

# **Western Australian Marine Stewardship Council Report Series**

West Coast Estuarine Managed Fishery (Area 2: Peel-Harvey Estuary) & Peel-Harvey Estuary Blue Swimmer Crab Recreational Fishery

Addendum 3

July 2019

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## Background

The West Coast Estuarine Managed Fishery (WCEMF) Area 2 (Peel-Harvey Estuary) uses haul and gillnets to target predominantly sea mullet (*Mugil cephalus*), and crab traps to target blue swimmer crabs (*Portunus armatus*). The recreational crab fishers in the Peel-Harvey Estuary primarily use drop and scoop nets for catching blue swimmer crabs.

The fisheries achieved Marine Stewardship Council (MSC) certification in 2016 and the assessment was based on information presented in Johnston et al. (2015):

[http://www.fish.wa.gov.au/Documents/wamsc\\_reports/wamsc\\_report\\_no\\_3.pdf](http://www.fish.wa.gov.au/Documents/wamsc_reports/wamsc_report_no_3.pdf)

This report is the third addendum to Johnston et al. (2015) and provides catch and effort information for the 2017 and 2018 fishing seasons in the Peel-Harvey Estuary. It also provides updates on progress made to date to address the MSC conditions placed on the fisheries for the criteria where the standard was not quite achieved.

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## MSC Principle 1

### 1. Current Stock Status

The sea mullet and blue swimmer crab stocks targeted by fishers in the Peel-Harvey Estuary are assessed annually using a weight-of-evidence approach that considers all available information (see Wise et al. 2007). This approach is primarily based on evaluating standardised commercial catch rates (primary performance indicator) and catches (secondary performance indicator) of both species in the WCEMF Area 2, relative to reference points calculated based on a reference period in which these indicators have been stable (see Department of Fisheries 2015a, b). Overall weight-of-evidence assessments also consider any additional fishery-independent and fishery-dependent information where available.

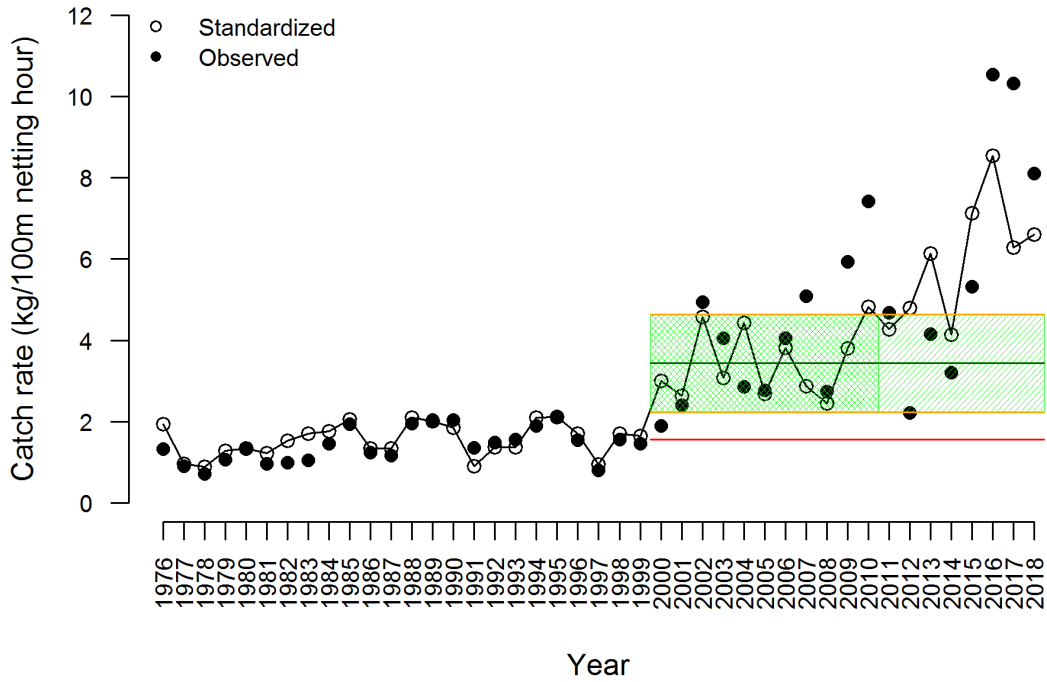
#### 1.1 Sea Mullet

After concerns that the original catch rate standardisation for sea mullet (based on “100 m netting hours” as the measure of fishing effort) could be inaccurate, both the original and an updated time series of catch rates (based on fishing days) are now simultaneously monitored against their respective reference levels (Table 1.1). This will continue until the first version of the harvest strategy for the Peel-Harvey finfish resource (2015-2020) is formally reviewed and the indicators can be updated. The review will also take into account the results of a mortality-based assessment of the sea mullet stock, for which age composition samples are currently have been collected (see below).

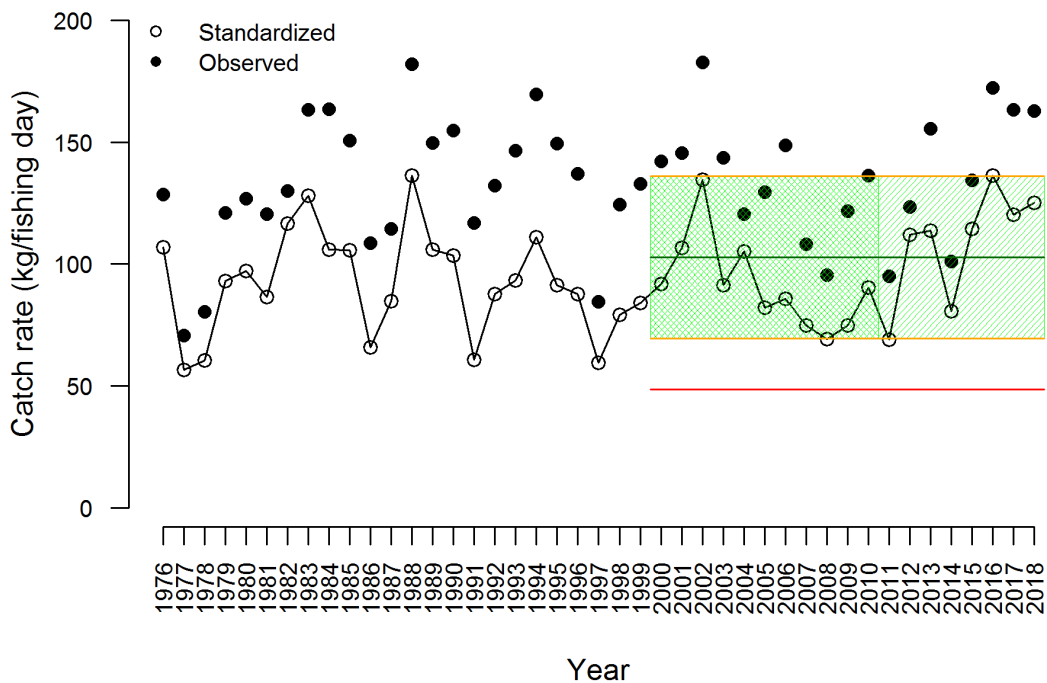
**Table 1.1. Catch rate reference points for sea mullet in the Peel-Harvey Estuary based on original catch rate standardisation (kg/100 m netting hour) and the updated standardised catch rate (kg/fishing day).**

Reference point	Original catch rate	Updated catch rate
Target	3.4 kg/100 m netting hour	103 kg/day
Upper Threshold	4.6 kg/100 m netting hour	136 kg/day
Lower Threshold	2.2 kg/100 m netting hour	69 kg/day
Limit	1.6 kg/100 m netting hour	49 kg/day

The old standardised catch rate for sea mullet has followed a rising trend, with recent values well above the upper threshold level (Figure 1.1). The updated catch rate has been relatively stable, remaining between target and threshold level except for 2016 when it slightly exceeded the threshold (Figure 1.2). In 2018 the updated catch rate of 125 kg/day was between the target (103 kg/day) and upper threshold (136 kg/day), whilst the old catch rate of 6.6 kg/100 m netting hour was well above the threshold level (4.6 kg/100 m netting hour). The commercial sea mullet catch also shows an increasing trend in recent years and the 2018 catch of 103 t was well above the upper threshold value of 70 t (Figure 1.3). This follows an increase in haul netting effort over recent years (Figure 1.4), likely reflecting an increased targeting of sea mullet following the MSC certification of the fishery.



