

Ecological indicator report for the Vasse-Wonnerup Wetlands – Black Bream 2021

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Methods

Sampling of Black Bream was undertaken at eight sites in the Wonnerup Inlet and Deadwater regions of the Vasse-Wonnerup Wetlands in spring (November) and summer (January/February). Due to the large fish kill occurring in the Vasse Estuary Channel during June 2021 an additional four sites were sampled in this region. Monitoring and calculation of indices were undertaken following the methodology outlined in Cottingham et al. (2023). In brief, the number, size and length of Black Bream are used to calculate an index of i) recruitment, i.e. a measure of breeding success and survival of juvenile fish, and ii) a body condition index, that indicates how healthy fish are. The values for each index are compared to a suite of reference conditions and assigned a grade from A (*Very good*) to E (*Very poor*). The grade for each year relates to the year in which the November sampling was conducted in.

Key findings and observations 2021

- A total of 192 Black Bream was collected throughout Wonnerup Inlet and the Deadwater in November 2021 and January 2022. Of these fish, 176 were recorded in seine nets and 11 from gill nets.
- Catches of juveniles Black Bream in seine nets in November 2021 and January 2022 were similar those recorded in the preceding year. Most fish were recorded at sites located at the northern end of the Deadwater and near the surge barriers in Wonnerup Inlet.
- Recruitment in 2021 was rated as D (*Poor*) but was only a very slight reduction from that in 2020. Considering an estimated 10,000 adult Black Bream died in the June 2021 fish kill which occurred prior to the spawning season in the Vasse-Wonnerup, numbers of juvenile Black Bream in 2021 were greater than expected based on the recruitment failure seen after the April 2013 fish kill, which reduced the number of adult fish (i.e. the spawning stock). This could be related to the higher-than-average rainfall in 2021.
- No adult Black Bream were recorded in gill nets in either Wonnerup Inlet or the Deadwater in November 2021. This was the first time no individuals had been recorded in these regions since sampling began in 2013. However, a total of 11 fish were recorded in January 2022.
- On the basis of these low catches, a reliable body condition index value was not able to be calculated. The low catches would reflect, at least in part, the loss of considerable numbers of adult Black Bream in the June 2021 fish kill event.

Triggers and management

- Triggers have yet to be established.

Recommendations

- Given the large number of Black Bream (~10,000) that were estimated to have died in the fish kill event in June 2021 monitoring must continue to allow the longer-term effects of the event to be quantified.
- Large growths of the reef-forming polychaete worm *Ficopomatus enigmaticus* were observed on the sides of the fish gate partially obstructing the passage through the Vasse surge barrier. PIT-tagging data suggested fewer fish had travelled through than in previous years. To facilitate the movement of Black Bream through the fish gate the worm mounds should be removed.

Results

Table 1. Average number of juvenile Black Bream caught (100 m⁻²) in November 2021 and January 2022 (\pm 1 standard error) and the associated recruitment index grade.

Ecological region	Black Bream density	Grade
Vasse-Wonnerup Wetlands	4.77 \pm 1.1	D

Table 2. Recruitment index grade for each year where data are available.

Ecological region	2011	2012	2013	2014	2015	2016
Vasse-Wonnerup Wetlands	A	B	E	D	C	D
	2017	2018	2019	2020	2021	
Vasse-Wonnerup Wetlands	C	D	N/A	D	D	

* No sampling was conducted in 2019.

Table 3. Average weight at 250 mm total length of Black Bream (\pm 1 standard error) and the associated body condition grade.

Ecological region	Weight (g)	Grade
Vasse-Wonnerup Wetlands	N/A	N/A

* Insufficient numbers of Black Bream were caught to be able to reliably calculate this index.

