries.

3.0 HARVEST STRATEGY

This harvest strategy is structured to describe, hierarchically:

1. the high-level, long-term objectives of management (Section 3.1);
2. the short-term, operational objectives (Section 3.2); and
3. how these translate into the management approach used for this fishery (Section 3.3).

This is followed by a more detailed description of:

4. the harvest strategy procedures (Section 3.4);
5. the processes for assessing ecological sustainability (Section 3.5);
6. the recovery plan for WCDSR (Section 3.6);
7. the process for assessing fishery performance (Section 3.7); and
8. the specific monitoring and assessment procedures used to ascertain if objectives are being met (Section 3.8).

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 WCDSIMF and recreational and charter fisheries, as well as social and economic objectives for each fishing sector 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 above B_{MSY} to maintain high productivity and ensure the main factor impacting recruitment is the environment.
2. To ensure fishing impacts do not result in serious or irreversible harm to bycatch species populations.
3. To ensure fishing impacts do not result in serious or irreversible harm to ETP species populations.
4. To ensure the effects of fishing do not result in serious or irreversible harm to habitat structure and function.
5. To ensure the effects of fishing do not result in serious or irreversible harm to ecosystem structure and function.

3.1.2 Economic and Social Benefits

1. To provide flexible opportunities to ensure commercial fishers can maintain or enhance their livelihood (economic and social), within the constraints of ecological sustainability and catch share allocations, while having regard for the objectives of other fishing sectors;
2. To maintain and provide opportunity to maximise the flow of commercial fishing related economic benefit to the broader community within the constraints of ecological sustainability and catch share allocations, while having regard for the objectives of other fishing sectors;

3. To maintain or improve cultural, recreational and lifestyle benefits for recreational fishing participants within the constraints of ecological sustainability and catch share allocations, while having regard for the objectives of other fishing sectors;
4. To provide flexible opportunities to ensure charter operators can maintain or enhance their livelihood (economic and social), within the constraints of ecological sustainability and catch share allocations, while having regard for the objectives of other fishing sectors;
5. To maintain and provide opportunity to maximise the flow of recreational (including charter) fishing tourism related economic benefit to the broader community within the constraints of ecological sustainability and catch share allocations, while having regard for the objectives of other fishing sectors.

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. Identification of performance indicators enables performance to be assessed against pre-defined reference levels. Consequently, both the commercial and recreational fisheries that access the WCDSR have operational objectives designed to maintain each resource or component above the threshold level (and, where relevant, close to the target range or level), or to rebuild the resource if it has fallen below the threshold or the limit levels.

3.3 Overview of Management Approach

The regulatory harvesting system for the WCDSR is based on a *constant catch approach* (where catch is kept constant) when a stock is in recovery, and a *constant exploitation approach* (where the catch varies in proportion to variations in stock abundance) when a stock is above B_{MSY} (i.e. above the threshold).

In line with this harvesting approach, the WCDSIMF (main commercial fishery that targets the WCDSR) is primarily managed using input controls via an Individual Transferable Effort (ITE) system. Total Allowable Effort (TAE; i.e. hours) is allocated within the Kalbarri, Mid-West and South-West Areas of the WCDSIMF.

The recreational (including charter) fishery in the WCB is primarily managed using a combination of input (i.e. temporal and spatial closures) and output controls (i.e. size limits, daily bag limits, boat limits and possession limits, etc.). 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 licensed fisher(s). Charter operators are required to hold a Fishing Tour Operators Licence, which also enables passengers to fish without the need to hold an RFBL.

The decision-making process required to ensure the objectives are being met is framed around a series of linked procedures within the operational part of this harvest strategy.

3.4 Overview of Harvest Strategy Procedures

The procedures used within this harvest strategy involve two interrelated decision-making processes (see Figure 3 and Figure 4). The first is the formal, resource-level review process that, for the WCDSR, will be undertaken every 3 - 5 years. This assesses the current status of the resource against defined (target, threshold and limit) reference levels to determine the risks associated with each operational objective and therefore whether the current HCRs and their associated management arrangements are still appropriate. If the status falls outside the target reference level/range, HCRs are triggered and management adjustments/measures implemented to return the resource status back to the target range.

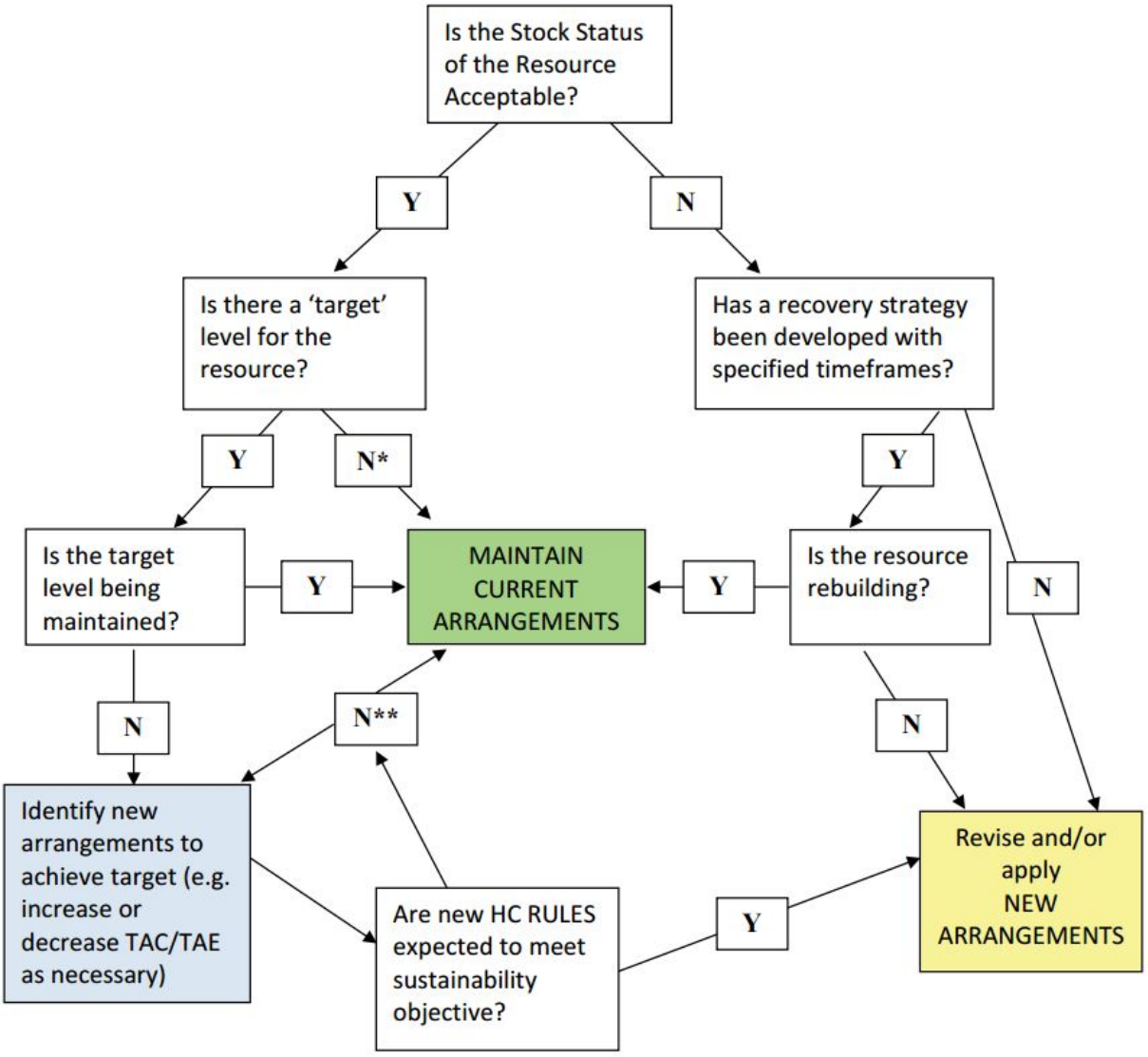

Figure 3. Decision tree for regular review of resource status (Source: Department of Fisheries 2015a). 'New arrangements' can include any activity associated with management process. * Not all operational objectives have target levels. ** The primary sustainability objective must be met.

The second process involves an annual, fishery-level review. This determines whether the current catch/effort by each of the relevant sectors is consistent with the levels defined (or expected) by the current HCRs and the status of the resource (i.e. the resource-level review process). If the annual (or when additional information becomes available) catch, effort and/or catch rate for one or more species/sectors falls outside of an annual tolerance range and cannot be adequately explained the performance is termed 'Unacceptable'. This result would generate a review that may lead to management adjustments, or the need for a re-assessment of the resource status and determine whether the current HCRs and their associated management arrangements are still appropriate. These are described in detail in the following sections.