**Figure 1.1. Time series of annual standardised commercial catch rate (kg/100 m netting hour) for sea mullet in the Peel-Harvey Estuary net fishery, based on original catch rate standardisation, relative to the original target (green range), threshold (orange line) and limit (red line) reference levels outlined in the Finfish Resources of the Peel-Harvey Estuary Harvest Strategy 2015-2020 (see Table 1.1).**



**Figure 1.2. Time series of annual standardised commercial catch rate (kg/day) for sea mullet in the Peel-Harvey Estuary net fishery, based on an updated catch rate standardisation, relative to the new target (green range), threshold (orange line) and limit (red line) reference levels (see Table 1.1).**

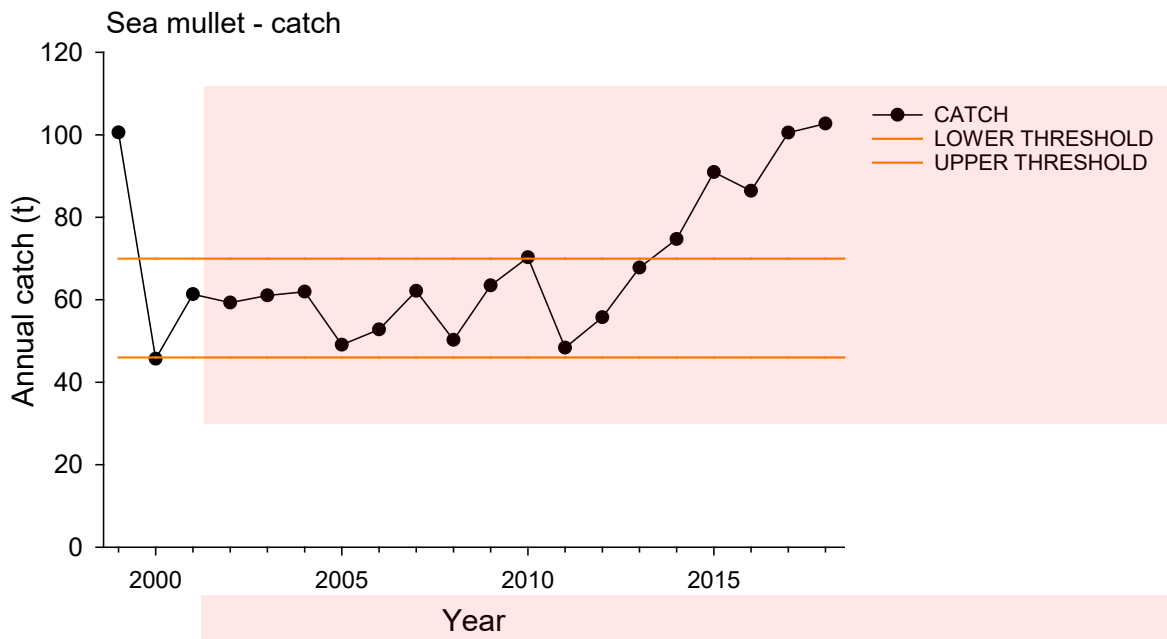


Figure 1.3. Annual commercial catch (tonnes) of sea mullet in the Peel-Harvey Estuary haul and gillnet fishery relative to the associated harvest strategy reference points.

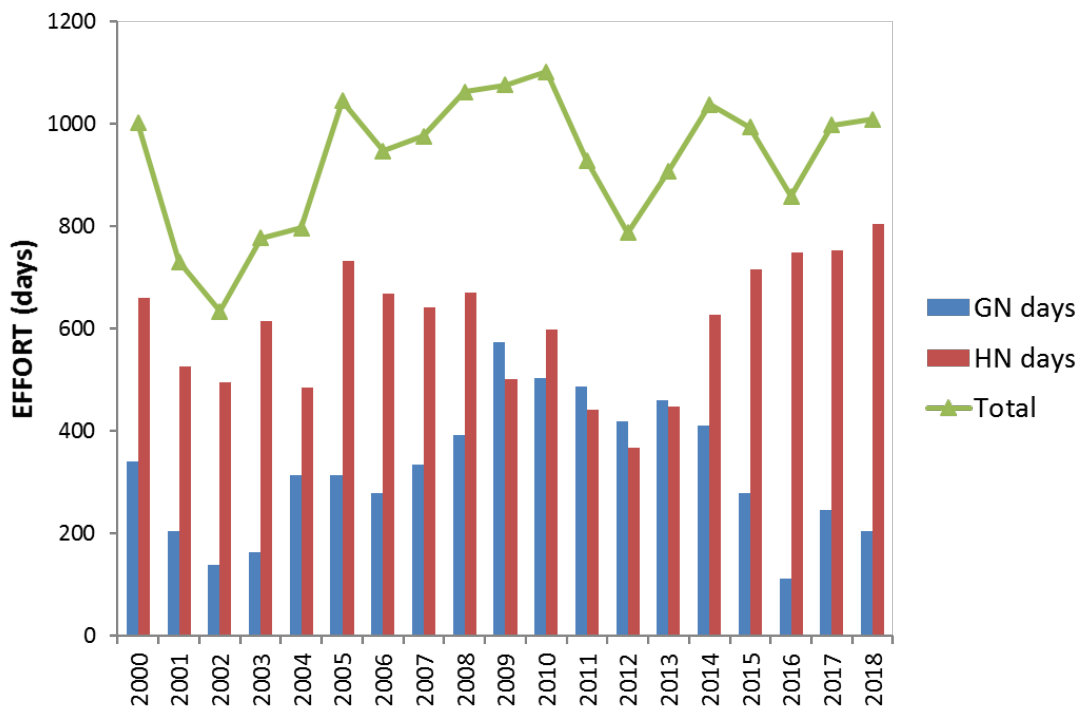


Figure 1.4. Annual nominal commercial netting effort (haul net and gill net days) in the Peel-Harvey Estuary fishery between 2000 and 2018.

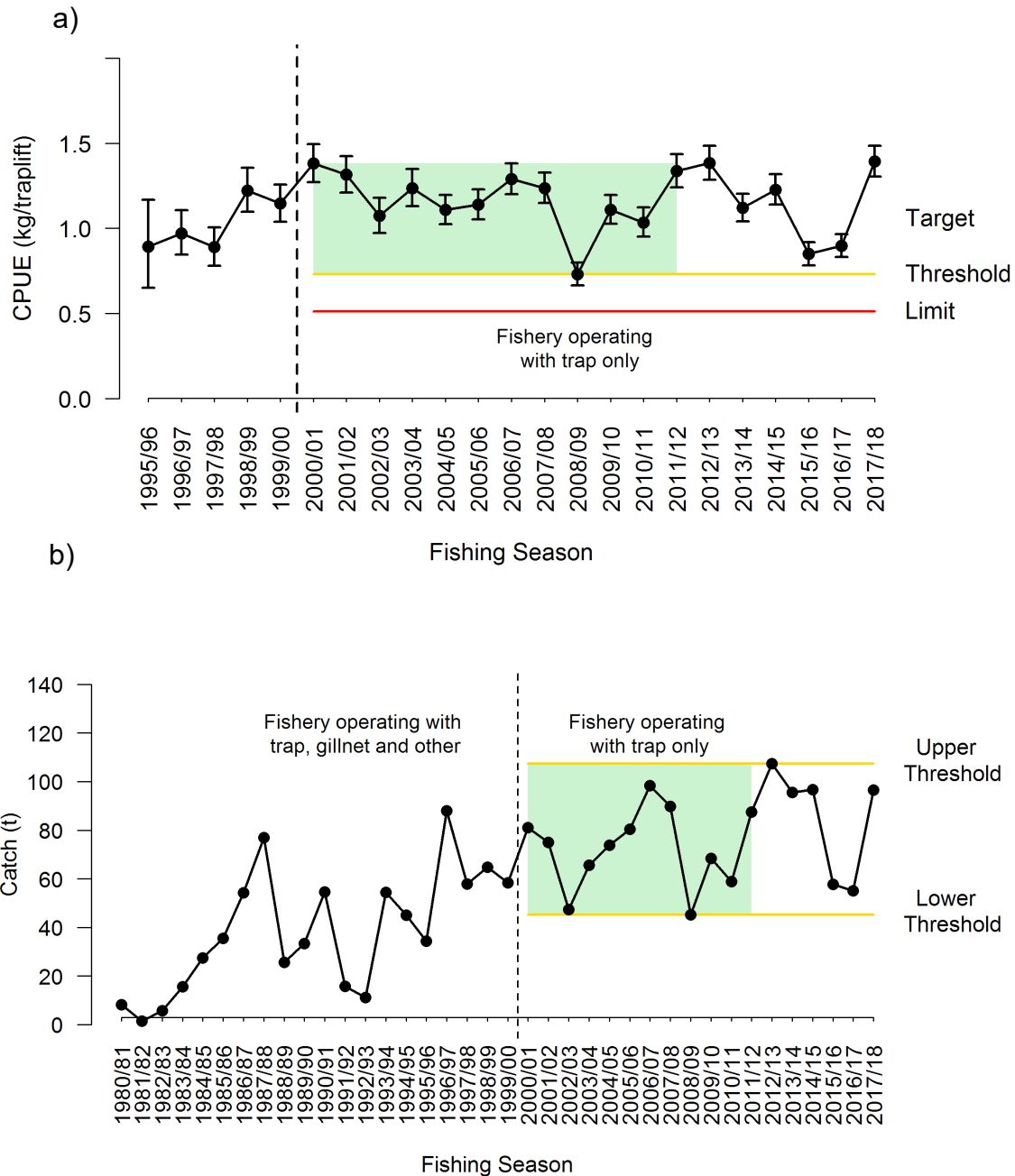
Although the trends in both sea mullet catch rates and catch indicate that the stock level is currently adequate, the recent breaches of the upper threshold levels have triggered a review of the risk to the sustainability of the stock. A full weight-of-evidence assessment of the sea mullet stock, incorporating the age composition data and other available information, will be completed before the end of 2019. The outputs from this assessment will be used to inform sustainable harvest levels of this species for the next version of the harvest strategy.