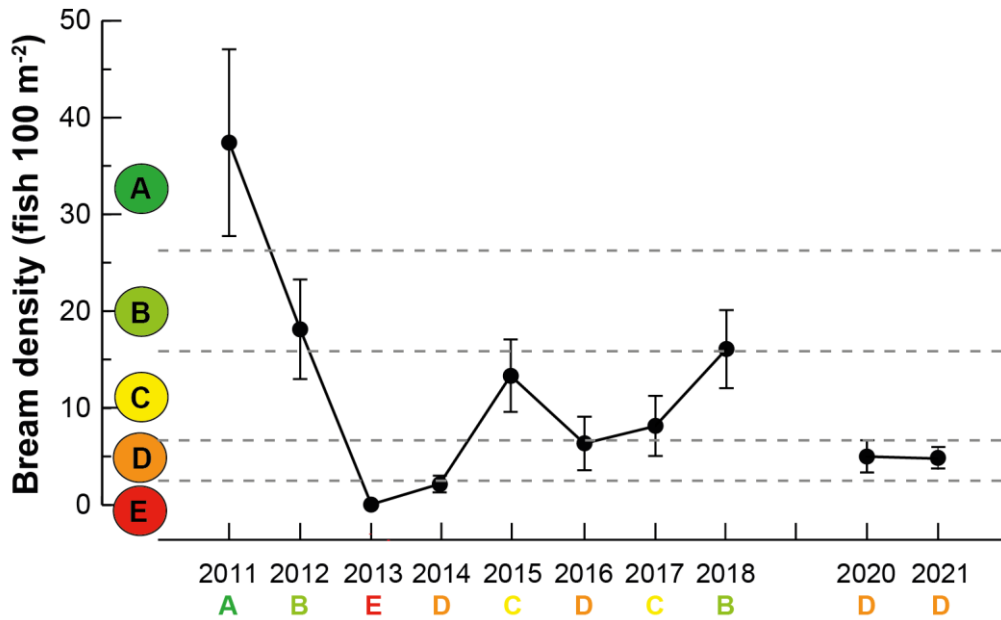
Table 4. Body condition grade for each year where data are available.

Ecological region	2011	2012	2013	2014	2015	2016
Vasse-Wonnerup Wetlands	N/A	N/A	A	B	N/A	N/A
	2017	2018	2019	2020	2021	
Vasse-Wonnerup Wetlands	N/A	E	N/A	D	N/A	

* Sampling was only conducted in 2013, 2014, 2018, 2020 and 2021.

Appendices

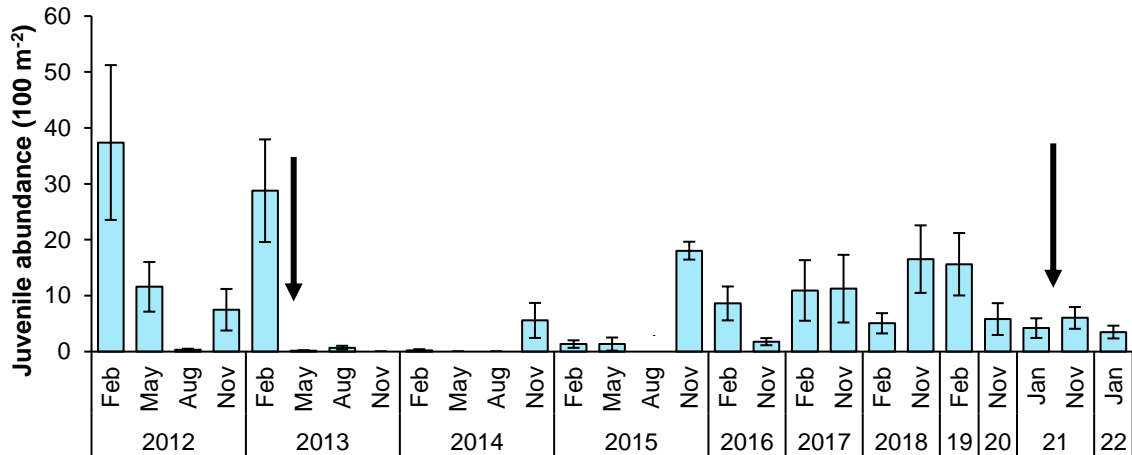
Appendix 1. Average recruitment index scores (± 1 standard error) for the abundance of juvenile Black Bream in the Vasse-Wonnerup between 2011 and 2021. Colour shading depicts the thresholds for each health grade from A (Very good) to E (Very poor). Note that no sampling was conducted in 2019.