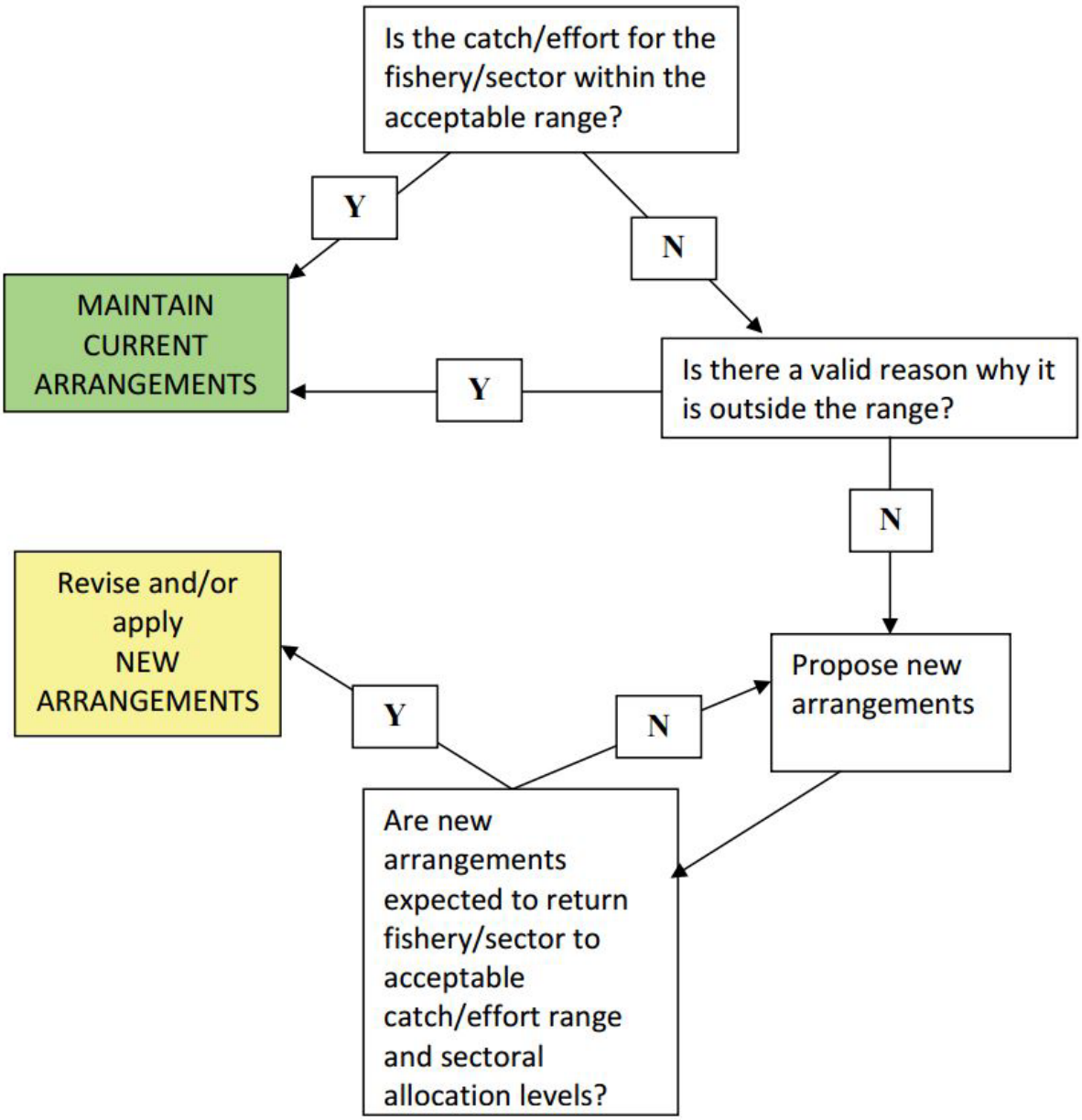

Figure 4. Decision tree for regular review of fishery status –based on allowable catch/effort tolerance levels and any sectoral allocation decisions (Source: Department of Fisheries 2015a).

3.5 Ecological Sustainability

To determine the resource status for demersal scalefish in the WCB, and other ecological assets, suitable indicators have been selected to describe performance in relation to each ecological management objective, with a set of reference levels established to separate acceptable from unacceptable performance. Where relevant, these levels include a:

- target level or range (i.e. where you want the indicator to be);
- threshold level (i.e. you review your position); and
- limit level (i.e. where you do not want the indicator to be and there is a significantly increased risk of recruitment impairment).

Harvest Control Rules (HCRs) define the management actions that relate to the status of each performance indicator compared to the reference levels (Section 3.5.3).

3.5.1 Performance Indicators and Reference Levels

3.5.1.1 Retained (Indicator and Non-Indicator) Species

The performance indicators used to evaluate the stock status of indicator species and non-indicator species in the WCDSR are Spawning Biomass (*B*) or an appropriate proxy (i.e. Spawning Potential Ratio; *SPR*) and Fishing Mortality (*F*) (see Table 1). For each stock, the performance indicator is estimated periodically (currently every 3 years) and compared to associated reference levels (Target, Threshold and Limit) consistent with those used by DPIRD in similar assessments and based on internationally accepted benchmarks for moderate to long-lived fish species (Caddy and Mahon 1995; Gabriel and Mace 1999; Mace 2001; Wise et al. 2007).

This harvest strategy aims to maintain the stock at a level above that at which Maximum Sustainable Yield (MSY) can be achieved, i.e. $B>B_{MSY}$. The life history characteristics of the indicator species for this fishery are commensurate with a steepness (of the stock recruitment relationship) of around 0.75. Investigation into the relationship between virgin biomass (B_0) and B_{MSY} for stocks with a range of steepness values around this level (0.6 to 1.0) indicates B_{MSY} is likely to be close to B_{30} (30% of unfished biomass) (N. Hall, unpublished). Accordingly, the B_{30} threshold level used for this fishery corresponds to B_{MSY}. By extension the B_{20} limit levels correspond to 0.67 B_{MSY}, which is more conservative than the 0.5 B_{MSY} level required for meeting the MSC standard.

The WCDSR Harvest Strategy Working Group (HSWG) was of the view that each fishing sector aspired for higher abundance of WCDSR and that the target reference level should be set somewhere between B_{40} and B_{60} (i.e. 1.33 B_{MSY} - 2 B_{MSY}). The HSWG recommended research be undertaken prior to the 5-year review of this Harvest Strategy to determine an appropriate target reference level within this range taking into consideration the views of each fishing sector. However, until this research is undertaken to refine the target reference level and remove any ambiguity, the HSWG has recommended the target reference level be set at B_{50} to reflect each sectors aspiration for higher abundance and to be more in line with other Australian jurisdictions.

In line with the ecological objectives of this harvest strategy, the reference levels and control rules act to maintain stocks of all retained species above BMSY, with management action triggered should they drop below this level. Any stock size above the B30 threshold is consistent with meeting the objectives for biological sustainability. Maintaining the stock at or above the B30 threshold is also sufficient to meet the stock status requirements as defined for purposes of certification under the MSC standard. Note that while being above the B_{MSY} threshold meets the objectives of this harvest strategy, the HSWG has proposed an additional step to aspire to increase Spawning Biomass (*B*) and Fishing Mortality (*F*) to the target reference level. From an ecological perspective, there would generally be no need to adjust management settings when Spawning Biomass (*B*) and Fishing Mortality (*F*) is between the threshold and target levels. However, if stock size exceeds the target reference level then there may be a need to review management settings to ensure other objectives are being met.

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

Table 1. Performance indicators and reference levels used to evaluate the status of indicator species and non-indicator species in the WCB.

	Reference Levels		
Performance Indicator	**Target**	**Threshold (B_{MSY})**	**Limit**
Spawning Biomass (*B*)	$B_{40\text{-}60}$	B_{30}	B_{20}
Spawning potential ratio (*SPR*)	$SPR_{40\text{-}60}$	SPR_{30}	SPR_{20}
Fishing mortality (F)	F = 2/3M	F = M	F = 1.5M

3.5.1.2 Total fishing mortality

A portion of catch is retained and landed and a portion of catch is released/discarded (dead or alive) before landing due to a range of reasons (i.e. regulations).

Post-release mortality refers to the portion of demersal scalefish that are released and subsequently die due to the impacts of fishing activities (although in the case of depredation, mortality may also occur during capture). The rate of post-release mortality is influenced by a range of factors including species biology (e.g. susceptibility to barotrauma), depth of capture, capture and handling practices, hooking injuries and shark depredation. The Department has developed three proposed post-release mortality categories for WCDSR species based on likely depth of capture, available scientific literature and anecdotal information from fishers:

1. Moderate – 25% post-release mortality rate (i.e. 25% of released fish die);
2. High – 50% post-release mortality rate (i.e. 50% of released fish die); and
3. Very High – 90% post-release mortality rate (i.e. 90% of released fish die).

Total fishing mortality accounts for the combined mortality associated with **both** retained catch and the proportion of released catch that dies (i.e. post-release mortality) generated by fishing activities (Figure 3). Calculation of total fishing mortality is outlined in section 6.2.

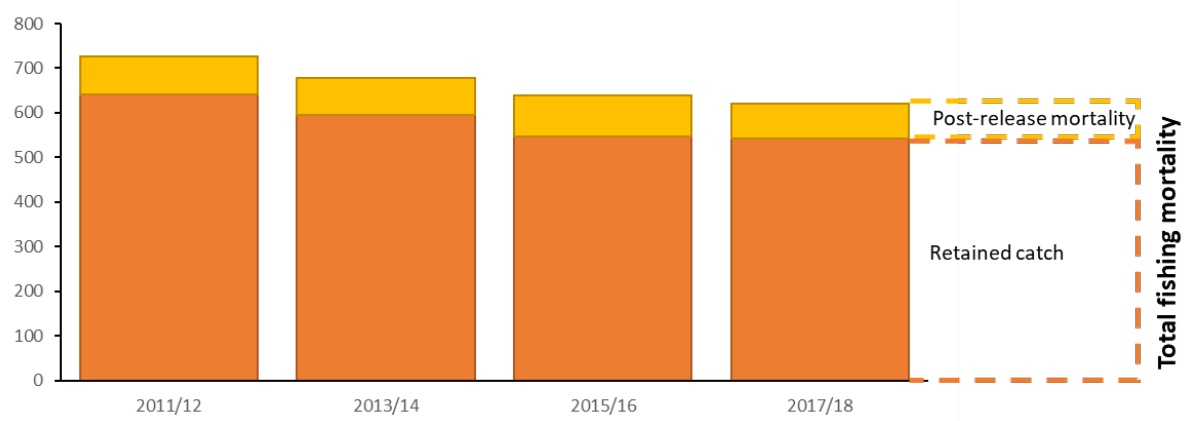

Figure 3. Example of the breakdown of WCDSR estimated total fishing mortality (retained catch + post-release mortality) by all fishing sectors. Orange boxes ( ) indicate estimated WCDSR retained catch by all fishing sectors and yellow boxes ( ) indicate estimated WCDSR post-release mortality by all fishing sectors.

3.5.1.3 Other Ecological Assets

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 line fishing by the commercial WCDSIMF 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 WCDSIMF 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, 2015).

3.5.2 Application of Harvest Control Rules

For each performance indicator and reference level there needs to be accompanying guidance that leads to management decisions and actions. HCRs are the key part of the harvest strategy for directing what management decisions need to be made to meet sustainability, economic and social objectives. Due to the inherent complexities of fisheries management, HCRs need to strike an appropriate balance. The HCRs cannot be overly explicit as this could hinder effective management; neither can they be overly vague, which could put the decision-making process at risk. 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. 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. Examples of potential management responses for the commercial fishery include reducing effort via unit value reductions, spatial, temporal or additional gear restrictions. Examples for the recreational fishery 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. Further information on the management measures in place for this fishery is provided in Section 4. The management objectives, performance indicators, reference levels and HCRs for the resource is provided in Table 3.