## 1.2 Blue Swimmer Crab

The standardised commercial catch rate for blue swimmer crabs during the 2017/18 fishing season (1 November 2016 to 31 August 2017) of 1.4 kg/traplift was a significant increase from the previous year of 0.9kg/traplift. This is above the harvest strategy threshold of 0.7 kg/traplift (Figure 1.5a), which indicates that the stock has been fished at sustainable levels. The annual commercial crab catch also increased significantly from 55 t in 2016/17 to 96.6 t in 2017/18 and remained within the target range of 45-104 t (Figure 1.5b). As both performance indicators have remained within their respective target ranges, no changes to management were required for the 2018/19 season.

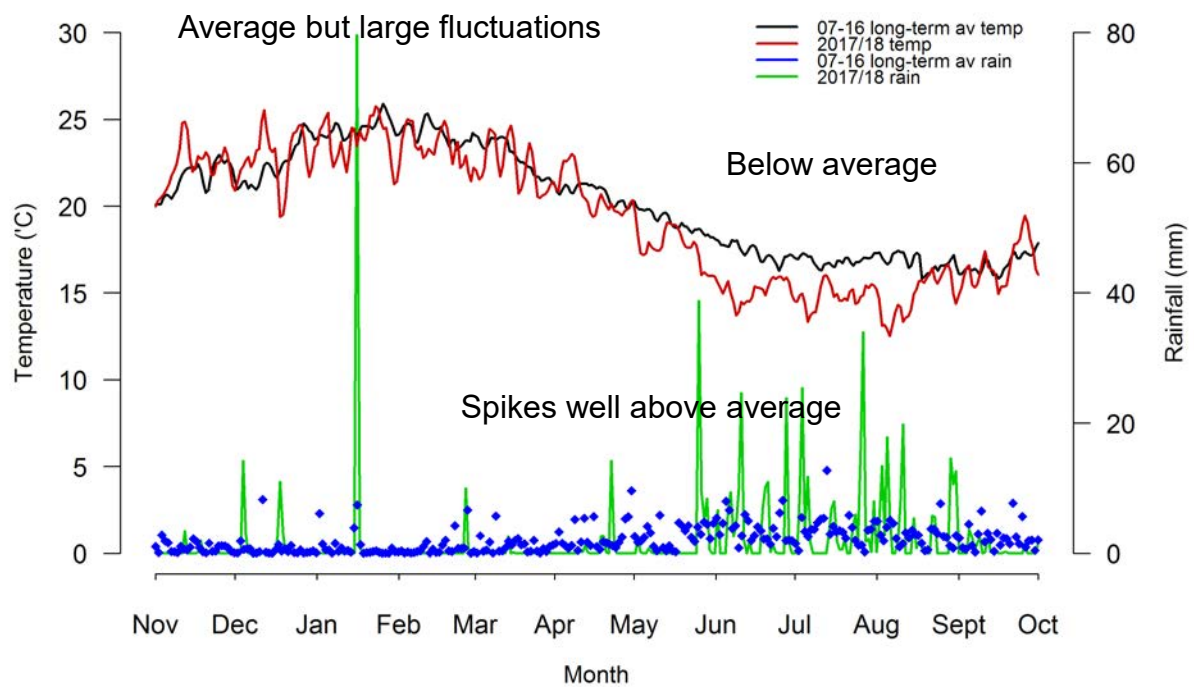
From the total Statewide catch of blue swimmer crabs by recreational boat-based fishers (95% CI 38-56 t in 2015/16), around 50-70% is typically taken in the Peel-Harvey Estuary. The estimated boat-based recreational catch of blue swimmer crabs in the West Coast Bioregion in 2015/16 (95% CI 36-50 t) was lower than the 2013/14 survey estimate of 50-68 t and the 2011/12 estimate of 75-97 t (Ryan et al. 2017). Since 2015/16, the survey also allows for some data on shore-based fishing undertaken by (licensed) boat-based recreational fishers to be obtained. Information on recreational scoop netting effort has also been collected using 24-hr remote cameras at three locations around the Peel-Harvey Estuary, and a recently completed 14-month roving creel survey of scoop netting activities around the majority of the estuary (see Section 4.1).

Additional data collected by fishery-dependent and fishery-independent monitoring as well as environmental data (rainfall data from Bureau of Meteorology and *in situ* temperature loggers) in the Peel-Harvey Estuary indicate that the increase in catch rates and catch during the 2017/18 season may be due to water temperatures remaining around the long term average during summer and autumn with minimal rainfall, so crabs remained in the estuary for the majority of the season with relatively good growth rates (Figure 1.6). This is consistent with the high numbers of crabs, particularly males, reported in commercial monitoring and fishery independent trap and trawl surveys during 2017/18 (see below).



**Figure 1.5.** Annual (a) standardised commercial catch rate (kg/traplift,  $\pm 95\%$  CIs) and (b) commercial catch (t) of blue swimmer crabs in the Peel-Harvey Estuary fishery relative to target (green range), threshold (orange line) and limit (red line) reference levels. The reference period from 2000/01 to 2011/12 is defined as the period where the fishery was operating with traps only and for which the fishery was operating normally following the transition from gillnets in the late 1990s.

