

OVERVIEW OF THE STATUS OF KEY ECOLOGICAL RESOURCES (ASSETS)

ECOLOGICAL ASSETS

Captured Species (Fisheries and Stocks)

Annual stock assessments, including analyses of trends in catch and fishing activity, are used each year to determine the status of each of the State's most significant fisheries and are presented in detail in the rest of this document. This section provides an overview of the outcomes of the Department's management systems by collectively examining the status of all the commercial and recreational fisheries and harvested fish stocks in WA (Overview Table 4). The material presented in this section is based on the analyses and text presented in the Key Performance Indicators (KPI) section of the Department of Fisheries Annual Report to the Parliament 2016/17.

The proportion of fish stocks identified as not being at risk or vulnerable through exploitation.

Annual stock assessments of the fisheries that are subject to management are undertaken by the Department's Science and Resource Assessment Division. These assessments, together with trends in catch and fishing activity, have been used to determine the sustainability status of the State's most significant commercial and recreational fisheries (full details of which are in the companion Status Reports on the Western Australia's Fisheries and Aquatic Resources 2016/17). Performance is measured as the proportion of fisheries (which have sufficient data) for which the breeding stocks of each of the major target or indicator species are being maintained at levels that ensure catches could be sustained at desirable levels given effort levels and normal environmental conditions; or they are recovering from a depleted state at an appropriate rate following management intervention. The Department's 2016/17 Budget Papers state that the target is for the proportion of fish stocks not at risk from fishing is ninety-seven percent (97%).

For the 2016/17 performance review, 40 fisheries have been reviewed, which includes two recreational only fisheries. For the 40 fisheries reviewed, the 'Stock Status and Catch Ranges for Major Fisheries' in the Outcomes section of the Annual Report records that breeding stock assessments are available for the major species taken in 39 (97%) of these fisheries. The one fishery where there are insufficient data to make an assessment on the target species to make a critical assessment was due to the fishery having not operated for more than six years.

Within the group of 39 assessed fisheries, 32 were considered to have adequate breeding stock levels and a further four fisheries (West Coast Demersal Scalefish Fishery (WCDSF); the Shark Bay Crab Fishery, the Shark Bay Scallop Fishery and the Cockburn Sound Crab Fishery) had breeding stocks considered to be recovering at acceptable rates (collectively 92% of fisheries). The WCDSF targets relatively long lived species so its recovery is expected to take a number of years to complete. The initial strong management actions taken in Shark Bay combined with the conservative Total Allowable Commercial Catches (TACCs) imposed since the resumption of commercial fishing are enabling the recovery of both the scallop and crab stocks from the impact of the heat wave event six years ago.

Of the remaining 8% of fisheries, the fishery for scallops in the Abrolhos Islands has been closed since the 2011 marine heat wave but is finally beginning to show the first signs of recovery. Therefore, only two fisheries (or 5% of those assessed) have stocks that are considered inadequate as a result of exploitation (garfish in the West Coast Nearshore fishery and cobbler within Wilson Inlet in the South Coast Nearshore fishery) with additional actions now progressing to deal with these issues (Overview Table 1). Consequently, 95% of stocks are considered to not be at risk or vulnerable through exploitation, which is very close to the target level.

OVERVIEW TABLE 1:

The proportion (%) of fisheries in which breeding stocks of the major target species are both assessed and considered not to be at risk due to fishing. Note, prior to 2016/17 the KPI and the target listed in the budget papers referred to the proportion of fish stocks at risk.

Year	Percentage of fish stocks considered at risk by fishing (%)	Target value as per budget (%)
2006/07	21	Not applicable
2007/08	23	Not applicable
2008/09	14	18
2009/10	11	15
2010/11	6	17
2011/12	6	14
2012/13	3	9
2013/14	3	6
2014/15	3	6
2015/16	5	3
	Percentage of fish stocks considered not at risk by fishing (%)	Target value as per budget (%)
2016/17	95	97

The proportion of commercial fisheries where acceptable catches (or effort levels) are achieved.