3.6 Recovery Plan 2010-2030

A resource that has fallen below the acceptable level and for which suitable management adjustments have been implemented to reduce catch and/or effort (as outlined in the HCRs) is considered to be in a recovery phase (Department of Fisheries 2012). For target stocks that fall below the limit reference level, a recovery strategy will be implemented to ensure that the resource can rebuild at an acceptable rate. Where the environmental conditions have led, or contributed significantly, to the resource being at an unacceptable level, the strategy needs to consider how this may affect the speed and extent of recovery.

A 2007 WCDSR stock assessment of indicator species dhufish, pink snapper and baldchin groper found that fishing mortality was above the F_{Limit} (Wise et al. 2007). Due to these species being relatively slow growing and long lived, a recommended outcome of this stock assessment was to reduce total fishing mortality by all sectors (recovery benchmarks) by 50-100% to allow the WCDSR to recover within 20 years.

Three key steps have been identified as part of the process to recover the WCDSR (Figure 4):

Step 1: Initiate recovery of the WCDSR (Milestone: All indicator species spawning biomass (*B*) and Fishing mortality (*F*) between Limit and Threshold by 2023).

Step 2: Recover the WCDSR (Milestone: All indicator species spawning biomass (*B*) and Fishing mortality (*F*) between the Threshold and Target by 2032).

Step 3: Build to the Target (Milestone: All indicator species spawning biomass (*B*) and Fishing mortality (*F*) to the Target).

Please note milestones are based on scheduled delivery timeframes for a WCDSR stock assessment (generally every 3 years) to ensure an estimate of spawning biomass and fishing mortality against the Target, Threshold and Limit reference points will be available and to ensure the recovery period is no longer than 20 years.

Two key strategies have been developed to support this recovery plan:

Strategy 1: Reduce total fishing mortality by an agreed level (50-100%); and

Strategy 2: Provide targeted protection for key spawning aggregations.

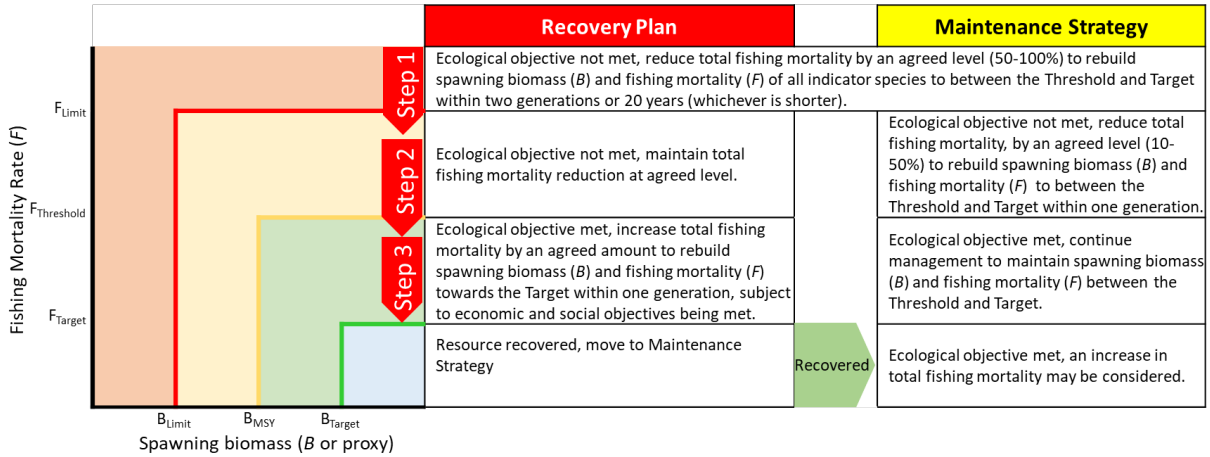

Figure 4. Graphical illustration of WCDSR harvest control rules when under the Recovery Plan or Maintenance Strategy of the Harvest Strategy.

3.6.1 Step 1: Initiate recovery to exceed the Limit

To initiate recovery of the WCDSR, it is a requirement of this Harvest Strategy to take appropriate management action as soon as practicable to reduce the fishing mortality by 50-100%, applicable to all fishing sectors, to enable a return to above the threshold within 2 generations or 20 years (whichever is shorter).

The 2007 WCDSR stock assessment recommended that at least a 50% reduction in fishing mortality was required to rebuild the WCDSR to between the Threshold and Target within 20 years. Major reform to both the commercial and recreational sectors to achieve at least a 50% reduction was completed by 2010 with the overall objective or recovering the WCDSR by 2030.

3.6.1.1 Step 1 Aim

To rebuild spawning biomass (*B*) and fishing mortality (*F*) of all WCDSR indicator species to between the Limit and Threshold by 2020 (i.e. by the 2023 WCDSR stock assessment).

3.6.1.2 Actions taken under Step 1

Since 2007, significant actions have been taken to reduce each sectors catch by at least 50% (Strategy 1) and provide targeted protection for key spawning aggregations (Strategy 2).

3.6.1.2.1 Strategy 1: Reduce total fishing mortality by 50-100%

To achieve the 50% reduction in fishing mortality, between 2007 and 2010, significant management action was undertaken to reduce both the commercial and recreational sectors retained catch by at least 50% (Table 2).

Table 2. Changes to the recreational and commercial sectors following reviews undertaken between 2008 and 2010 to reduce catch of demersal scalefish on the West Coast by at least 50%.

Measure	Recreational sector changes	Commercial sector changes
Licence framework	RFBL introduced	Introduced WCDSIMF management plan with limited entry arrangements (~1250 to 64 licences)
Spatial closures		Closed the Metropolitan Area to the WCDSIMF and the WCDGDLIMF
Limited effort	Introduced WCB demersal scalefish closure (15 October to 15 December)	Introduced ITE system limiting the number of fishing hours in each WCDSIMF area.
Bag limits	Reduced mixed daily bag limit (from 4 to 2). Reduced dhufish, blue groper, coral trout and coronation trout species daily bag limits (from 4 to 1)	
Boat limit	Introduced dhufish boat limit of 2 (6 on charter)	
Possession limit	Reduced Abrolhos Islands possession limit from 20 kg to 10 kg of fillets	
Fishing gear controls		Limited number of lines and hooks to be used on each vessel
	Requirement to carry a release weight on-board vessels fishing for demersal scalefish in the WCB.	
Size limits	Increased pink snapper minimum size limit South of Lancelin (40cm to 50cm)	

When reducing each sectors catch between 2007 and 2010, it was assumed that reducing each sectors retained catch by at least 50% would achieve a reduction in each sectors total fishing mortality (retained catch + post-release mortality) by 50%. The HSWG have recommended that the recovery benchmarks change from being based on retained catch to total fishing mortality (retained catch + post-release mortality). Revised recovery benchmarks for each sector/fishery and harvest control rules to maintain each sectors total fishing mortality below their recovery benchmarks are outlined in section 3.7.1.

3.6.1.2.2 Strategy 2: Provide targeted protection for key spawning aggregations

Where appropriate, protection of indicator species key spawning aggregations will be considered to help fast track the recovery of the WCDSR. Key aggregations of pink snapper in Cockburn and Warnbro Sounds and baldchin groper at the Abrolhos Islands are currently protected during their peak spawning periods to provide additional protection from exploitation and is likely to also be assisting in their recovery.

The following changes have occurred to the Cockburn and Warnbro Sounds pink snapper spawning closure to provide additional protection for these important spawning aggregations under step 1:

- In 2007, the closure period was extended from 1 October to 15 December to 1 October to 31 January.
- In 2019, the closure period was extended from 1 October to 31 January to 1 September to 31 January and the area of the closure was extended north to Fremantle Fishing Boat harbour and West to the inside of Five Fathom Bank.

3.6.1.3 When is further action required under Step 1

3.6.1.3.1 Further action required if milestone 1 is not achieved or likely to be achieved

If spawning biomass (*B*) and fishing mortality (*F*) of all WCDSR indicator species are not between the Limit and Threshold, or likely to be between the Limit and Threshold by 2020 (i.e. by the 2023 stock assessment), reduce recovery benchmarks for all sectors by a further 50-100% to rebuild spawning biomass (*B*) and fishing mortality (*F*) to between the Threshold and Target by 2030 (i.e. 2032 WCDSR stock assessment). Management action applicable to each sector should be undertaken as soon as practicable to reduce total fishing mortality below their recovery benchmark.

3.6.1.3.2 Further action required if a sector exceeds its recovery benchmark

In the event that a sector exceeds its recovery benchmark, a review is to be completed as soon as practicable. Appropriate management action will be undertaken as soon as practicable to reduce that sectors fishing mortality below their recovery benchmark (See section 3.8 for further information).

3.6.1.3.3 Further action required if effort or catch increases in key spawning aggregations

To ensure the integrity of the Cockburn and Warnbro Sounds pink snapper spawning closure and the Abrolhos Islands baldchin groper closure to provide targeted protection of key spawning aggregations in the WCB, further action is required if any sector increases:

1. Effort resulting in increased incidental catch of spawning fish within a closure; or
2. Targeting of key spawning aggregations outside existing closure periods or areas.

In the event that effort by a sector increases within one of these spawning closures, a review is to be completed as soon as practicable. If deemed appropriate, appropriate management action will be taken as soon as is practicable to provide targeted protection of that key spawning aggregation.

3.6.2 Step 2: Recover the WCDSR to exceed the Threshold

3.6.2.1 Step 2 Aim

To rebuild spawning biomass (*B*) and fishing mortality (*F*) of all WCDSR indicator species to between the Threshold and Limit by 2030 (i.e. by the 2032 WCDSR stock assessment).

3.6.2.2 Proposed actions under Step 2

3.6.2.2.1 Strategy 1: Maintain each sectors total fishing mortality below their recovery benchmark

Under Step 2, management and recovery benchmarks should be maintained from Step 1 to allow the WCDSR to continue to rebuild to achieve milestone 2 by 2030.

3.6.2.2.2 Strategy 2: Provide targeted protection for key spawning aggregations

Under Step 2, the level of protection of key spawning aggregations should be maintained from Step 1 to allow the WCDSR to continue to rebuild to achieve milestone 2 by 2030.