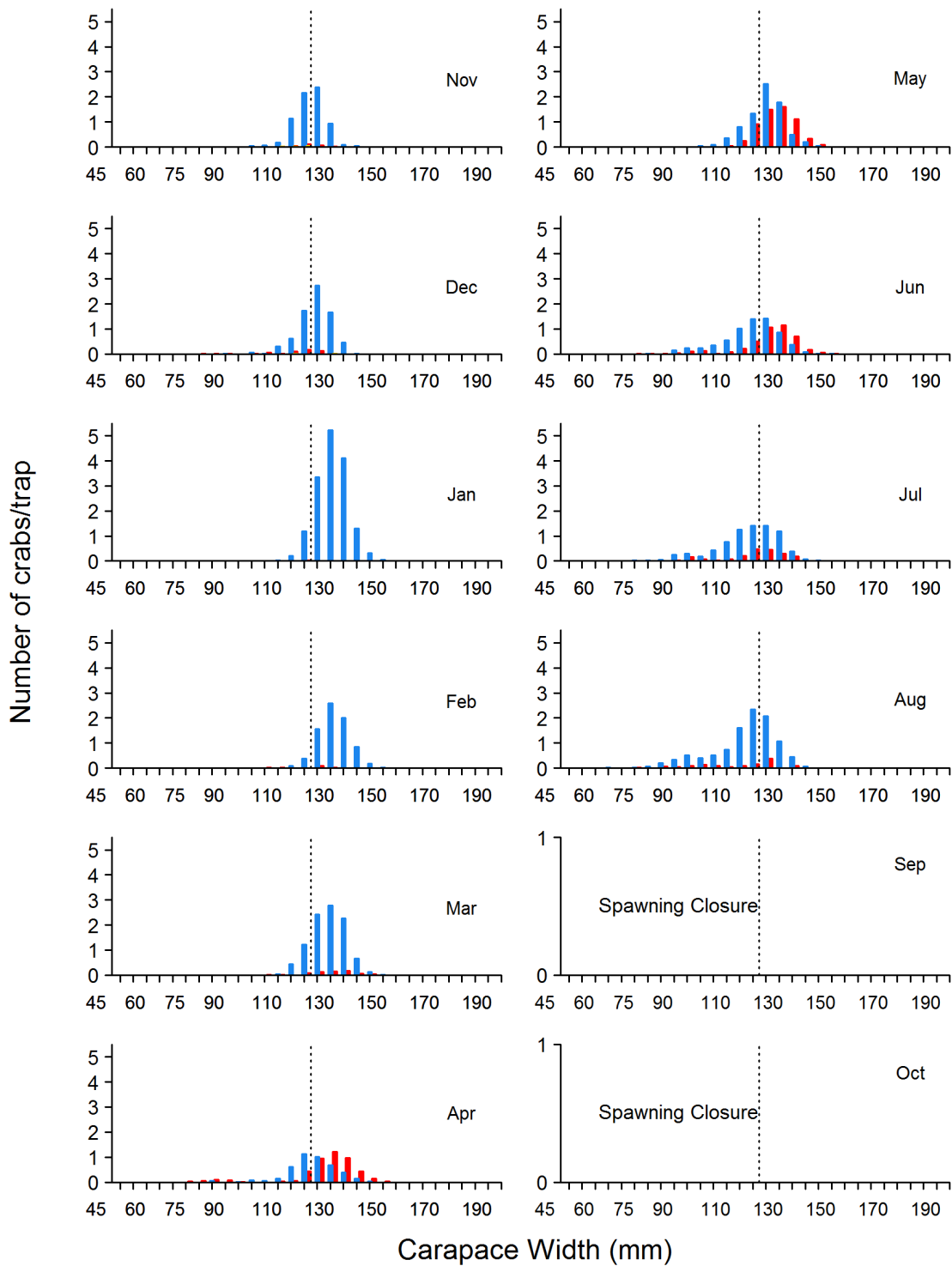




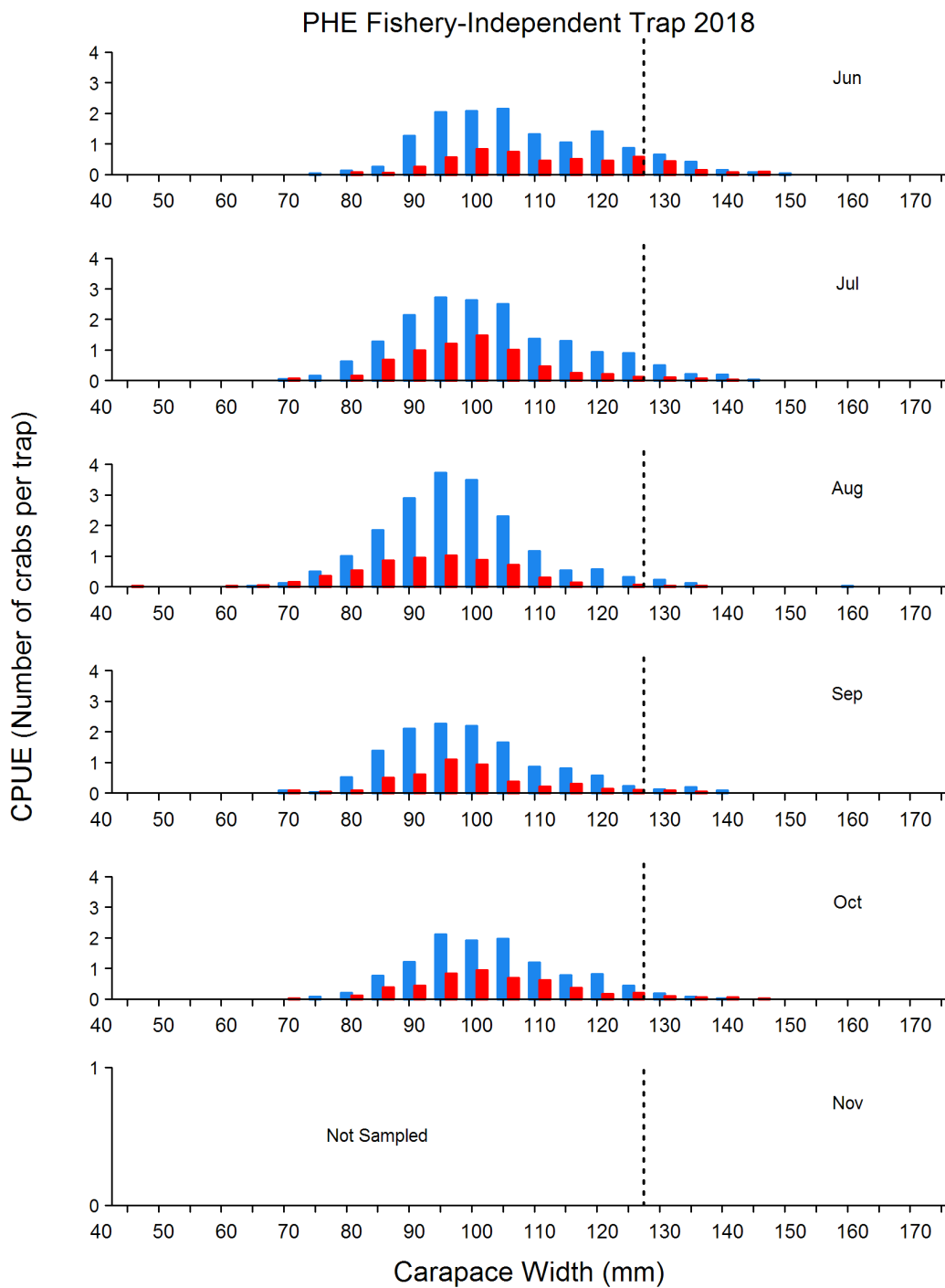
**Figure 1.6. Patterns of water temperature and rainfall in the Peel-Harvey Estuary in 2017/18 relative to the long-term (2007-2016) average trends. Rainfall Sourced from Bureau of Meteorology Mandurah Station.**

Monthly commercial trap monitoring of blue swimmer crab length frequencies in 2017/18 shows that males dominate the catch between November and April (Figure 1.7). Large females dominated catches in May but were caught in lower numbers in June, July and August. Fishery-independent surveys using research traps (without the escape gaps used in commercial trap to minimise captures of undersize crabs) show a dominance of male sub-legal crabs between June and November the majority between 90 and 110 mm carapace width (Figure 1.8). The large proportion of sub-legal crabs in the Peel-Harvey Estuary is also evident from trawl surveys undertaken in 2018, although smaller juvenile and sub-adult crabs were evident with much higher numbers of females overall, with females dominating the catch in April, May and September. A significant number of crabs (pulse) were caught in September, the majority being between 60 and 100 mm carapace width (Figure 1.9).