This indicator provides an assessment of the success of the Department's commercial management plans and regulatory activities in keeping fish catches at appropriate levels (including those in a recovery phase). For most of the commercial fisheries in WA, each management plan seeks to directly control the amount of fishing effort applied to stocks, with the level of catch taken providing an indication of the effectiveness of the plan. Where the plan is operating effectively, the catch by the fishery should fall within a projected range. The extent of this range reflects the degree to which normal environmental variations affect the recruitment of juveniles to the stock which cannot be 'controlled' by the management plan. Additional considerations include market conditions, fleet rationalisation or other factors that may result in ongoing changes to the amount of effort expended in a fishery which will in turn influence the appropriateness of acceptable catch ranges for certain fisheries. The Department's 2016/17 Budget Papers state that the target is ninety-five percent (95%).

A target catch or effort range has been determined for each of the major commercial fisheries (see the 'Stock Status and Catch Ranges for Major Fisheries' section of the Annual Report) by the Department's Science and Resource Assessment group.

For quota-managed fisheries, the measure of success of management arrangements is that the majority of the

Total Allowable Commercial Catch (TACC) is achieved, and additionally, that it has been possible to take this catch using an acceptable amount of fishing effort. If an unusually large expenditure of effort is needed to take the TAC, or the industry fails to achieve the TACC by a significant margin, this may indicate that the abundance of the stock is significantly lower than anticipated. For these reasons, an appropriate range of fishing effort to take the TACC has also been incorporated for assessing the performance of quota-managed fisheries (see 'Stock Status and Catch Ranges for Major Fisheries' section of the Annual Report).

The major commercial fisheries which have target catch or effort ranges account for most of the commercial value of WA's landed catch. Comparisons between the actual catches (or effort) with the target ranges have been undertaken for 29 of the 37 commercial fisheries referred to in 'Stock Status and Catch Ranges for Major Fisheries'. There is still a relatively high number of fisheries not assessed which is due to a combination of ongoing environmentally induced stock issues in some regions (see above) and poor economic conditions for some fisheries which meant a number of fisheries were either closed or did not have material levels of catches during this reporting period. This includes two fisheries (Cockburn Sound crabs, Abrolhos Islands and mid-west (scallops) trawl) still affected by unusual environmental conditions to the extent that the fisheries were again closed. These stocks continue to be closely monitored and are starting to both show signs of recovery which highlights the

benefits of strong management actions taken by the Department.

Of the 29 fisheries where ‘target ranges’ were available and a material level of fishing was undertaken in the relevant reporting period, eleven were catch-quota managed with 18 subject to effort control management.

Ten of the eleven Individually Transferable Quota (ITQ) managed fisheries operated within their target effort/catch ranges or were acceptably below the effort range (e.g. roe’s abalone, pearl oysters, purse seine fisheries). In the Gascoyne demersal fishery Pink snapper catch rates fell below the threshold level and a review of the stock status will be completed in the coming year.

In the 18 effort-controlled fisheries, eleven were within or acceptably above (1) or below (five) their target catch ranges. For effort controlled fisheries, the current catch level of southern garfish required suitable adjustments to management which have already been initiated.

In summary, 27 of the 29 commercial fisheries assessed (93%) were considered to have met their performance criteria, or were affected by factors outside the purview of the management plan/arrangements. This figure is close to the target level of 95% (Overview Table 2).

OVERVIEW TABLE 2:

The proportion (%) of commercial fisheries in which the catch or effort reported is acceptable relevant to the target management range being applied.

Year	Percentage of fisheries with acceptable catch/effort	Target value as per budget
2006/07	80	Not applicable
2007/08	96	Not applicable
2008/09	96	85
2009/10	93	90
2010/11	94	90
2011/12	100	94
2012/13	97	88
2013/14	89	92
2014/15	89	95
2015/16	90	95
2016/17	93	95

The proportion of recreational fisheries where catches or effort levels are acceptable.