3.6.2.3 When is further action required under Step 2

3.6.2.3.1 Further action required if milestone 2 is not achieved or likely to be achieved

If spawning biomass (*B*) and fishing mortality (*F*) of all WCDSR indicator species is not between the Threshold and Limit, or likely to be between the Threshold and Limit by 2030 (i.e. by the 2032 stock assessment), reduce recovery benchmarks for all sectors by a further 10-50% to rebuild spawning biomass (*B*) and fishing mortality (*F*) to between the Threshold and Target by 2030 (i.e. 2032 WCDSR stock assessment). Management action applicable to each sector should be undertaken as soon as practicable to reduce total fishing mortality below their recovery benchmark.

3.6.2.3.2 Further action required if a sector exceeds its recovery benchmark

In the event that a sector exceeds its recovery benchmark, a review is to be completed as soon as practicable. Appropriate management action will be undertaken as soon as practicable to

reduce that sectors fishing mortality below their recovery benchmark (See section 3.8 for further information).

3.6.2.3.3 Further action required if effort or catch increases in key spawning aggregations

To ensure the integrity of the Cockburn and Warnbro Sounds pink snapper spawning closure and the Abrolhos Islands baldchin groper closure to provide targeted protection of key spawning aggregations in the WCB, further action is required if any sector increases:

3. Effort resulting in increased incidental catch of spawning fish within a closure; or
4. Targeting of key spawning aggregations outside existing closure periods or areas.

In the event that effort by a sector increases within one of these spawning closures, a review is to be completed as soon as practicable. If deemed appropriate, appropriate management action will be taken as soon as is practicable to provide targeted protection of that key spawning aggregation.

3.6.3 Step 3: Build to the Target

3.6.3.1 Step 3 Aim

To rebuild spawning biomass (*B*) and fishing mortality (*F*) of all WCDSR indicator species to the Target within one generation, subject to economic and social objectives being met.

Under step 3, the Department will undertake a review in consultation with the HSWG to consider the appropriate levels of total fishing mortality and spawning protection required to allow WCDSR indicator species to rebuild to the Target, subject to economic and social objectives being met.

Table 3. Harvest Strategy reference levels and control rules for WCDSR retained (indicator and non-indicator) species when under recovery and other ecological assets that may be impacted by fishing activities undertaken by commercial and recreational fishers while targeting demersal scalefish. Note that only the impacts of the WCDSIMF and recreational (including charter) fishing on ecological assets, other than the retained (indicator and non-indicator) species, are currently assessed within this harvest strategy.

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
Indicator species	To maintain spawning stock biomass of each retained species above B_{MSY} to maintain high productivity and ensure the main factor impacting recruitment is the environment.	Inshore demersal scalefish suite indicator species: Pink snapper Dhufish Baldchin groper (Mid-West only)	Periodic estimates of spawning biomass (*B*, or appropriate proxy) and Periodic estimates of fishing mortality (*F*)	**Target:** B_{Target} and F_{Target}	Once the Threshold is exceeded for all indicator species, undertake a review to consider appropriate recovery benchmarks to allow all indicator species to rebuild to the Target within one generation, subject to economic and social objectives being met. Appropriate management action will be taken as soon as is practicable to adjust total fishing mortality to meet revised recovery benchmarks.
				Threshold: B_{MSY} and $F_{Threshold}$	If the Threshold continues to be breached[3] or is likely to still be breached by 2030 (2032 stock assessment) by any indicator species a management review will be completed as soon as practicable to reduce recovery benchmarks by an agreed level (10-50%) and develop a management response. Appropriate management action will be taken as soon as is practicable to reduce total fishing mortality below revised recovery benchmarks, applicable to all fishing sectors, to enable a return to above the threshold by 2030.
				Limit: B_{Limit} and F_{Limit}	If the Limit[3] continues to be breached (by any indicator species) or is likely to still be breached by 2020 (2023 stock assessment), a review will be initiated immediately and completed as soon as practicable to reduce recovery benchmarks by an agreed level (50-100%) and to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce total fishing mortality below revised recovery benchmarks, applicable to all fishing sectors, to enable a return to above the threshold by 2030.

[3] For indicator species, the Threshold and Limit levels are considered breached when there is greater than a 20% probability that these levels have been exceeded. That is, the 20th percentile of a distribution of the estimated performance indicator (i.e. the lower bound of a 60% confidence interval) falls below the Threshold or Limit level.

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
Indicator species	To maintain spawning stock biomass of each retained species above B_{MSY} to maintain high productivity and ensure the main factor impacting recruitment is the environment.	Offshore demersal scalefish suite indicator species: Bass groper Blue-eye trevalla Hapuku	Periodic estimates of spawning biomass (B, or appropriate proxy) and Periodic estimates of fishing mortality (F)	**Target:** B_{Target} and F_{Target} **Threshold:** B_{MSY} and $F_{Threshold}$ **Limit:** B_{Limit} and F_{Limit}	Continue management aimed at achieving ecological, economic and social objectives. If the Threshold is breached[4] by any indicator species a management review completed as soon as practicable to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total fishing mortality by 10 to 50%, applicable to all fishing sectors, to enable a return to above the threshold within one generation. If the Limit[3] is breached (by any indicator species), a review will be initiated immediately and completed as soon as practicable to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total fishing mortality by 50 to 100%, applicable to all fishing sectors, to enable a return to above the threshold within one generation.
Retained species	To manage each sectors total fishing mortality (retained catch + post-release mortality) below each sectors recovery benchmark and in line with catch share allocations (where applicable)	Commercial sector: Total demersal scalefish Recreational (including charter) sector: Top 15 species Key species: Dhufish Pink snapper Baldchin groper Bight redfish	Total fishing mortality (retained catch + post-release mortality) for each sector	**Target Range:** Between Recovery Benchmark and Lower Tolerance **Lower Tolerance:** ≤75% of recovery benchmark	Continue management aimed at achieving ecological, economic and social objectives. A review is triggered to investigate the reasons for the low total fishing mortality as soon as practicable. If sustainability is identified as the reason, implement an appropriate management response to reduce the risk to an acceptable level as soon as practicable. This may include additional monitoring and/or undertaking a spawning biomass/fishing mortality assessment. If social or economic impacts are identified as the reason, implement an appropriate management response (where possible) to meet social and/or economic objectives as soon as practicable.

[4] For indicator species, the Threshold and Limit levels are considered breached when there is greater than a 20% probability that these levels have been exceeded. That is, the 20th percentile of a distribution of the estimated performance indicator (i.e. the lower bound of a 60% confidence interval) falls below the Threshold or Limit level.

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
		Redthroat emperor Breaksea cod		**Recovery benchmark:** Recovery benchmark$_{Commercial}$ Recovery benchmark$_{Recreational}$ (refer to section 4.1.1.)	If a sectors Recovery Benchmark is breached[4], a review will be initiated immediately and completed as soon as practicable to develop a management response. Management action will be taken as soon as is practicable to reduce the total fishing mortality by that sector below their Recovery Benchmark.
Retained non-indicator species	To maintain spawning stock biomass of each retained species above B_{MSY} to maintain high productivity and ensure the main factor impacting recruitment is the environment.	Non-indicator species (additional monitoring may be periodically undertaken to facilitate 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.	Continue management aimed at achieving ecological, economic and social objectives.
				Threshold: $B_{Threshold}$; and Fishing impacts are considered to generate an undesirable level of risk to any species' populations, i.e. high risk.	If the Threshold is breached a management review will be completed as soon as practicable to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total mortality by an agreed level (10 to 50%), applicable to all fishing sectors, to enable a return to above the threshold within one generation.
				Limit: B_{Limit}; and Fishing impacts are considered to generate an unacceptable level of risk to any species' populations, i.e. severe risk.	If the Limit is breached, a review will be initiated immediately and completed as soon as practicable to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total fishing mortality by an agreed level (50 to 100%), applicable to all fishing sectors, to enable a return to above the threshold within one generation.
Bycatch (non-ETP species)	To ensure fishing impacts do not result in serious or irreversible harm to bycatch	All bycatch species (commercial and recreational sector)[5]	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.	Continue management aimed at achieving ecological, economic and social objectives.

[5] Note that only the impacts of line fishing on ecological assets other than the retained species are currently assessed within this harvest strategy.

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
	species populations.		information and available research	**Threshold:** A potential material change to risk levels is identified; or fishing impacts are considered to generate an undesirable level of risk to any bycatch species' populations, i.e. high risk.	Review the reasons for this variation as within 3 months and implement an appropriate management response to reduce the risk to an acceptable level as soon as practicable.
				Limit: Fishing impacts are considered to generate an unacceptable level of risk to any bycatch species' populations, i.e. severe risk.	Initiate an immediate management response to reduce the risk to an acceptable level as soon as practicable.
ETP species	To ensure fishing impacts do not result in serious or irreversible harm to ETP species populations.	All ETP species[6]	Periodic risk assessments incorporating current management arrangements, number of reported interactions, species information and available research.	**Target:** Fishing impacts expected to generate an acceptable risk level to ETP species' populations, i.e. moderate risk or lower.	Continue management aimed at achieving ecological, economic and social objectives.
				Threshold: Fishing impacts are considered to generate an undesirable level of risk to any ETP species' populations, i.e. high risk.	Review the reasons for this variation as within 3 months and implement an appropriate management response to reduce the risk to an acceptable level as soon as practicable.

[6] Note that only the 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
				Limit: Fishing impacts are considered to generate an unacceptable level of risk to any ETP species' populations, i.e. severe risk.	Initiate an immediate management response to reduce the risk to an acceptable level as soon as practicable.
Habitats	To ensure the effects of fishing do not result in serious or irreversible harm to habitat structure and function.	All habitats[6]	Periodic risk assessments incorporating current management arrangements, extent of fishing activities, habitat distribution and available research.	**Target:** Fishing impacts are considered to generate an acceptable level of risk to all benthic habitats, i.e. moderate risk or lower.	Continue management aimed at achieving ecological, economic and social objectives.
				Threshold: Fishing impacts are considered to generate an undesirable level of risk to any benthic habitats, i.e. high risk.	Review the reasons for this variation as within 3 months and implement an appropriate management response to reduce the risk to an acceptable level as soon as practicable.
				Limit: Fishing impacts are considered to generate an unacceptable level of risk to any benthic habitats, i.e. severe risk.	Initiate an immediate management response to reduce the risk to an acceptable level as soon as practicable.
Ecosystem	To ensure the effects of fishing do not result in serious or irreversible harm to ecological processes.	Trophic interactions[7]	Periodic risk assessments incorporating current management arrangements, catch levels, extent of fishing activities, ecosystem	**Target:** Fishing impacts are considered to generate an acceptable level of risk to ecological processes within the ecosystem, i.e. moderate risk or lower.	Continue management aimed at achieving ecological, economic and social objectives.