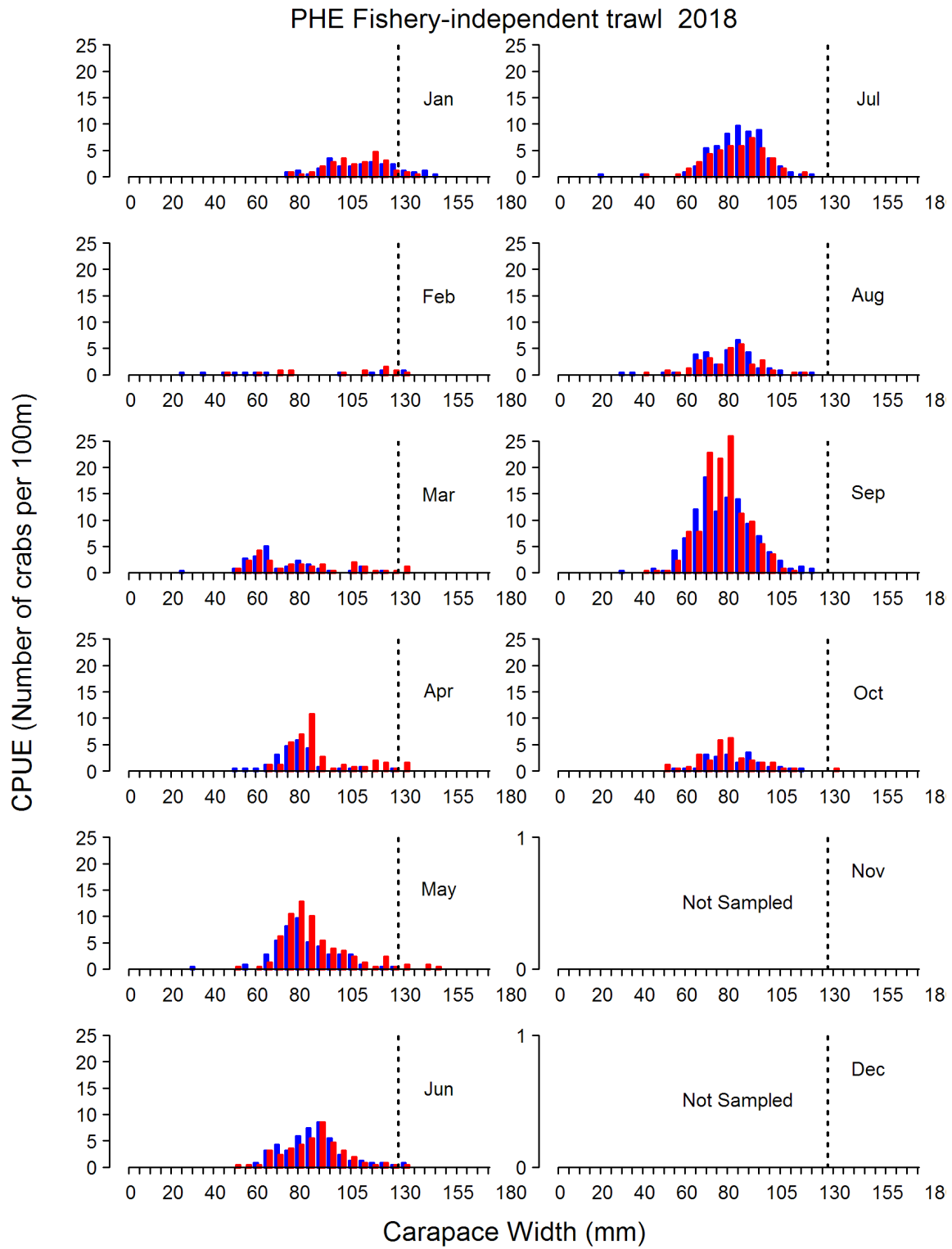
### PHE Commercial Monitoring 2017 / 2018



**Figure 1.7. Monthly length frequencies of commercial trap catches of male (blue), female (red) and juvenile (yellow) blue swimmer crabs in the Peel-Harvey Estuary during the 2017/18 fishing season (1 November – 31 August). The minimum commercial size limit of 127 mm carapace width is indicated by the vertical dashed lines.**

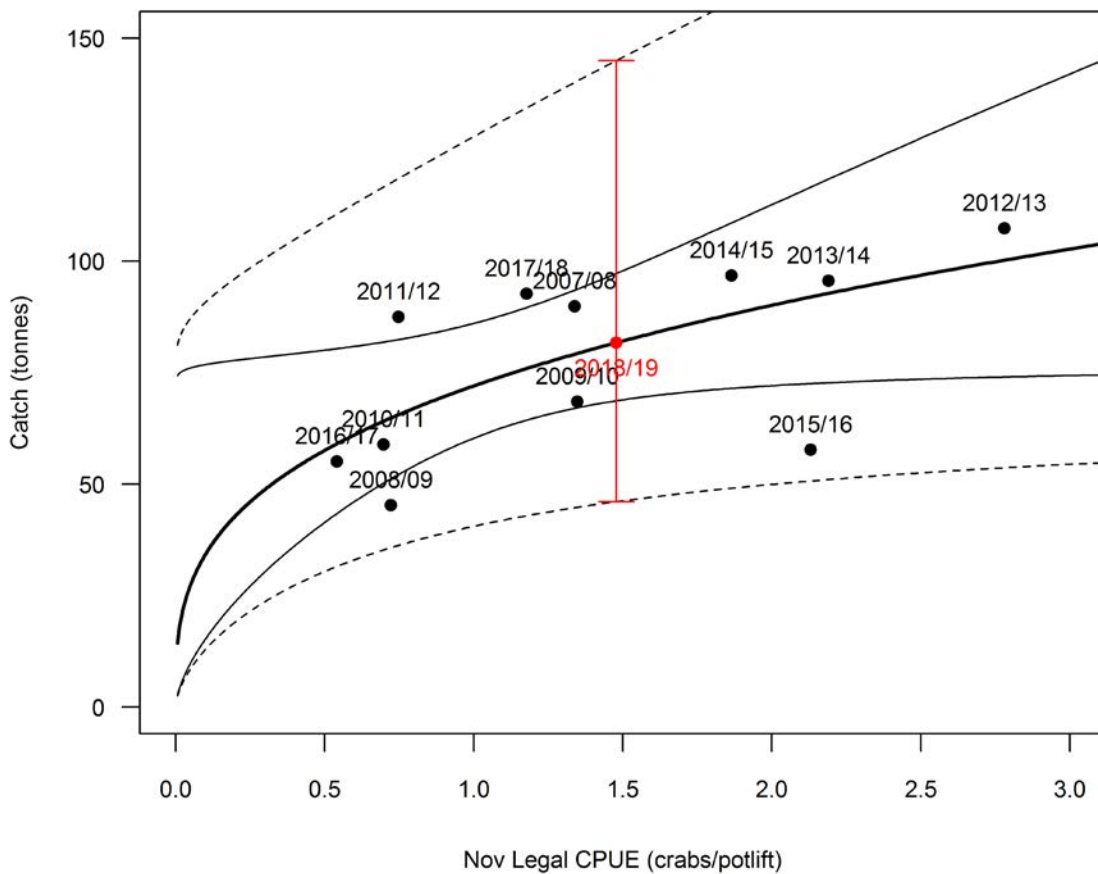


**Figure 1.8. Monthly length frequencies of fishery-independent trap catches of male (blue), female (red) and berried (yellow) blue swimmer crabs in the Peel-Harvey Estuary between June and November 2018. The minimum commercial size limit of 127 mm carapace width is indicated by the vertical dashed lines.**



**Figure 1.9. Monthly length frequencies of fishery-independent trawl survey catches of male (blue), female (red) and juvenile (yellow) blue swimmer crabs in the Peel-Harvey Estuary in 2018. The minimum commercial size limit of 127 mm carapace width is indicated by the vertical dashed lines.**

The fishery-independent trap survey data was used to develop an index of November legal crab abundance of 1.18 crabs/traplift in 2017, with the index increasing to 1.48 crabs/traplift in 2018 (Figure 1.10). Based on the relationship established between this index and the commercial catches in the following fishing season, the predicted catch for 2017/18 was 75.9 t, which was well below the actual recorded catch of 96.6 t. The reasons for this improvement may be due to water temperatures remaining around the long term average during summer and autumn with minimal rainfall, so crabs remained in the estuary for the majority of the season. Predicted catch for the 2018/19 season (based on the 2018 legal November index of 1.48 crabs/traplift) was 81 t (Figure 1.10). Together with an index of recruitment that will be developed from the trawl survey data, this fishery-independent information will continue to be considered in addition to the current harvest strategy performance indicators in an overall weight of evidence approach to stock assessment in this fishery.



**Figure 1.10. Catch prediction model using the fishery-independent November trap catch rates of legal sized blue swimmer crabs (year t) as predictor of commercial catch for the following (November-August) fishing season (year t+1) (power relationship). The solid black line indicates the fitted regression line (bias corrected for estimation in log space), and the 95% confidence limits are indicated by the black line. The dotted line indicates the 95% prediction limits. The predicted catch and its prediction limits for 2018/19 are shown in red.**

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## MSC Principle 2

### 2. Other Retained Species

This section reports available information on species other than the ‘target’ (P1) species that are retained by commercial fishers in the commercial WCEMF (Area 2) and recreational blue swimmer crab fishers in the Peel-Harvey Estuary.

#### 2.1 Commercial Net Fishery

In addition to sea mullet, the commercial haul and gillnet fishery also retains a number of other nearshore and estuarine finfish species (Table 2.1). Catch data shows a substantial further reduction in gillnet catches in 2016 (Table 2.1), which follows a continued decline in gillnetting effort over the past three years (Figure 1.4).

As outlined in the harvest strategy for the finfish resources of the PHE (Department of Fisheries 2015a), catch and catch rate-based reference levels have been developed for these species as indicators of change in fish abundance and/or the level of targeting by fishers. The target catch / catch rate levels are:

- Yelloweye mullet: annual commercial catch is < 46 tonnes;
- Yellowfin whiting: annual commercial catch is < 12 tonnes;
- Australian herring: annual commercial catch is < 9 tonnes;
- Tailor: annual commercial catch is < 9 tonnes;
- Cobbler: annual catch rate of cobbler is > 6 kg / fishing day and annual commercial catch is < 9 tonnes;
- Perth herring: annual commercial catch of Perth herring is < 2.7 tonnes; and
- All other retained species: annual commercial catch of each other retained species is < 5 % of the total retained catch.