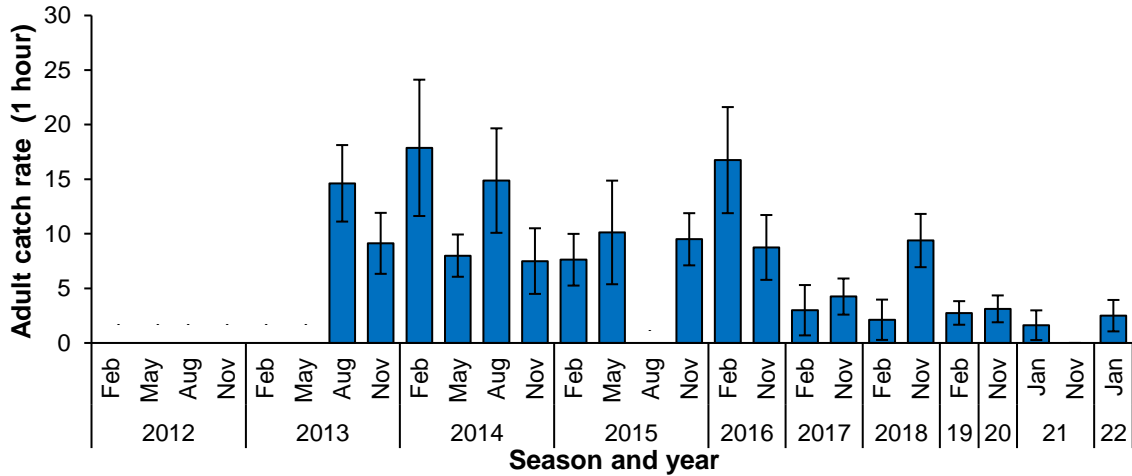
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Appendix 2. (a) Average density (± 1 standard error) of juvenile Black Bream (fish 100 m^{-2}) recorded from 21.5 m seine nets in the shallow, nearshore waters and (bottom) mean catch rate (± 1 standard error) of adult Black Bream (fish hour $^{-1}$) recorded from 160 m gill nets in the deeper, offshore waters of the Wonnerup Inlet and Deadwater regions of the Vasse-Wonnerup in seasons between February 2012 and January 2022. Black arrows denotes the approximate time at which the large fish kills have occurred and * seasons in which no sampling was undertaken.

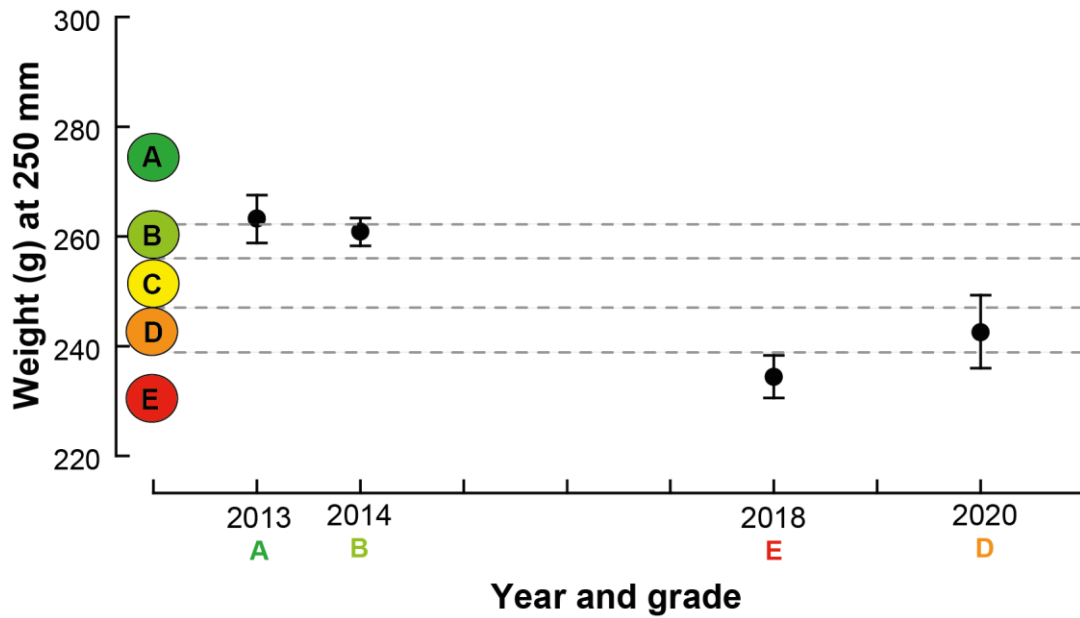
(a)



(b)



Appendix 3. Average body condition index scores (and 95% confidence interval) for Black Bream in the Vasse-Wonnerup between 2013 and 2021. Colour shading depicts the thresholds for each grade from A (*Very good*) to E (*Very poor*). Note this index was not able to be calculated in 2021 due to low numbers of about Black Bream being caught.



References

Cottingham, A., Cronin-O'Reilly, S., Beatty, S.J., Tweedley, J.R., 2023. Development of indicators for assessing Black Bream health in the Vasse-Wonnerup Wetlands Murdoch University, Perth, Western Australia, Report for the Department of Water and Environmental Regulation, p. 24.