[7] Note that only the 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
			information and available research.	**Threshold:** Fishing impacts are considered to generate an undesirable level of risk to any ecological processes within the ecosystem, i.e. high risk.	Review the reasons for this variation as within 3 months and implement an appropriate management response to reduce the risk to an acceptable level as soon as practicable.
				Limit: Fishing impacts are considered to generate an unacceptable level of risk to any ecological processes within the ecosystem, i.e. severe risk.	Initiate an immediate management response to reduce the risk to an acceptable level as soon as practicable.

3.7 Fishery Performance

Defining annual or periodic tolerance levels for fisheries provides a formal and efficient basis to evaluate the effectiveness of current management arrangements in delivering the levels of catch, total fishing mortality and/or effort specified by the HCRs and, where relevant, any sectoral allocation decisions (Fletcher et al. 2016). In line with the principles of ESD, this fishery-level review process can also consider the performance against any objectives relating to the economic and social amenity benefits of fishing. Where possible, and in due consideration of ecological sustainability, fisheries management arrangements can be adjusted or reformed to help meet these economic and/or social objectives.

3.7.1 Total Fishing Mortality Tolerance Levels

For the WCDSR, the catch tolerance ranges used to assess annual recreational (including charter) and commercial fishery performance within the WCDSRF are currently based on recovery benchmark levels and IFM allocations. The current catch tolerance ranges used to assess annual fishery performance are evaluated by comparing the total fishing mortality of demersal scalefish and each key species by each sector against their respective catch tolerance range. As part of the annual performance review, vulnerability of all species will be assessed (e.g. with regard to current management arrangements, catch levels, new species information).

For the WCDSR, the current total fishing mortality (retained catch + post-release mortality) tolerance ranges for each sector is currently defined as achieving between their recovery benchmarks and 75% of their recovery benchmarks. Recovery benchmarks are currently set based on 50% of 2005/06 levels of total fishing mortality for the WCDSR (Table 4) and key species (Table 5). Recovery benchmarks have been adjusted to conform to the WCDSR IFM allocation and species proportional allocation guidelines (see section 2.4.4 and section 6.1), with the exception of breaksea cod where no allocation guideline was provided for in the IFM determination and therefore remains proportional to 2005/06 levels (see section .1).

If a sector breaches a Tolerance Limit, a review is to be completed as soon as practicable to investigate options to adjust that sectors fishing mortality back within the tolerance range. The review process may identify a formal reallocation of the resource as a potential management option however, these would need to be progressed in accordance with the IFM policy. Appropriate management action will be taken as soon as is practicable to adjust that sectors catch back into the tolerance range.

If the status of the WCDSR changes such that the control rules trigger additional management adjustments or if the catch share allocations change into the future, the tolerance ranges must also be adjusted accordingly.

Table 4. Total fishing mortality (retained catch + post-release mortality) recovery benchmarks and lower tolerance range for the WCDSR.

Sector	Fishery	Lower tolerance	Recovery benchmark
Recreational sector (top 15 species)	Recreational boat based	172 tonnes	230 tonnes
	Charter	29 tonnes	40 tonnes
	Total recreational sector	201 tonnes	270 tonnes
Commercial sector	WCDSIMF	332 tonnes	437 tonnes
	Other WA commercial	31 tonnes	43 tonnes
	Total commercial sector	360 tonnes	480 tonnes

Table 5. Total fishing mortality (retained catch + post-release mortality) recovery benchmarks for key WCDSR inshore demersal scalefish species and the offshore demersal scalefish suite.

		Recreational sector		Commercial sector	
Suite	Species	Lower tolerance	Recovery Benchmark Recreational	Lower tolerance	Recovery Benchmark Commercial
Inshore demersal	Baldchin groper	30 tonnes	40 tonnes	17 tonnes	22 tonnes
	Redfish sp.	5 tonnes	7 tonnes	32 tonnes	42 tonnes
	Breaksea cod	11 tonnes	15 tonnes	2 tonnes	3 tonnes
	Dhufish	102 tonnes	136 tonnes	68 tonnes	91 tonnes
	Pink snapper	26 tonnes	35 tonnes	104 tonnes	138 tonnes
	Emperor sp.	8 tonnes	11 tonnes	77 tonnes	102 tonnes
Offshore demersal	Total offshore demersal suite of species	3 tonnes	5 tonnes	30 tonnes	40 tonnes

3.7.2 Economic and Social Benefits

Achieving economic and social benefits is intrinsic to the status of the WCDSR. The periodic and annual reviews of the WCDSR incorporate all available fishery-independent and fishery-dependent data for the stock, as well as environmental, economic and social information.

Specific performance indicators and reference levels to evaluate economic and social benefits have been developed for some of the economic and social operational objectives (see below). If the performance indicator for an economic and social operational objective is within the Target range, then the management response is to continue management aimed at achieving ecological, economic and social objectives. If the performance indicator for an economic and social operational objective has breached a Threshold level, then a review is triggered to investigate the reasons for the threshold reference level being breached. If possible, initiate commercial, recreational and/or charter initiatives aimed at moving the performance indicator back into the target range and/or review whether fisheries management arrangements impose constraints, for reasons other than ecological sustainability, that limit the ability to achieve that economic or social objective.

In line with the principles of ESD, this harvest strategy also includes objectives and performance indicators for the economic and social benefits of fishing which have been

developed by a stakeholder working group. 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 and while having regards to the objectives of other sectors.

3.7.2.1 Commercial Economic and Social Benefits

The economic and social benefit operational objectives for the commercial WCDSIMF are to:

1. provide for the maximum economic efficiency so that sustainable catch for the WCDSIMF maximises profits or creates the largest difference between total revenues and the total cost of fishing; and
2. maintain or provide opportunity to maximise the flow of commercial fishing related economic and social benefit to the broader community.

The percent of annual entitlement (in hours) used in the WCDSIMF has been chosen as a performance indicator to evaluate whether commercial fishers in the WCDSIMF have been able to maximise their economic efficiency. Percentage of annual entitlement used is calculated by dividing the total number of hours utilised in each management area of the WCDSIMF by the total capacity of hours available in each area of the WCDSIMF in that year. The target reference level ($Efficiency_{Target}$)has been set at equal to or above 75% of entitlement being utilised each year.

No performance indicators or reference levels currently exist to evaluate flow of commercial fishing related economic benefit to the broader community. It is envisaged that this objective will be measured using socio-economic surveys in the future.

3.7.2.2 Recreational (including Charter) Sector Economic and Social Benefits

The economic and social benefit operational objectives for the recreational fishing sector are to:

1. maintain or improve cultural and recreational lifestyle benefits for recreational fishing participants; and
2. maintain or provide opportunity to maximise the flow of recreational fishing tourism related economic benefit to the broader community.

Recreational boat-based fishing participation (hours fished) has been chosen as a performance indicator used to measure whether cultural and recreational lifestyle benefits have been maintained or improved. Recreational boat based participation has been estimated through four state-wide boat-based recreational fishing surveys completed in 2011/12 (Ryan et al. 2013), 2013/14 (Ryan et al. 2015), 2015/16 (Ryan et al. 2017) and 2017/18 (Ryan et al. 2019). The target reference level ($Participation_{Target}$) has been set at 820,693 hours fished, the upper participation estimate for recreational boat fishing for demersal scalefish in the West Coast Bioregion from the 2011/12-2017/18 surveys. The threshold reference level ($Participation_{Threshold}$) is set at ± 20% the target.

The economic and social benefit objectives for the charter fishing sector are to provide flexible opportunities to ensure fishing tour operators can maintain or enhance their livelihood. Fishing tour participation (client days) has been chosen as the performance indicator to evaluate

whether this objective is being met. Fishing tour participation has been recorded through statutory logbook information since 2002. The target reference level (Client Days$_{Target}$) has been set at the 10-year average (2009 to 2018) of 27,901 client days, with the threshold reference level (Client Days$_{Threshold}$) set at ± 20% of the target.

No performance indicators or reference levels currently exist to evaluate whether the recreational and charter fishing tourism related economic benefits are being maximised. It is envisaged that this objective will be measured using socio-economic surveys in the future.

3.7.3 Unacceptable Performance Review Timelines

The fishing mortality tolerance levels are reviewed annually (i.e. commercial and charter) or periodically (i.e. recreational surveys) and published in the State of Fisheries and Aquatic Resource Report and in DPIRD's Annual report to the WA Parliament (see Section 3.7.3). Where one or more unacceptable performance levels have been identified, a review is to be completed, and outcomes implemented as soon as is practicable.

3.8 Monitoring and Assessment Procedures

3.8.1 Information and Monitoring

3.8.1.1 Commercial catch and effort information

Commercial catch and effort in the WCDSIMF has been monitored using statutory daily/trip logbooks (reporting blocks 10 x 10 nautical miles) and VMS has been used to monitor fishing activity since 2008. Monitoring of catch and effort data from compulsory logbooks is conducted annually for each of the commercial fisheries that exploit the WCDSR (i.e. TSFs, WCRLMF, CSLPF and SWTMF). Commercial discard rates are monitored periodically using voluntary logbooks and on board observers.

3.8.1.2 Recreational catch and effort information

Estimates of recreational fishing effort and demersal scalefish catches and releases on the WCB are available from a number of recreational fishing surveys undertaken by DPIRD, including four creel surveys of boat-based recreational fishing in the West Coast in 1998/99, 2005/06, 2008/09 and 2009/10 (Lai et al. 2019). More recently, a periodic state-wide survey providing a broader-scale and an integrated system involving several survey methods has been used to estimate effort and catch by boat-based recreational fishers in WA (Ryan et al. 2013). Four state-wide recreational fishing surveys have been completed to date using this methodology, in 2011/12 (Ryan et al. 2013), 2013/14 (Ryan et al. 2015), 2015/16 (Ryan et al. 2017) and 2017/18 (Ryan et al. 2019).

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

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

3.8.1.3 Economic and social benefits

The percentage of annual entitlement used in the WCDSIMF is monitored through DPIRD's VMS system (see section 4.2.1.2) and annual report is provided to WCDSIMF licence holders at their management meeting.

DPIRD's biennial/triennial survey of boat-based recreational fishing collects economic and social information including expenditure data and recreational fisher satisfaction. This information will be investigated to determine appropriate indictors for social and economic objectives in the future.