Overall catch trends for the individual key retained species other than sea mullet, relative to harvest strategy reference levels, are briefly summarised below.

**Table 2.1. Retained species catches (kg) for the commercial Peel-Harvey Estuary haul net (HN) and gillnet (GN) sectors between 2016 and 2018. Dark blue shading indicates target (P1) species and light blue shading indicates main retained species (i.e. > 5% of total retained catch).**

Common Name	Annual Catch (kg)					
	2016		2017		2018	
	GN	HN	GN	HN	GN	HN
Mullet, Sea	1831	84591	5161	95367	2355	100377
Mullet, Yelloweye	313	11054	2047	10684	840	10394
Whiting, Yellowfin		19048	508	12191	62	11600
Herring, Australian		3080	449	3806	684	5403
Tailor		1331	40	1076	794	2624
Cobbler	853	326	1779	72	1156	518
Herring, Perth		2754	1089	3316	1020	2475
Whiting, King George		784	5	144		1629
Trevallies, General		823		380		277
Whiting, General/Sand		778		382		291
Bream, Black		24	28	3		15
Flatheads, General		9	12	18		5
Common Silverbiddy		70		2		10
Flounders, General			2			
Pilchard		90				
Fish, General				5		
<b>Total (kg)</b>	2997	124762	11120	127446	6911	135618
<b>Annual Total (kg)</b>		<b>127759</b>		<b>138566</b>		<b>142529</b>

### 2.1.1 Yelloweye mullet

The catch of yelloweye mullet in the Peel-Harvey Estuary was stable at 11.4, 12.7 and 11.2 t in 2016, 2017 and 2018, respectively (Table 2.1). As the catch was within the target range, no harvest strategy response has been required.

### 2.1.2 Yellowfin whiting

After above-average yellowfin whiting catches were observed in the Peel-Harvey Estuary in 2014 and 2015, a Level 3 (catch curve and per-recruit) assessment of the yellowfin whiting stock was triggered by the harvest strategy. Two consecutive years of age composition data from 2015 and 2016 confirmed that the stock is in a healthy state and that a very strong recruitment by the 2010/11 year class had contributed to the recent high catches (Smith et al. 2019).

The results of the yellowfin whiting assessment were presented in the 2017 addendum to the Johnston et al. (2015) MSC report<sup>1</sup>, and summaries were communicated by the Department through emails to key stakeholders and also to the broader public via their website and social

<sup>1</sup> [http://www.fish.wa.gov.au/Documents/wamsc\\_reports/wamsc\\_report\\_no\\_4\\_addendum.pdf](http://www.fish.wa.gov.au/Documents/wamsc_reports/wamsc_report_no_4_addendum.pdf)

media<sup>2</sup>. As expected, catches subsequently declined, reaching 12.7 t in 2017 and 11.7 t in 2018 (Table 2.1). These catch levels were both below the threshold level for this species of 13.8 t.

### **2.1.3 Australian herring**

The catch of Australian herring in the Peel-Harvey Estuary was 4.3 t in 2017 and 6.1 t in 2018 (Table 2.1), which were below the threshold level (10.4 t). This is a very small component of the total Statewide catch from the overall stock, which is in a recovery phase after management changes were implemented in March 2015 to reduce fishing pressure.

### **2.1.4 Tailor**

Following a peak in catches of tailor in the Peel-Harvey Estuary in 2013 corresponding to a period of strong recruitment, annual catches have returned to a low level. Catches in 2017 and 2018 (1.1 t and 3.4 t respectively) were below the threshold level of 10.4 t (Table 2.1). Hence there are no concerns about the current status of the stock.

### **2.1.5 Cobbler**

Commercial catches and catch rates of cobbler in the Peel-Harvey Estuary have both remained at low levels in 2017 (1.9 t) and 2018 (1.7 t). The catch rate calculated for the July to September winter period when this species is mainly targeted declined from the 2016 peak of 66 kg/day but remained at relatively high levels in 2017 (40 kg/day) and 2018 (21 kg/day). As both indicators remained within their target reference levels, no changes to management were required.

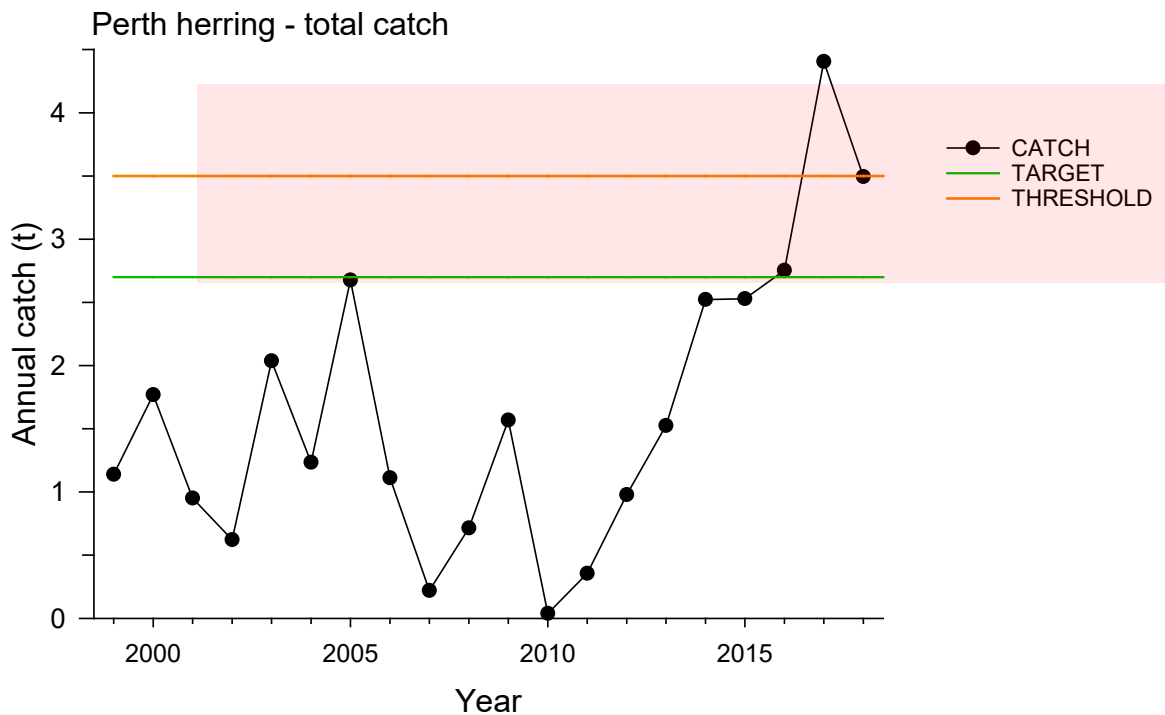
### **2.1.6 Perth herring**

The catch of Perth herring in the Peel-Harvey Estuary show an increasing trend between 2010 and 2014 to around 2.5 t and further increased slightly to just over the harvest strategy target of 2.7 t in 2016 (Figure 2.1; Table 2.1). As the 2017 catch of 4.4 t was above the threshold level (3.5 t), a review was triggered by the harvest strategy to evaluate the risk of the current catch levels to the overall sustainability of the stock. This review will incorporate all available data for Perth herring, which includes age composition data recently collected by Departmental staff. The catch was 3.5 t in 2018.

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<sup>2</sup> See <http://www.fish.wa.gov.au/About-Us/News/Pages/Yellowfin-whiting-population-in-the-black.aspx>, [http://www.fish.wa.gov.au/Documents/other/yellowfin\\_info\\_sheet.pdf](http://www.fish.wa.gov.au/Documents/other/yellowfin_info_sheet.pdf) and <https://twitter.com/FisheriesWA/status/922640613513859072>





**Figure 2.1. Annual commercial catch (tonnes) of Perth herring in the Peel-Harvey Estuary haul and gillnet fishery relative to the associated harvest strategy reference points.**

### 2.1.7 Other finfish species

The combined annual commercial catch of all other species retained in the Peel-Harvey Estuary net fishery has remained low at below 2% of the total catch in the fishery, which is well below the catch threshold level of 5%.

## 2.2 Commercial Trap Fishery

### 2.2.1 Octopus

The only other species retained in the commercial trap fishery for blue swimmer crabs has been octopus, with a catch of 100 kg reported for the 2017/18 fishing season.