This indicator provides an assessment of the success of the Department’s management plans and regulatory activities in keeping fish catches by the recreational sector at appropriate levels for both stock sustainability (including those in a recovery phase) and to meet integrated fisheries management objectives.

The Department has determined an annual tolerance catch and effort range for each of the major recreational fisheries. This indicator target has been set at 80% and has been measured since 2013/14.

For the purposes of this indicator, 17 fisheries or stocks have been identified as having a ‘material’ recreational catch share. Over time, the indicator may need to

expand to include reference to fisheries or stocks for which there are other ‘material’ sectoral shares (e.g. customary fishing).

Of the 17 recreational fisheries, only five currently have explicit catch ranges developed and another eight have implicit ranges that can be used to assess acceptability. Of these 13 fisheries, the data from the most recent available surveys had catch estimate levels that were all within an acceptable catch range.

Consequently, the percentage of recreational fisheries with acceptable catch levels was 100%, which exceeds the target level of 85% (Overview Table 3). The results of the 2016 state-wide boat survey will soon be available which will be used to update the assessments for a number of recreational fisheries.

OVERVIEW TABLE 3:

The proportion (%) of recreational fisheries in which the catch or effort reported is acceptable relevant to the target management range being applied.

Year	2013/2014	2014/2015	2015/2016	2016/2017
Percentage of fisheries with acceptable catch/effort	77	85	100	100
Target value as per budget	80	80	80	85

Listed species

In accordance with EBFM principles, risk-based assessment of the impact of commercial and recreational fishing activities on listed fish and non-fish species is undertaken. Specific detail may again be found within each bioregional risk assessment of ecological assets. Risks associated with interactions with listed species were generally assessed as being negligible to low with the exception of risks to mammals (dolphins) resulting from the Pilbara trawl fishery. Dolphin exclusion devices have subsequently reduced the incidence to acceptable levels. Risks associated with birds and mammals (sea lions) in the South Coast Bioregion were also assessed as moderate and appropriate management measures continue to be undertaken to mitigate these risks. The level of entanglements of whales in pot ropes has successfully been reduced following completion of research that, in collaboration with industry, identified appropriate and practical mitigation techniques¹.

Ecosystems and Habitats

A range of monitoring tools is used to assess the condition of ecosystems and associated biodiversity within the context of Ecosystem Based Fisheries Management. Detailed assessments of risk to the structure and benthic habitat of specific ecosystems can be found within each bioregional chapter. Across the marine bioregions, risks to benthic habitat and ecosystem structure and biodiversity have been generally assessed as ranging from negligible to at most only moderate. The exceptions to this are the estuarine ecosystems of the West Coast Bioregion which are identified as being at significant risk due to pressures from external (non-fishing) pressures largely associated with deteriorating water quality.

EXTERNAL IMPACTS**Introduced Pests and Diseases**

The Department of Primary Industries and Regional Development is the lead state government agency responsible for the management of aquatic biosecurity in Western Australia. Aquatic biosecurity threats include disease outbreaks in wild and farmed fish and

the introduction of marine and freshwater pest species that are not native to WA.

Introduced marine species are organisms that have moved, or been moved, from their natural environment to another area. Many of these organisms remain inconspicuous and innocuous causing no known adverse effects. However, some can potentially threaten human health, economic values or the environment, in which case they are then referred to as marine pests.

The introduction of marine species into a new region can be deliberate or accidental. Deliberate introductions may result from aquaculture practices or releases from aquariums. Accidental introductions are primarily due to shipping and recreational craft moving from country to country and between Australian jurisdictions, with the pests being transported in ballast water, on ship hulls, or within a vessel's internal seawater pipes. Introduced marine species also arrive naturally via marine debris and ocean currents.

As an ocean bound nation Australia relies heavily on maritime transport, with over 95% of our imports and exports carried by sea. The large ocean going vessels that transport these goods represent one of the largest vectors of introduced species, while recreational vessels represent the major secondary vector that can spread pests from ports and marinas around the coastline. For these reasons our ports and marinas become high risk areas for the introduction of a marine pest.