3.8.1.4 Fishery independent and dependent catch sampling

Biological monitoring is currently either using or exploring the following fishery dependent and independent methods:

- Monitoring of fishery-dependent length and age composition data from fish sampled from both commercial and recreational sectors in each Management Area on a monthly basis over a three-year period (for more detail about the sampling regimes, see Fairclough et al. 2014). Age composition data are used to assess the status of stocks via estimation of fishing-mortality rates with reference to recovery strategy reference points as described in Section 3.5, Section 3.6 and Fairclough et al. (2014).
- Fishery-independent ichthyoplankton surveys are conducted periodically in Cockburn and Warnbro Sounds and Owen Anchorage where pink snapper aggregate to spawn each spring.
- An annual fisheries-independent Baited Remote Underwater Video survey is being used to monitor recruitment strength of pink snapper at the new recruit (0+) stage in Cockburn and Warnbro Sounds and Owen Anchorage. Once sufficient years of data are available, these will be used to compare with recruitment variation in the age structure data, to egg abundance from the above surveys and trawl surveys conducted in Cockburn Sound for blue-swimmer crabs which also collect 0+ recruits of pink snapper.
- Monitoring of fishery-independent length and age composition data from fish sampled from each Management Area may be conducted over the next 5 years to compare against fishery-dependent data.

3.8.2 Assessment procedures

The different methods used by DPIRD 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 DPIRD take a risk-based, weight of evidence approach that considers all of the available (fishery-dependent and fishery-independent) information (Fletcher 2015).

3.8.2.1 Indicator species

In the absence of direct estimates of spawning stock biomass, the stock status of dhufish, pink snapper and baldchin groper in the WCB is assessed primarily based on estimated spawning biomass or proxies for biomass, e.g. SPR (Goodyear 1993) and / or fishing mortality from catch curve and per-recruit analyses. The estimates are periodically compared to specified reference points (Table 1) for the stock.

3.8.2.2 Non-indicator species

In the absence of direct estimates of spawning stock biomass, the stock status of non-indicator species in the WCB is assessed primarily based on estimated proxies for biomass, e.g. SPR (Goodyear 1993) and / or fishing mortality from catch curve and per-recruit analyses. The estimates are periodically compared to specified reference points (Table 1) to determine the status of each stock.

3.8.2.3 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 WCDSIMF and the recreational (and charter) fishing sector on these ecological components are currently assessed within this harvest strategy.

Due to the highly selective nature of line fishing, bycatch and interactions with ETP 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).

3.8.2.4 Economic and social benefits

Economic and social benefit objectives, and their associated performance indicators and controls continue to be developed for WA commercial and recreational fisheries. Provisional economic and social benefit objectives and associated performance indicators and control rules have been developed for the WCDSR by the HSWG with representation from the Western Australian Fishing Industry Council (WAFIC), Recfishwest, Marine Tourism WA, commercial, recreational and charter fishers and DPIRD.

The working group selected % of annual entitlement utilised as a performance indictor for the WCDSIMF on the basis that it can be influenced by factors such as catch rates, economic return from the fishery, continuity of supply and annual 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 in the West 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 numbers) was selected as the 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.

3.8.3 Reports and publications

Information on the current status of WA fisheries and aquatic resources is reported annually in the 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 publiclyavailable documents, including:

- DPIRD's Annual Report to Parliament; and
- Fisheries Research Reports, Fisheries Management Papers, Fisheries Occasional Publications, Fisheries Research Updates and peer-reviewed scientific journal articles.

4.0 MANAGEMENT MEASURES AND IMPLEMENTATION

There are a number of management measures in place for managing the WCDSR (Table 6). These measures can be amended as needed to ensure the management objectives are achieved; however, these do not preclude the consideration of other options.

Table 6. Management measures and instrument of implementation for the WCDSR.

Measure	Description	Instrument
Entitlement System	The WCDSIMF is managed via an ITE system, with separate TAE's for the Kalbarri, Mid-West and South West Areas. A minimum debit rule for each fishing trip applies in each management Area as follows: • Kalbarri Area: 20 hours • Mid-West Area: 12 hours • South-West Area: 8 hours	WCDSIMF Management Plan
Licence Requirements	Operators in the commercial WCDSIMF must hold an Interim Managed Fishery Permit (renewed annually). Operators in the commercial WCDGDLIMF must hold an Interim Managed Fishery Permit (renewed annually). Operators in the commercial SDGDLF must hold a Managed Fishery Licence (renewed annually). Recreational fishers must hold a RFBL if fishing for demersal scalefish from a boat (renewed annually). Charter operators must hold a Fishing Tour Operators Licence (renewed annually).	WCDSIMF Management Plan; WCDGDLIMF Management Plan; SDGDLF Management Plan; FRMR
Bag and possession limits	Daily recreational bag limits apply for all demersal species. A boat limit also applies to dhufish. 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 WCDSIMF are only permitted to fish using handlines and droplines. Commercial fishers are permitted to use up to 10 lines per vessel and must have VMS installed. Operators in the commercial TSFs are permitted to fish using demersal gillnets and demersal longlines. Recreational fishers are permitted to catch demersal scalefish by hook and line (up to three hooks per line) or by pointed instrument.	WCDSIMF Management Plan; TSFs Management Plans; Approved Directions; FRMR
Processing restrictions	All caught fish must be landed whole or trunked/filleted with a minimum length of 300 mm and skin and scales attached.	WCDSIMF Management Plan; Instrument of Exemption; 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).	WCDSIMF Management Plan; FRMR

Measure	Description	Instrument
Size Limits	Minimum size for: • pink snapper 410 mm (Total Length – TL); • dhufish 500 mm TL • baldchin groper 400 mm TL	FRMR
Spatial Closures	Commercial closures: Metropolitan Area, and Commonwealth Marine Reserve waters. Recreational and commercial closures: Marine Park sanctuary zones. Recreational closures: Blue groper protected at Rottnest Island.	WCDSIMF Management Plan; FRMR Marine Park Orders
Temporal Closures	Recreational and commercial closures: Cockburn Sound and Warnbro Sound snapper closure; Abrolhos Islands baldchin groper closure. Recreational closures: WCB Demersal scalefish closure.	FRMR; Prohibition 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 WCDSR:

- 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 Recovery benchmark setting and sectoral allocations

The recovery benchmark setting and review process for the WCDSR and its allocation between sectors is undertaken by DPIRD based on research advice and in consultation with key stakeholders in accordance with the control rules outlined in this harvest strategy (see Table 3). During this process consideration is also given to the fishery performance (see Section 3.6), and the economic and social benefit objectives. Once the recovery benchmark is set, the WCDSR recovery benchmark is allocated between sectors (and intra-sectoral proportions within sectors where relevant) in accordance with the IFM allocation (Figure 5). Please note that if the WCDSR recovery benchmark is adjusted for sustainability reasons or due to a reallocation of sectoral catch shares, key species recovery benchmarks should also be adjusted proportional to the WCDSR recovery benchmark adjustment.

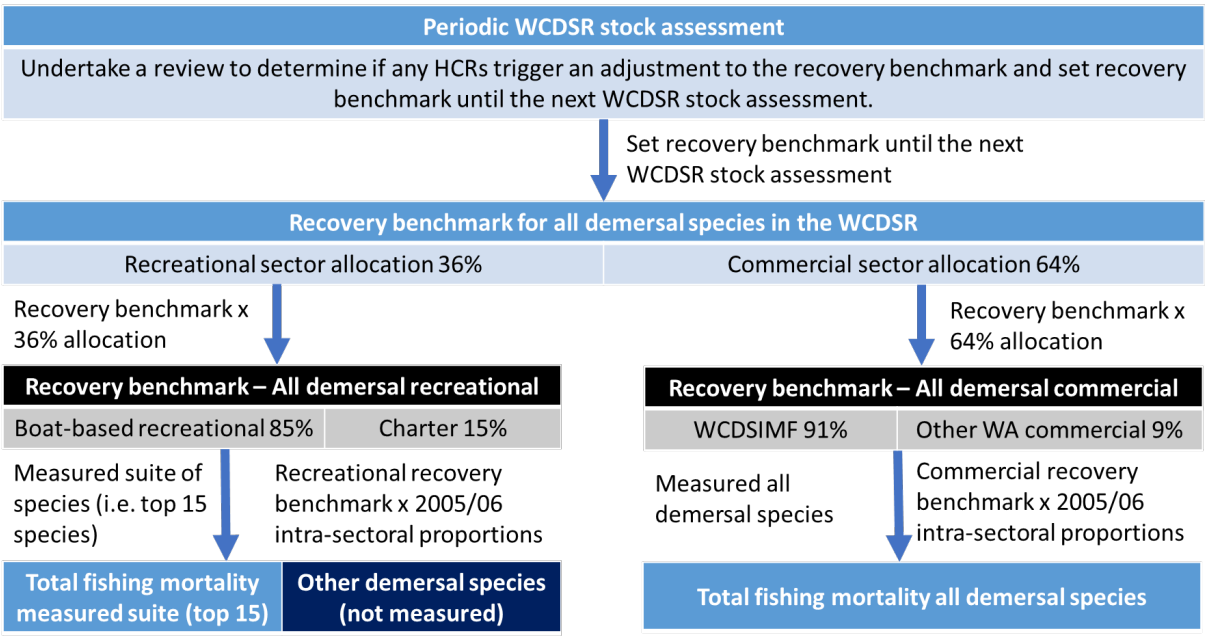

Figure 5. Allocation of WCDSR recovery benchmarks in accordance with IFM allocation. Note that the top 15 species is used to monitor the recreational sector total fishing mortality against its recovery benchmark.

Recovery benchmarks are reviewed following each periodic age-based assessment of indicator species. Where the performance indicator (i.e. spawning biomass and fishing mortality) triggers management action, the recovery benchmarks should be adjusted to give effect to the relevant HCRs.

The capacity for the WCDSIMF is contained in the management plan. A change in capacity is given effect through an amendment to the management plan following statutory consultation with licence holders and the approval of the Minister for Fisheries. Changes in capacity of other commercial fisheries that access the resource (such as TSFs) follow a similar process.

In the event that a change in the recovery benchmark causes a sector(s) total fishing mortality level to breach that recovery benchmark, a review and action should be undertaken in accordance with the control rules outlined in section 3.7.

4.1.2 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. DPIRD is the primary source of management advice; and
2. Peak Bodies (WAFIC and Recfishwest) are the primary source of industry advice and representation.