### 2.2.2 Bait Usage

As in recent years, commercial monitoring of the trap fishery for blue swimmer crabs shows no change in the use of bait, with around 300 g of locally-caught sea mullet and yelloweye mullet typically used per trap. Due to an increased catch rate of blue swimmer crabs in the 2017/18 fishing season, the bait conversion rate (kg bait used per kg of blue swimmer crab caught) was lower than in the two previous years and more similar to the 2014/15 fishing season (Table 2.2).

**Table 2.2. Summary of bait usage in the Peel-Harvey Estuary commercial trap fishery in 2014/15 to 2017/18**

Year	Total No. of trap lifts	Total crab Catch (kg)	Bait Type	Amount of Bait used per Trap (g)	Total Bait used (kg)	Conversion Rate
2014/15	69,888	96,753	Sea mullet Yelloweye mullet	300	20,966	0.22
2015/16	56,746	57,702	Sea mullet Yelloweye mullet	300	17,024	0.29
2016/17	52,874	55,095	Sea mullet Yelloweye mullet	300	15,862	0.29
2017/18	62,400	96,600	Sea mullet Yelloweye mullet	300	18,720	0.19

### 2.3 Recreational Drop and Scoop Net Fishery

There has been no further information collected on non-target retained catches (or bait) in the recreational drop and scoop net fishery for blue swimmer crabs since that reported in Johnston et al. (2015).

## 3. Bycatch & ETP Species Interactions

Monitoring of bycatch in the commercial finfish and crab fisheries in the PHE is ongoing. Bycatch in the crab trap fishery is recorded by Department staff undertaking monitoring on board commercial vessels. In the net fishery for finfish, discarded catches has been reported by commercial fishers on a voluntary basis since May 2017, with one year of monthly observer trips undertaken to validate the information.

There have been no reported interactions in the commercial WCEMF (Area 2) with Endangered, Threatened or Protected (ETP) species. Although the risk of direct interactions of recreational crab fishers with ETP species is also considered low due to the high selectivity of fishing methods, the potential indirect effect of recreational fishing activities on shorebirds through disturbance is currently being evaluated as part of a project to assess habitat impact of scoop netting in the PHE (see section below).

All available bycatch data, including information on ETP species interactions, will be considered as part of an Ecological Risk Assessment (ERA) of the PHE fisheries in 2020. This assessment will in turn inform the risk-based performance indicators used to monitor bycatch and ETP species in the next version of the harvest strategy for these resources.

## 4. Habitat & Ecosystem

As part of a 3-year project that commenced in 2017 to address the MSC condition on the recreational scoop net fishery for blue swimmer crabs, an assessment of the impact of this fishery on habitats in the Peel-Harvey Estuary is currently being undertaken. The project is

comprised of three separate parts, including (1) a survey of scoop netting effort across broader areas of the estuary, (2) mapping of benthic habitats within the estuary, and (3) an exploration of shorebird data to identify areas/habitats of particular importance.

The sections below provides updates on progress of each of the components of this project, which is due to be completed next year. Once finalised, the results from these studies will be used with any other relevant information to inform the ERA for the PHE in the first half of 2020.

#### 4.1 Scoop-net survey

The roving survey to determine areas of high-, medium- and low-intensity scooping in the Peel-Harvey Estuary was extended for two months, finishing at the end of May 2019. This was done to collect data for an extra mid-season period. Preliminary data analysis has been carried out and is summarised in Table 4.1 and Table 4.2.

The current remote camera network being used to provide ongoing monitoring has cameras located at Coodanup bird-hide, Herron Point campsite and Novara foreshore: ranked third, sixth and eleventh for observed scooping activity during the roving survey (Table 4.3). There has also been a collaboration with the City of Mandurah and DPIRD compliance staff to install cameras at Island Point and Roberts Bay (west) to monitor fishing activity during peak season, as residents and other stakeholders raised concerns about antisocial activity.

It is intended that ongoing, low-level monitoring will continue at both the existing remote camera sites and the new sites at Island Point and Roberts Bay, providing temporal trends in fishing activity. An application has also been submitted for the purchase of two extra cameras to increase the scope of the network at other high-use sites.

**Table 4.1. Proportion of surveyed days that the activity was recorded in each group.**

Group	No. of days surveyed	No activity	Scooping	Scooping & other	Drop net	Netting	Rod & reel	Non-fisher	
Season	Mid_18	8	1.00	0.63	0.13	-	-	0.75	0.5
	Low_18	6	1.00	0.17	-	-	-	-	-
	Closed_18	4	1.00	0.25	-	-	-	0.25	-
	High_18/19	40	1.00	1.00	0.15	0.08	0.13	0.58	0.50
	Mid_19	8	1.00	0.83	-	-	0.25	0.38	0.38
Day Type	Weekday	34	1.00	0.79	0.06	0.03	0.18	0.41	0.32
	Weekend/PH	32	1.00	0.84	0.16	0.06	0.03	0.59	0.50
Time of Day	a.m.	21	1.00	0.81	0.14	-	0.10	0.48	0.52
	noon	21	1.00	0.81	0.14	0.14	0.05	0.86	0.52
	p.m.	24	1.00	0.83	0.04	-	0.17	0.21	0.21
Region	North	42	1.00	0.81	0.07	0.02	0.10	0.45	0.36
	East	48	1.00	0.65	0.08	-	0.04	0.25	0.27
	West	46	1.00	0.67	0.02	0.04	0.04	0.22	0.17

**Table 4.2. Number of people observed undertaking the activity in each stratum**

Stratum		No. of days surveyed	No activity	Scooping	Scooping & other	Drop net	Netting	Rod & reel	Non-fisher
Season	Mid_18	8	-	79	1			21	5
	Low_18	6	-	2					
	Closed_18	4	-	7				2	
	High_18/19	40	-	1438	50	6	14	103	116
	Mid_19	8	-	54			27	9	5
Day Type	Weekday	34	-	280	21	2	39	39	21
	Weekend/PH	32	-	1300	30	4	2	96	105
Time of Day	a.m.	21	-	509	19		3	43	37
	noon	21	-	361	12	6	8	54	71
	p.m.	24	-	710	20		30	38	18
Region	North	42	-	626	17	1	14	89	48
	East	48	-	496	28		15	31	43
	West	46	-	458	6	5	12	15	35

**Table 4.3. The number of scoop-net fishers observed at the highest-use sites during the roving survey in 2018/19. Each site has its associated bird survey area/s and the remote camera status for ongoing monitoring.**

Site	Bird survey area/s	Observed crab fishers	Remote camera site
Island Point	9B; 10B	236	Planned (CoM/FMO)
Herron Point carpark	10A; 10B	187	Potential (DPIRD)
Coodanup bird-hide	3; 5	186	Yes
Batavia Quays	5; 6A	89	
Roberts Bay (west)	7A	87	Planned (FMO)
Herron Point campsite	10A	78	Yes
Dampier Reserve	4	73	
Coodanup Stairs	3	69	Potential (DPIRD)
Coodanup Wanjeep	3	65	
Marina Quays	4	59	
Novara foreshore	4	52	Yes

## 4.2 Habitat information

Updated habitat information for the PHE has been collected as part of an ARC Linkage Project led by scientists at Murdoch University, titled “*Balancing estuarine and societal health in a changing environment*”. As well as developing a hydrological model of the estuary to improve the understanding of water movement and water quality across the system, a key component of this project has involved on-ground surveys of macrophytes (seagrass and macroalgae), benthic invertebrates and fish to develop ecological health indices for the estuary. The macrophyte data has been the focus of a recently completed Honours