In recognition of an increasing risk presented by aquatic pests to WA associated with increasing international travel, transport and trade, the Department has developed the capacity for rapid detection and identification of aquatic pests. Rapid detection of introduced aquatic pests is important in preventing their spread and establishment. The Department, working with our Port stakeholders, has developed a state-wide marine biosecurity surveillance system to try and detect any introduced species that arrive in Australian port waters.

Additional to this the Department undertakes risk based targeted marine pest surveillance in high value assets such as the Swan River system and Cockburn Sound. Details of the introduced species and pests detected in 2016/17 surveillance are provided in Overview Table 5.

The Department provides the Federal Department of Agriculture Forestry and Fisheries with a quarterly report on nationally notifiable aquatic diseases detected in Western Australia. This information is compiled

¹ How *et al.*, (2015) Effectiveness of mitigation measures to reduce interactions between commercial fishing gear and whales. FRDC Project 2013/037 Fisheries Research Report, WA. 267.

with that of other Australian jurisdictions and is provided quarterly to the World Organisation for Animal Health (OIE). Summary data is available at <http://www.oie.int/>. No new notifiable diseases were recorded in Western Australian wild stocks in 2016/17.

Aquatic disease is a critical issue for aquaculture operations, requiring considerable vigilance through regulated testing regimes and translocation restrictions. This is covered in more detail in the accompanying annual report on aquaculture.

The Department coordinates the fish kill response program within Western Australia. This program forms

part of a national program endorsed by Primary Industries Standing Committee and Natural Resource Management Standing Committee in December 2006. The number and cause of fish kills is also a key indicator in the “State of the Environment Report Western Australia” (SOEWA) issued from time to time by the state Environmental Protection Authority (IW19 Number and location of significant fishkills). The total number of significant fish kills and fish kills investigated in Western Australia since the last SOEWA report is shown in Overview Table 6.

OVERVIEW TABLE 4

Stock Status, Catch & Effort Ranges for WA's Major Commercial and Recreational Fisheries

NA - Not applicable, Q - Quota management, TAC - Total Allowable Catch, TACC - Total Allowable Commercial Catch; MSC – Certified by Marine Stewardship Council.

Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
WEST COAST BIOREGION					
West coast rock lobster (MSC)	Size-structured Population Model (Level 5)	Sustainable: Adequate	Commercial: 6000 (TACC) Recreational: 422 t (TARC)	Commercial: 6087 (t) Recreational: 272-400 t (1) 346-481 t (2)	Acceptable (1) based on historical data (2) based on updated average weight data for metropolitan region. A full review of methods used for estimating recreational catch underway.
Roe's abalone	Catch Rates & Direct Survey (Level 4)	Sustainable: Adequate (open areas)	Commercial: 87 t (Q) (530 – 640 days) Recreational: 18 – 22 t Perth Metro Area	Commercial: 49 t (383 days) Recreational: 26 - 30 t Perth Metro Area; 14 t Other	Acceptable Low overall commercial catch due to in season TACC reduction in area 7 (metro) plus economic and accessibility issues. Recreational catch above target partly due to larger size of abalone taken.
Octopus	Catch Rates (Level 2)	Sustainable: Adequate	Commercial 200 – 500 t Recreational: Not Developed	Commercial: 252t Recreational: 2t (boat only)	Acceptable The commercial catch range was reviewed in 2016 to reflect increased knowledge of sustainable harvest levels. Commercial fishery is in a planned expansion phase.