Under a funding agreement, the Peak Bodies are funded by Government to undertake their representation/advisory and consultation roles.

4.1.2.1 Commercial Sector Consultation

Under its funding agreement with DPIRD, 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 for Fisheries to consult with affected parties when changes to a management plan are being considered. In the case of the WCDSIMF, this includes all permit holders. Management meetings between DPIRD, WAFIC and licence holders are generally held in September-November and are used as the main forum to consult with stakeholders and licence holders on the management of the fishery. During these meetings, DPIRD 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 TAE. Follow-up meetings may be held as required.

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

4.1.2.1.1 TAE Setting and Review Process

The capacity setting and review process Total Allowable Effort (TAE) in each Area of the WCDSIMF is undertaken by DPIRD based on research advice and in consultation with WCDSIMF licence holders in accordance with the controls rules outlined in this harvest strategy (see Table 3). During this process consideration is also given to the fishery performance (see Section 3.6), and the economic and social benefit objectives.

The capacity (TAE) for each Area of the WCDSIMF is reviewed following each periodic age-based assessment of indicator species. Where the performance indicator (spawning biomass and fishing mortality) triggers management action and recovery benchmarks are adjusted to give effect to the relevant HCRs, the TAE may be adjusted to meet any changes to recovery benchmarks (Section 4.1.1).

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

4.1.2.2 Recreational Sector Consultation

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

The recreational (including charter) sector tolerance levels are reviewed following each periodic age-based assessment of indicator species. Where the performance indicator (spawning biomass and fishing mortality) triggers management action and recovery benchmarks are adjusted to give effect to the relevant HCRs, recreational fishers and charter operators will be consulted on management options to adjust total fishing mortality levels to meet the adjusted recovery benchmarks.

Recreational and charter management arrangements are generally contained in the FRMR and Orders. A change in any management arrangements to maintain fishing mortality within tolerance ranges is given effect through an amendment to the FRMR or relevant Order following public consultation and the approval of the Minister for Fisheries.

4.1.2.3 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 or interested parties is undertaken by DPIRD in accordance with the Stakeholder Engagement Guideline (Department of Fisheries 2016). DPIRD'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 and Enforcement

As the key regulatory agency, DPIRD's compliance role is to achieve sustainability, economic and social objectives by addressing:

- our ability and capacity to influence compliance with the rules; and
- the effectiveness, capacity and credibility of the compliance program.

The Western Australian Fisheries Compliance Strategy (the Strategy; DPIRD 2018) was published in 2018. The purpose of the Strategy is to provide an understanding of the principles underlying the DPIRD's compliance role and how its compliance services are delivered to the WA community. The Strategy aligns with, and complements, DPIRD's Compliance Framework and Risk Assessment Policy which informs the risk-based model, compliance planning and the governance structure applied to fisheries compliance services.

The Department's compliance model is based on the Australian Fisheries National Compliance Strategy 2016-2020 (the National Strategy). DPIRD's compliance program is aligned to support the three key compliance strategies recommended by the National Strategy:

- maximising voluntary compliance;
- effective deterrence; and
- organisational capability and capacity.

4.2.1 Operational Compliance Plans

Enforcement of the management arrangements for the WCDSR is guided by an Operational Compliance Plan (OCP) that is informed and underpinned by a compliance risk assessment. The OCP has the following objectives:

- to provide clear direction and guidance to officers regarding compliance activities that are required to support effective management of the fishery;
- to provide a mechanism that aids the identification of future and current priorities;
- to encourage voluntary compliance through education, awareness and consultation activities; and
- to review compliance strategies and their effective implementation.

The OCP is reviewed every 1-2 years.

4.2.1.1 Compliance Strategies

Compliance strategies and activities that are used to protect the WCDSR include:

- land and sea patrols;
- catch validation against managed fishery licences/interim managed fishery permits;
- inspections at wholesale and retail outlets;
- inspections at processing facilities;
- inspections of vessels in port;
- at-sea inspection of fishing boats;
- closed area/entitlement monitoring via VMS (WCDSIMF and TSFs);
- inspections at road-side check points; and
- aerial surveillance.

Inspections may involve:

- inspections of all compartments on board vessels;
- Inspection of all authorisations;
- Inspection of logbooks;
- Inspection of fishing gear; and
- Inspection of catch on board the vessel or in vehicle.

4.2.1.2 Vessel Monitoring System

VMS was introduced to the WCDSIMF in 2008 and is also used in the TSFs to allow real time entitlement monitoring of the commercial fleet and to support the fishing nomination system. VMS also 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 DPIRD via satellite. The information is processed by specialised software designed to receive, analyse, display and record position reports and messaging via satellites.

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6.0APPENDICES

6.1 Appendix 1 – WCDSR IFM Allocation Determination

The WCDSR IFM allocation determination by the Minister for Fisheries on 12 December 2012.

DETERMINATION BY THE MINISTER FOR FISHERIES ON THE WEST COAST DEMERSAL SCALEFISH RESOURCE ALLOCATION

Matters that the Minister for Fisheries considers important in setting out his position on the West Coast Demersal Scalefish Resource

- The west coast demersal scalefish resource is a multi-user, multi-zonal and multi-species resource.
- The sectors targeting the west coast demersal scalefish resource have undergone significant management change since 2005/06 in order to reduce their catch by at least 50% of the 2005/06 catch level and are now largely meeting that objective.
- While the commercial and recreational sectors catch the whole suite of west coast demersal scalefish, the indicator species of Western Australian dhufish, pink snapper and baldchin groper are particularly important for both sectors.
- The commercial sector catches large quantities of species that are not generally targeted by the recreational sector, such as emperors or deep-water species such as hapuku. This means, that while the commercial sectors catch is larger than the recreational sectors catch, much of the fish caught is not readily available to all recreational sector participants because they are too far off-shore or species such as emperors are found in waters off less heavily populated areas of the State.
- The fish species that make up this resource are geographically distributed in such a way that, for example, baldchin groper is more common in the northern area of the west coast, and Western Australian dhufish is more common in the southern part of the west coast.
- The Integrated Fisheries Allocation Advisory Committee (the Allocation Committee) is required by the Integrated Fisheries Management policy to make its recommendations on the best available information. The absence of, or any uncertainty in, information should not be used as a reason for delaying or failing to make a decision.

DETERMINATION BY THE MINISTER FOR FISHERIES ON THE WEST COAST DEMERSAL SCALEFISH RESOURCE ALLOCATION	
Integrated Fisheries Allocation Advisory Committee Recommendations	**Minister for Fisheries' position**
Recommendation 1: The initial allocation for the west coast demersal scalefish resource be made for the entire area covered by the West Coast Demersal Scalefish Interim Managed Fishery, 26º30' South to 115º30' East (north of Kalbarri to east of Augusta).	Agree - Bioregional allocations are easier to manage than zonal allocations within bioregions. This is particularly the case for recreational fisheries, as recreational fishers are mobile and able to shift catch and effort between zones.
Recommendation 2: The total recorded commercial catch of all west coast demersal species and the estimated total recreational catch of all west coast demersal species should be used for allocating the west coast demersal scalefish resource.	Agree – The whole suite of species is the resource that is managed by the Department of Fisheries (Department). Monitoring of the commercial sector is comprehensive across the demersal suite. Monitoring of the recreational sector for the foreseeable future is likely to be restricted to representative species because the Department does not have weight-length relationships for all 200 species and issues of identification using a phone logbook survey methodology. Having the allocation apply to the whole suite, even if only a sub-component is monitored for the recreational sector, will guard against shifts in targeting of the resource by either sector. If necessary species, such as deep water species, may be added to the monitored component if they become significant in the catch. The Department will develop business rules around the use of a species subset (e.g. the predominant 15 species), for which there is quantitative data as a basis for monitoring the allocation.
Recommendation 3: 2005/06 should be used as the reference year for the allocation of the west coast demersal scalefish resource.	Agree - When the Allocation Committee started its west coast demersal scalefish investigations and issued its draft Allocation Report, the 2005/06 creel survey was the most recent creel survey data available before substantial management changes. The catch information for the West Coast Demersal Scalefish Fishery in 2005/06

DETERMINATION BY THE MINISTER FOR FISHERIES ON THE WEST COAST DEMERSAL SCALEFISH RESOURCE ALLOCATION	
Integrated Fisheries Allocation Advisory Committee Recommendations	**Minister for Fisheries' position**
	was the basis on which the Department determined that at least a 50% reduction in catch was required for sustainable management of the fishery. Two independent reviews of the science associated with this decision have confirmed that the 50% reduction is required. 2005/06 was also the year before substantial management changes commenced for the commercial and recreational sectors.
Recommendation 4: No specific allocation to the Customary sector is required and Customary fishing can continue in accordance with existing Customary fishing arrangements.	Agree
Recommendation 5: The formal allocations in the fishery should be made to the recreational and commercial sectors.	Agree
Recommendation 6: The Department of Fisheries should manage the fishery so that the intra-sectoral catch shares remain approximately at their 2005/06 levels.	Agree
Recommendation 7: That for allocation purposes the recreational catch be considered to be 30% greater than the revised 2005/06 recreational creel survey catch.	Accept – It is the Allocation Committee's role to address the issues surrounding gaps and uncertainty with respect to the available data when ascertaining each sectors historical catch shares.
Recommendation 8: The estimate of the recreational catch for 2005/06 should be increased by 39 tonnes to take account of the Abrolhos Island's recreational catch.	See recommendation 7, above.
Recommendation 9: The 2005/06 commercial sectors catch in the metropolitan area should not be taken into account when determining the sectoral allocations for the west coast demersal scalefish resource.	Agree – The commercial licence and permit holders that fished in the metropolitan area were provided with *Act of Grace* or Voluntary Fisheries Adjustment Scheme payments to take account of the closure. It is the Allocation Committee's role to address issues

DETERMINATION BY THE MINISTER FOR FISHERIES ON THE WEST COAST DEMERSAL SCALEFISH RESOURCE ALLOCATION	
Integrated Fisheries Allocation Advisory Committee Recommendations	**Minister for Fisheries' position**
	surrounding how specific sector catches should be allocated.
Recommendation 10: That the allocation of shares in the total suite of species in the WCDSF should be 64% to the commercial sector and 36% to the recreational sector.	Agree
Recommendation 11: Within each sectors allocation, the proportions of the five indicator species, be monitored and managed so that as far as practicable, they remain with their relative catch share of: Western Australian dhufish – recreational sector 62%, commercial sector 38%, Pink snapper – recreational sector 21%, commercial sector 79%, Baldchin groper – recreational sector 65%, commercial sector 35%, Emperors – recreational sector 9%, commercial sector 91%, Bight redfish – recreational sector 14%, commercial sector 86%.	Agree in principle – Multispecies fish resources are dynamic and variable over time. To allow for practical management, catch proportions of indicator species to be adopted as guidelines, rather than as specific fixed proportional shares, as follows: Western Australian dhufish – recreational sector 60%, commercial sector 40%, Pink snapper – recreational sector 20%, commercial sector 80%, Baldchin groper – recreational sector 65%, commercial sector 35%, Emperors – recreational sector 10%, commercial sector 90%, Bight redfish – recreational sector 15%, commercial sector 85%. The Department will manage and monitor the catch within these guidelines. This will allow for issues such as individual species recruitment pulses to flow through the sectoral catches without separate management measures for each species necessarily having to be taken.
Recommendation 12: A system of monitoring and managing the sectoral catches, based on the principles set out in the document "*Considerations for the Implementation of Western Rock Lobster Sectoral Allocations*" should be established to manage allocations in the West Coast Demersal Scalefish Fishery.	Agree – While the principles contained in "*Considerations for the Implementation of Western Rock Lobster Sectoral Allocations*" can be followed the west coast demersal scalefish resource is a significantly more complex resource and a more adaptive approach to management needs to be taken (see Recommendations 2 and 11 above).