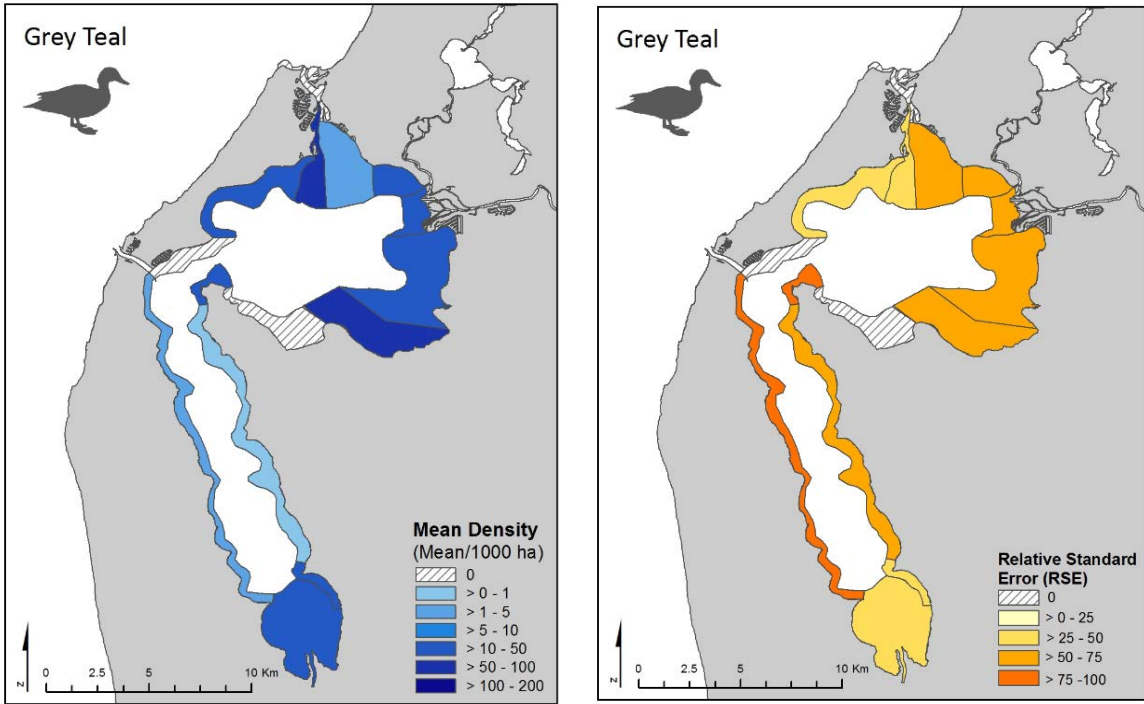
study and will become available on completion of the thesis examination process later this year. The findings of the broader ARC project are currently being finalised as a report.

### **4.3 Shorebird data exploration**

Exploration of data from the Shorebird 2020 monitoring program in the broader Peel-Yalgorup system has progressed, now incorporating all data collected annually between 2008 and 2019 during summer. The selection of key shorebirds to be assessed as part of the ERA has been reviewed by Birdlife WA and four additional migratory species/groups have been added to the initial list of 14 species considered of most interest (see table in Audit 2 addendum document). Although the count data are available for the broader Peel-Yalgorup system, analyses to date have focused on the spatial abundance patterns of each key species/group within the Peel-Harvey Estuary. Thus, a small number of species that have only been recorded outside the estuary areas were excluded from these spatial analyses.

Figure 4.1 provides an example map of the relative densities of the grey teal (*Anas gracilis*) across the count areas in the Peel-Harvey Estuary, standardised for differences in the size of the areas. The data indicate that grey teals typically occur in relatively low numbers across most of the estuary shoreline during summer, noting that densities are presented in categories of mean annual counts per 1000 hectares. It is important to note that differences in the relative densities of a species between the different areas are often not statistically meaningful due to the large variation in counts between years. Despite the large standard errors associated with the mean annual densities for some species (e.g. Figure 4.1), however, presenting the data in this way is still considered useful to visualise any broader differences in the distributions and relative abundances of the key species.

For each of the key species/groups, a review of available literature on their ecological niches will next be undertaken to understand how disturbance by scoop net fishers may affect these shorebirds. Other information that will also be considered as part of the ERA in 2020 includes the findings from a citizen science project on shorebird disturbance, led by Birdlife WA over the 2018/19 summer months.



**Figure 4.1. Mean annual density (per 1000 hectares) and associated relative standard errors of the grey teal in the different count areas within the Peel-Harvey Estuary between 2008 and 2019.**

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## MSC Principle 3

### 5. Management Update

#### 5.1 South-West blue swimmer crab review

The Department has been undertaking a management review of the South-West blue swimmer crab resource. This includes all crab fisheries, both recreational and commercial, between Perth and Cape Naturaliste. As part of the review, the Department released Fisheries Management Paper No. 288 *Protection of the blue swimmer crab resource in the south west* (FMP288) for public comment in October 2018.

FMP288 identified a need to improve protection of breeding stock at the resource level to ensure resilience and ongoing performance of the resource, and examined a range of options to achieve this. Outcomes of the review are likely result in management changes that will affect both recreational and commercial sectors across the resource, including the Peel-Harvey Estuary. Advice on the review has been prepared for consideration by the Minister for Fisheries. The outcomes of the review are likely to be announced before the end of 2019.

#### 5.2 Buy back of commercial licences in the Peel-Harvey Estuary

In September 2018, a Voluntary Fisheries Adjustment Scheme (VFAS) was established to buy back three to five commercial fishing licences in the Peel Harvey Estuary. The objective of the scheme is to undertake a re-allocation of the blue swimmer crab resource from the commercial sector to the recreational sector and ecosystem. The scheme is set to run until 30 June 2020 and is open to offers until 30 April 2020.

Upon completion of the VFAS, the blue swimmer crab harvest strategy will be revised to adjust the catch tolerance range for the commercial sector (currently 45-104 tonnes). The upper tolerance level will be set based on 12 tonnes multiplied by the remaining number of licences. The lower tolerance level will be adjusted proportional to the number of licences removed. The finfish harvest strategy will also be amended such that a yellowfin whiting trigger will be introduced at 10 tonnes annual commercial catch.

The *West Coast Estuarine Managed Fishery Management Plan 2014* will also be revised following the completion of the VFAS to reduce the Area 2 (Peel Harvey Estuary) capacity in proportion to the number of licences that are bought back.

### 6. Compliance & Enforcement

Compliance effort in the PHE, both with regards to overall presence of Fisheries Officers and the number of contacts made with fishers, has remained very similar since 2014/15 (Table 6.1). There were two minor offences detected in the commercial fishery during the 2017/18 fishing season, relating to processing without a licence and failing to furnish returns. An updated summary of offences by recreational fishers is provided in Table 6.2.

Although the data show that retention of undersized crabs remains the main offence type in the recreational crab fishery, the number of prosecution briefs, infringement notices and

warnings recorded in 2017/18 were all lower than the previous year (Table 6.2). Although this, coupled with the stable compliance effort, suggests that the level of non-compliance in this fishery has declined, these data are likely to be heavily influenced by changes in the abundance and availability of crabs between years.

**Table 6.1. A summary of offence data relative to the compliance effort in the broader Peel-Harvey Estuary area, noting that this also incorporates oceanic waters outside of the estuary**

<b>Financial year</b>	<b>Total Presence (Officer Hours) in area</b>	<b>Rec Crabbing Compliance Contacts in area</b>	<b>Rec Crabbing Offences in area</b>	<b>Rec Netting Offences in area</b>
2012/13	3,562	5,854	511	41
2013/14	3,788	9,283	1,058	20
2014/15	4,497	10,930	1,009	49
2015/16	4,898	7,384	773	36
2016/17	4,676	7,013	432	31
2017/18	4,228	7,349	355	13



**Table 6.2. Summary of detected offences by recreational fishers in the Peel-Harvey Estuary between 2014/15 and 2017/18.**

Offence Type	Prosecution Briefs				Infringement Notices				Infringement Warnings			
	14/15	15/16	16/17	17/18	14/15	15/16	16/17	17/18	14/15	15/16	16/17	17/18
<b>Crabbing</b>												
Closed Season			1		13	5	6	2	2	3		2
Closed Waters			1		2			1				
Excess Bag	27	25	22	5	27	8	6	22	102	59	27	22
Excess Gear					1		1		1			
Illegal Gear	2	3	4		14	11	2		10	16	21	2
Licensing												
No Licence					18	8	2	1	4		1	7
Obstruction	8	14	5	6								
Species					5							
Undersize	27	44	28	10	286	256	173	161	450	317	127	113
Processing	3		4			2		1				
Other	7		1									
<b>TOTAL</b>	<b>74</b>	<b>86</b>	<b>66</b>	<b>21</b>	<b>366</b>	<b>290</b>	<b>190</b>	<b>188</b>	<b>569</b>	<b>395</b>	<b>176</b>	<b>146</b>
<b>Netting</b>												
Closed Season		1	3			2			1			
Closed Waters	3	5	6	1		3	7	4	4		1	
Excess Bag		3				1			7			
Illegal Gear	2	7	3	1	4	3	1		7		3	2
No Licence		1		1	4	1	1	2			1	
Undersize		2			5				1			
Other			2		7	3	2	1	4	4	1	1
<b>TOTAL</b>	<b>5</b>	<b>19</b>	<b>14</b>	<b>3</b>	<b>20</b>	<b>13</b>	<b>11</b>	<b>7</b>	<b>24</b>	<b>4</b>	<b>6</b>	<b>3</b>

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