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Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
WEST COAST BIOREGION Continued					
					NA
Abrolhos Islands and mid west trawl	Direct Survey & Catch Rates (Level 4)	Environ. Limited	Commercial: 95 – 1,830 (set to 0 for this year) Recreational: NA	Commercial: 0 t	The fishery remained closed due to ongoing effects of the 2010/11 marine heat-wave and continued above-average water temperatures. With cooler temperatures in 2016, stock levels in part of the Abrolhos Islands have improved.
					NA
Cockburn Sound crab	Direct Survey (Level 4)	Sustainable: Recovering	Commercial: Under Revision Recreational: Under Revision	Commercial: 0 t Recreational: 0t	With low egg and juvenile indices, the fishery has been closed since April 2014. While the egg production index has increased above the threshold in 2016 (Sep-Dec) the resulting level of recruitment is not yet known.
					Acceptable
Peel-Harvey West Coast Crab (MSC)	Commercial Catch Rates (Level 2)	Sustainable: Adequate	Commercial: 45-105 t Recreational: Not formal	Commercial: 57 t Recreational (boat only, 95% CI) 2013/14: West Coast 50-66 t, Peel-Harvey 38-56 t	Catch and catch rates were within allowable range. The large proportion of undersize crabs in 2015/16 was possibly due to cooler than average water temperatures and sporadic high rainfall events.
West Coast Nearshore and Estuarine finfish (MSC part)	Yes (Level 2)	Adequate: Mullet/Whiting Actions taken: Herring Inadequate: Southern garfish	Commercial: 46-166 Peel-Harvey: 46-166t Herring: Under Review Recreational: Not Developed	Commercial (Peel-Harvey): 128 t Herring (Statewide): 72 t Recreational: 69-87 t (boat only)	Acceptable Status of herring stock to be reviewed in 2017 using level 3 assessment. New management arrangements for garfish are being developed.

Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
WEST COAST BIOREGION Continued					
West coast beach bait and south west beach seine	Catch (Level 1)	Sustainable: Adequate	Commercial: 60 – 275 (whitebait only) Recreational: Not applicable	Commercial: (whitebait): 34t	Not Acceptable Available evidence suggests gradual decline in whitebait stock level over past decade in line with environmental shifts requiring a review of the acceptable catch range.
West coast purse seine	Catch (Level 1)	Sustainable: Adequate	Commercial: 0 – 3,000 (Q) Recreational: Not applicable	Commercial: 1,177 t (all species)	Acceptable Total catch for all zones within recent historical catch range.
West coast demersal scalefish	Annual: Catch (Level 1) Periodic: Level 3	Sustainable: Recovering	Commercial: < 450 t Recreational < 250 t	Commercial: 256 t Recreational: 139-166 t(boat only) 56 t (charter)	Acceptable Catches by the commercial and recreational sectors were both within recovery and allocation benchmarks. Updated Level 3 assessment to be completed in 2017.
GASCOYNE COAST BIOREGION					
Shark Bay prawn (MSC)	Direct Survey/Catch Rate (Level 4)	Sustainable: Adequate	Commercial: 1,350-2,150 t Recreational: Not Applicable	Commercial: 1524 t	Acceptable Western king and brown tiger prawn annual landings were within their respective acceptable ranges.
Exmouth Gulf prawn (MSC)	Direct Survey/Catch rate (Level 4)	Sustainable: Adequate	Commercial: 771 – 1,276 Recreational: Not Applicable	Commercial: 822 t	Acceptable Landings of brown tiger and endeavor prawns were within their acceptable range, western king prawns were below their acceptable range but spawning stock above the threshold.

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Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
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GASCOYNE COAST BIOREGION Continued