DETERMINATION BY THE MINISTER FOR FISHERIES ON THE WEST COAST DEMERSAL SCALEFISH RESOURCE ALLOCATION	
Integrated Fisheries Allocation Advisory Committee Recommendations	**Minister for Fisheries' position**
Recommendation 13: Monitoring of boat fishing for silver trevally, King George whiting and other nearshore fish stocks should take place to ensure transfer of effort does not result in overfishing nearshore species.	Agree – The Department is to ensure that effort is not transferred to shore-based fishing.
Recommendation 14: That the initial management changes to enable the sectors to meet their allocation be taken at the same time as any changes to the sustainability management arrangements are made by the Minister for Fisheries as a result of the 2012 review of management arrangements.	Agree – It is expected that the review of management arrangements will occur in 2013/2014.
Recommendation 15: That a moving five-year average be used when determining if sectoral catches have remained within their allocation.	Accept - This is in line with the arrangements in the rock lobster and abalone resources. However, the responsiveness of the five year average for this resource will require further consideration.
Recommendation 16: A reallocation mechanism should be implemented for the west coast demersal scalefish resource as soon as practicable.	Agree
Recommendation 17: The Department should continue to improve its collection methodology for recreational fishing data and improve its community education strategies on the status and management of the west coast demersal scalefish resource.	Agree – The Department has introduced the new Western Australian Recreational Boat Fishing Survey. The Department is also updating its information brochures on the west coast demersal scalefish resource. The Department is also taking steps to improve its collection of commercial data with the development of an entitlement management system.

6.2 Appendix 2 – Calculating Total Fishing Mortality

Total fishing mortality accounts for the combined mortality associated with **both** retained catch and the proportion of released catch that dies (i.e. post-release mortality) generated by fishing activities

Species total fishing mortality = retained catch + (released catch x post-release mortality rate)

6.2.1 Post-release mortality defined parameters

The defined parameters used to estimate the post-release mortality component of total fishing mortality of WCDSR species by the recreational and commercial fishing sectors are outlined below.

6.2.1.1 Recreational and commercial sector release rates

Recreational (including charter) sector released catch is monitored in terms of number of each species released. Released catch of WCDSR species by boat-based recreational fishers is monitored periodically (every 2-3 years) in numbers as part of the state-wide survey of recreational fishing (see section 3.9.1.2). Released catch of WCDSR species by charter fishers is monitored annually through statutory logbooks.

Commercial release rates are not currently recorded in commercial logbooks however, release rate data has historically been monitored on an ad-hoc basis. The Department is currently monitoring WCDSIMF release rates via voluntary log sheets.

6.2.1.2 Post-release mortality rate for the WCDSR top 15 species

The Department has developed three proposed post-release mortality categories for the WCDSR top 15 species based on likely depth of capture, available scientific literature and anecdotal information from fishers (Table 7):

1. Moderate – 25% post-release mortality rate (i.e. 25% of released fish die);
2. High – 50% post-release mortality rate (i.e. 50% of released fish die); and
3. Very High – 90% post-release mortality rate (i.e. 90% of released fish die).

6.2.1.3 Average weight of released fish

Average weights of released fish were determined from average lengths and length-weight equations for species or closely-related taxa (Table 7). Average lengths of released fish were assumed to as 10% less than their MLLs, except for:

- dhufish and pink snapper which is based on the average length of released dhufish and pink snapper reported in the Recreational Angler Program logbook;
- foxfish where average length of released fish is less than 300 mm (Moore et al.);
- breaksea cod where it was assumed that fish less than 300 mm in length are not retained (Cossington et al.); and
- sea sweep and sergeant baker where there is no data on lengths of released fish, it was assumed the average length of released fish are 250 mm.

Table 7. Post-release mortality rates, average lengths and weights for main WCDSR species.

Species	Post-release mortality rate	Size limit	Released fish average length	Released fish average weight
Baldchin groper	90%	400 mm	360 mm	1439 g
Bass groper	90%	None	No data	No data
Eightbar grouper	90%	None	No data	No data
Foxfish	90%	None	278 mm	383 g
Hapuku	90%	None	No data	No data
Breaksea cod	50%	300 mm	247 mm	246 g
Dhufish	50%	500 mm	443 mm	1523 g
Bight redfish (incl. Yelloweye redfish and Swallowtail)	25%	300 mm	270 mm	332 g
Blue morwong	25%	410 mm	369 mm	598 g
Blue-eye trevalla	25%	None	No data	No data
Bluespotted emperor	25%	280 mm	252 mm	212 g
Emperors	25%	280 mm	252 mm	250 g
Grass emperor	25%	320 mm	288 mm	352 g
Pink Snapper	25%	500 mm /410 mm	400 mm	816 g
Redthroat emperor	25%	280 mm	252 mm	250 g
Robinson's seabream	25%	280 mm	252 mm	250 g
Ruby snapper	25%	None	No data	No data
Sea sweep	25%	None	250 mm	238 g
Sergeant Baker	25%	None	250 mm	211 g
Spangled emperor	25%	410 mm	369 mm	713 g
Spotcheek emperor	25%	280 mm	252 mm	212 g
Threadfin emperor	25%	280 mm	252 mm	212 g
Yellowtail emperor	25%	280 mm	252 mm	250 g

6.2.2 Recreational sector total fishing mortality calculation

WCDSR retained and released catches by boat-based recreational fishers and charter operators is sourced from state-wide surveys and charter logbooks respectively. Estimates of total fishing mortality for the recreational (including charter) sector are estimated using the following formula:

Total fishing mortality	=	**Retained catch**	+	**Post-release mortality**				
Total fishing mortality (kg)	=	Retained catch (kg)	+	Number of released fish (#)	x	Average weight of released fish (kg)	x	Post-release mortality rate (%)

6.2.3 Commercial sector total fishing mortality calculation

WCDSR retained catches by the commercial sector is monitored via statutory logbooks. WCDSR released catches by the commercial sector have historically been monitored on an ad-hoc opportunistic basis however, a voluntary log sheet program has recently been launched to

provide ongoing monitoring information on commercial release rates in the WCDSIMF. Until further information is derived from this monitoring program a proxy of 25% release rate has been implemented for WCDSIMF and a proxy of 10% release rate has been implemented for other commercial fisheries. Estimates of total fishing mortality for the commercial sector are estimated using the following formula:

Total fishing mortality	**=**	**Retained catch**	**+**	**Post-release mortality**				
Total fishing mortality (kg)	=	Retained catch (kg)	+	Retained catch (kg)	x	Commercial release rate (%)	x	Post-release mortality rate (%)

6.3 Appendix 3 - Harvest Strategy Control Rules for Retained (Indicator and Non-Indicator) Species once Recovered

Table 8. Harvest Strategy reference levels and control rules for WCDSR retained (indicator and non-indicator) species when under maintenance strategy that may be impacted by fishing activities undertaken by commercial and recreational fishers while targeting demersal scalefish.

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
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 Dhufish Baldchin groper (Mid-West only)	Periodic estimates of spawning biomass (*B*, or appropriate proxy) and Periodic estimates of fishing mortality (*F*)	**Target:** $B_{40\text{-}60}$ and $F_{2/3M}$	Continue management aimed at achieving ecological, economic and social objectives.
				Threshold: B_{MSY} and $F_{F=M}$	If the Threshold is breached[8] by any indicator species a management review will be completed within three months to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total fishing mortality by 10 to 50%, applicable to all fishing sectors, to enable a return to above the threshold within one generation.
				Limit: B_{20} and $F_{1.5M}$	If the Limit[3] is breached (by any indicator species), a review will be initiated immediately and completed within one month to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total fishing mortality by 50 to 100%, applicable to all fishing sectors, to enable a return to above the threshold within one generation.

Note that only the impacts of line fishing on ecological assets other than the retained species are currently assessed within this harvest strategy (see Section **Error! Reference source not found.**).
distribution of the estimated performance indicator (i.e. the lower bound of a 60% confidence interval) falls below the Threshold or Limit level.

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 (additional monitoring may be periodically undertaken to facilitate an age-based assessment)	3. Annual risk (vulnerability) assessments incorporating current management arrangements, catch levels, species information and available research 4. 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.	Continue management aimed at achieving ecological, economic and social objectives.
				Threshold: $B_{Threshold}$; and Fishing impacts are considered to generate an undesirable level of risk to any species' populations, i.e. high risk.	If the Threshold is breached a management review will be completed within three months to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total mortality by 10 to 50%, applicable to all fishing sectors, to enable a return to above the threshold within one generation.
				Limit: B_{Limit}; and Fishing impacts are considered to generate an unacceptable level of risk to any species' populations, i.e. severe risk.	If the Limit is breached, a review will be initiated immediately and completed within one month to develop a management response. Appropriate management action will be taken as soon as is practicable to reduce the total mortality by 50 to 100%, applicable to all fishing sectors, to enable a return to above the threshold within one generation. If a severe risk is identified then fishing will cease immediately while the initial review process is undertaken.