Shark Bay scallop	Catch Rates and Direct Survey (Level 4)	Sustainable: Recovering	Commercial: 830t Recreational: NA	Commercial: 816 t	Acceptable Trial quota for Denham Sound and northern Shark Bay stocks. Most recent survey identified further improved recruitment for both stocks.
Shark Bay Crabs	Catch Rates & Direct Survey (Level 4)	Sustainable: Recovering	Commercial: 450 t (Q) Recreational: NA	Commercial: 372 t	Acceptable Non-achievement of the TACC was due to unused quota. Most recent surveys have found a continued improvement in legal biomass.
Shark Bay beach seine and mesh net	Annual: Catch Rates (Level 2) Periodic: Fishing mortality (Level 3)	Sustainable: Adequate	Commercial: 235 – 335 t Recreational: NA	Commercial: 178 t	Acceptable Total catch remained below the acceptable range due to a further reduction in effort (lowest on record). Increase in catch of sea mullet and tailor, catch of yellowfin bream again above the 10-year average.
West Coast Deep sea crab (MSC)	Catch Rate (Level 2)	Sustainable: Adequate	Commercial: 154 t (Q); 61 k-101.5 k potlifts Recreational: NA	Commercial: 153.3 t (82 k potlifts)	Acceptable The TAC was achieved with effort remaining within its target range. The standardised catch rate of retained legal, undersize and berried crabs are all within their respective target ranges.
Gascoyne Demersal Scalefish	Annual: Catch and Catch Rates (Level 2) Periodic: Level 3 or Level 5	Sustainable: Adequate	Commercial: Snapper 277 (Q) Other demersals – 227 (Q) Recreational: Not formal	Commercial: Snapper 150 t Other demersals 120 t Recreational: 88-110 t (boat only)	Acceptable Snapper - Not Acceptable Other demersals - Acceptable Snapper catch rate has fallen below the threshold level prompting a review of the assessment. Goldband fishing mortality is lower than target level.

Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
GASCOYNE COAST BIOREGION Continued					
Inner Shark Bay Demersal (Snapper)	Periodic:	Sustainable: Adequate	Commercial: 8 t Recreational: 12 t EG, 12 t DS, 3.8 t FE	Commercial: 2 t Recreational: 4-5 t EG, 6-7 t DS, 1-2 t FE (boat only)	Acceptable The Eastern Gulf (EG), Denham Sound (DS) and Freycinet Estuary (FE) breeding stocks are all above their target abundance levels.
NORTH COAST BIOREGION					
Onslow prawn	Catch (Level 1)	Sustainable: Adequate	Commercial: 60 – 180 t Recreational: NA	Negligible	NA Minimal fishing occurred in 2016.
Nickol Bay prawn	Catch (Level 1)	Sustainable: Adequate	Commercial: 90 – 300 t Recreational: NA	17 t	Acceptable The catch prediction based on summer rainfall was low (30 t) which led to the low effort applied.
Broome prawn	Catch (Level 1)	Sustainable: Adequate	Commercial: 55 – 260 t Recreational: NA	Negligible	NA Minimal fishing occurred in 2016.
Kimberley prawn	Catch (Level 1)	Sustainable: Adequate	Commercial: 240 – 500 t Recreational: NA	Commercial: 155 t	Acceptable With landings of banana prawns below the catch prediction, the total catch was low due to drop in fishing effort in the second part of the season.
North Coast Nearshore and Estuarine	Catch Rates (Level 2)	Sustainable: Adequate	Commercial: 33–45 t (barramundi) Recreational: Not formal	Commercial: 51 t (barramundi) 75 t (total) Recreational: 11-19 t (boat)	Acceptable The catch of barramundi is similar to 2016 and the catch rate remains at a high level.

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Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
NORTH COAST BIOREGION Continued					
Northern demersal scalefish	Annual: Catch and Catch Rates (Level 2) Periodic: Integrated Model (Level 5)	Sustainable: Adequate	Commercial: Under revision Recreational: Not Formal	Commercial: 1,173t (total) Recreational: 48-64 t (boat only)	NA Catches of goldband snapper and red emperor both within their longer-term ranges. Current recreational catch not considered a risk to stocks.
Pilbara fish trawl	Catch and Catch Rates/ Fishing Mortality/ Integrated Model (Level 2, 3 & 5)	Sustainable: Adequate	Commercial: Under revision Recreational: NA	Commercial: 1529 t Recreational: Covered in NDSF	NA Full assessment is in progress and the catch range is under review.
Pilbara demersal trap and line	Catch and Catch Rates/ Fishing Mortality/ Integrated Model (Level 2, 3 & 5)	Sustainable: Adequate	Commercial: 400 – 600 t (trap) 50 – 115 t (line)	Commercial 495 t (trap) 126 t (line) Recreational: Covered in NDSF	Acceptable The total catch of the trap fishery in 2016 was within the catch range. The line catch was marginally above the catch range which is under review for this sector.
Mackerel	Catch (Level 1)	Sustainable: Adequate	Commercial: 246 – 410 t(Q, Spanish Mackerel) Recreational: Not formal	Commercial: 276 t Recreational: 22-37 t (boat only)	Acceptable The commercial catch within the tolerance range since the management plan was introduced. Current recreational catch levels are not considered to pose any stock issues.
Northern shark	No Assessment	NA	< 20 (sandbar)	0	NA No fishing effort since 2008/09.
Pearl oyster	Catch rate predictions, standardised CPUE (Level 3)	Sustainable: Adequate	Commercial 612,550 oysters (Q) (14,071 – 20,551 hours) Recreational: NA	Commercial: 541,260 oysters (19,699 dive hours)	Acceptable Quota not achieved as vessels switched to seeding operations. Catch rates for season low but still within tolerance range. Abundance predicted to significantly increase in 2017.

Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
NORTH COAST BIOREGION Continued					
Sea cucumber	Catch Rate (Level 2)	Sustainable: Adequate	Commercial: Sandfish (Kimberley) 0 – 100 t Sandfish (Pilbara) 0 – 80 t Redfish 0 – 150t Recreational: NA	Commercial: Sandfish (K): 21 t Sandfish (P): 70 t Redfish: 2 t	Acceptable Catch ranges revised in 2016 as part of the new harvest strategy. Catch rates for sandfish and redfish above the target reference levels. New stock of sandfish accessed in Pilbara. Main redfish stocks not targeted this year due to planned rotational harvest schedule by industry.
SOUTH COAST BIOREGION					
South Coast crustacean	Standardised Catch Rate (Level 2)	Sustainable: Adequate	Commercial: 50 – 80 (southern rock lobster) Recreational: NA	Commercial: 38 t	Acceptable Commercial catch was below tolerance range but the catch rate in the targeted region. Catch and catch rates of deep sea crabs currently being assessed.
Abalone (greenlip/brownlip)	Standardised Catch Rate plus Fishing Mortality (Level 3)	Sustainable: Adequate	Commercial: 145 t (Q) (3440 - 5270 hours) Recreational: Not formal	Commercial: 121 t (4411 hours) Recreational: 8 t	Acceptable Commercial effort within tolerance range following TACC reductions. Non-achievement of TAC due to a commercial industry decisions. Recreational catch not considered a risk to these stocks.
South Coast Nearshore and Estuarine finfish	Catch Rates (Level 2)	Inadequate (cobbler in Wilson Inlet) Others: Adequate	Commercial: Under review Recreational: Not formal	Commercial: 103 t (salmon) 260 t (other) Recreational: 19-27 t (boat only)	NA Inadequate cobbler stock in Wilson Inlet is being addressed. Commercial catch of salmon relative low due to low effort from limited market demand.

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Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
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SOUTH COAST BIOREGION Continued

Albany/King George Sound purse seine	Catch (Level 1)	Sustainable: Adequate	Commercial: 2683 t (Q) Recreational: NA	1515 t	Acceptable Catch and effort higher than in 2014/15 but within recent range.
Bremer Bay and Esperance purse seine	Catch (Level 1)	Sustainable: Adequate	Commercial: 3000 t(Q) Recreational: NA	Commercial: 632 t	Acceptable Catch and effort were lower than 2014/15 for both Bremer Bay and Esperance and within recent ranges
Temperate Demersal Shark Fishery	CPUE (relative to previous assessment) (Level 4)	Gummy and whiskery: Sustainable: Adequate Dusky and sandbar: Recovering	Commercial: shark 725 – 1,095 t	Commercial: 823 t (key shark species only)	Acceptable Total commercial catch of key shark species within allowable tolerance range.
South Coast Demersal Scalefish	Demersal finfish: Level 3 Age Structure SPR	Demersal finfish: Sustainable: Adequate.	Demersal Finfish: under Development Recreational: Not formal	Commercial: 180 t. (Comprises 88 t wetline, 82 t TDGDLMF, and 10 t estuarine netting) Charter: 7 t Recreational: 31-38 t (boat only)	N/A Formal management for this fishery is now under development.

NORTHERN INLAND BIOREGION

Lake Argyle catfish	Catch (Level 1)	Sustainable: Adequate	Commercial: 93 – 180 t Recreational: NA	103 t.	Acceptable The level of catch is within the allowable range for the fishery.
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Fishery / Resource	Stock assessment method and level	Breeding stock assessment	Target catch (and effort) range in tonnes (days)	Catch (tonnes), Effort (days/hours) and Catch rate for season reported ^{1,2} 2015/16 or 2016	Catch (or effort or catch rate) level acceptable and explanation if needed
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SOUTHERN INLAND BIOREGION

Marron	Catch & Fishery Independent CPUE (Level 1 & 4)	Sustainable: Adequate	Commercial: NA Recreational: 50 – 100 k	52,669 marron (± 4,801 se)	Acceptable Total catch was within the historic catch range recorded since 2003.
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1. Catch figures supplied for latest year/ season available.

2. Where there are three or less licences operating in the fishery annual catch levels are not reported due to confidentiality requirements.

OVERVIEW TABLE 5:

Detection of introduced and pest species in 2015/16 resulting from surveillance activities.

(Shading indicates species has been detected in that Bioregion. Y or N indicates if species was detected in recent surveillance in that bioregion. * indicates species was detected on a vessel but is not known to be established in wild).

Common Name	Scientific Name	Type of Organism	Pest status	Year first detected	Bioregion			
					North Coast	Gascoyne Coast	West Coast	South Coast
Mediterranean fanworm	Sabella spallanzanii	Polychaete	Pest	2012/13			Y	Y
Scallop	Scaechlamys livida	Mollusc	Introduced species	2012/13			Y	N
Aeolid nudibranch	Godiva quadricolor	Mollusc	Introduced species	2013/14			Y	Y
	Alexandrium catanella	Dinoflagellate	Pest-like if in bloom	2012/13			N	
	Alexandrium sp.	Dinoflagellate	Pest-like if in bloom	2014/15			N	
Ciona	Ciona intestinalis	Ascidian	Introduced species	2013/14			Y	Y
Asian paddle crab	Charybdis japonica	Crab	Pest	2013/14			N	
Ivory barnacle	Balanus improvisus	Barnacle	Pest	2013/14*			N	
	Balanus pulchellus	Barnacle	Introduced species	2013/14*			N	
	Amphibalanus amphitrite	Barnacle	Introduced species	2014/15			N	
Asian green mussel	Perna viridis	Mussel	Pest	2011/12*	N		Y*	
Asian date mussel	Arcuatula senhousia	Mussel	Pest	2012/13			Y	Y

OVERVIEW

Common Name	Scientific Name	Type of Organism	Pest status	Year first detected	Bioregion			
					North Coast	Gascoyne Coast	West Coast	South Coast
	<i>Didemnum perlucidum</i>	Ascidian	Introduced species, pest-like characters	2012/13	Y	Y	Y	Y
Striped Sandgoby	<i>Acentrogobius pflaumi</i>	Goby	Introduced species	2014/15			Y	
	<i>Theora fragilis</i>	Mollusc	Introduced species	2012/13	N			
Dead man's fingers	<i>Codium fragile</i> subsp. <i>fragile</i>	Algae	Pest	2014/15				Y

OVERVIEW TABLE 6:

The total number of fish kills in Western Australia and the total number of fish kill investigated by the Fish Health Laboratory since the last SOEWA report.

Year	Total Number of Fish Kills	Number of fish kill investigated
2007	23	11
2008	36	21
2009	18	6
2010	18	9
2011	29	12
2012	34	12
2013	25	5
2014	21	6
2015	18	8
2016	27	9