Ecological indicator report for the Vasse-Wonnerup Wetlands – Black Bream 2022

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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 2021) and summer (January/February 2022). 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 (*Excellent*) 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 2022

- A total of 1,280 Black Bream was collected throughout Wonnerup Inlet and the Deadwater in November 2021 and January 2022. Of these fish, 1,230 were recorded in seine net (mean density = 33 fish per 100 m^2; Table 1), and 50 from gill nets (catch rate = 3.13 fish per hour).
- Catches of juveniles Black Bream in seine nets in November 2022 where the highest ever recorded in any of the 28 previous sampling occasions dating back to 2012 (Appendix 2). While, catches were lower in January 2023 than the November 2022, they were amongst the greatest recorded at any time since the 2013 fish kill. Most fish were recorded at sites throughout the Deadwater and near the surge barriers in Wonnerup Inlet.
- Recruitment in 2022 was the second highest recorded and rated as A (*Excellent*) (Table 1). It was the first time since the 2013 fish kill that recruitment was assessed as *Excellent*, this was despite an estimated 10,000 adult Black Bream dying in June 2021 in a major fish kill and subsequent recruitment that year being rated as D (*Poor*) (Table 2).
- The recruitment of Black Bream can be variable and it is likely that the success of the 2022 recruits was due to strong freshwater flow and the presence of macroalgae in the Deadwater. Algae would provide shelter for the larvae from predators and increase survival.
- Numbers of adult Black Bream in gill nets were in line with those recorded from 2017 onwards and were slightly greater than those recorded in 2021 (Appendix 3).
- Sufficient Black Bream were caught to produce a reliable body condition index, with a estimated average weight at 250 mm total length of 270g (Table 3). This was the highest recorded and the first time since 2013 this index had received a rating of A (*Excellent*) (Table 4). The healthy state of the fish (i.e. a good body weight for their size) indicates that there were abundant quantities of food, typically benthic invertebrates, available. It is likely that the strong freshwater flow recorded in 2021 and 2022 stimulated productivity in Wonnerup Inlet and the Deadwater increasing the densities of prey species.

Triggers and management

- Triggers have yet to be established.

Recommendations

- Given the strong recruitment success of juveniles in 2022 annual monitoring should continue for several years to determine if these individuals obtain sexual maturity, contribute to future recruitment events and increase the abundance of larger (adult) fish. Current densities of adult fish are substantially below those recorded between 2013 and 2016.

Results

Table 1. Average number of juvenile Black Bream caught (100 m^{-2}) in November 2022 and January 2023 (± 1 standard error) and the associated recruitment index grade.

Ecological region	Black Bream density	Grade
Vasse-Wonnerup Wetlands	33.12 ± 11.6	A

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	2022
Vasse-Wonnerup Wetlands	C	D	N/A	D	D	A

** No sampling was conducted in 2019.*

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

Ecological region	Weight (g)	Grade
Vasse-Wonnerup Wetlands	270.4	A

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

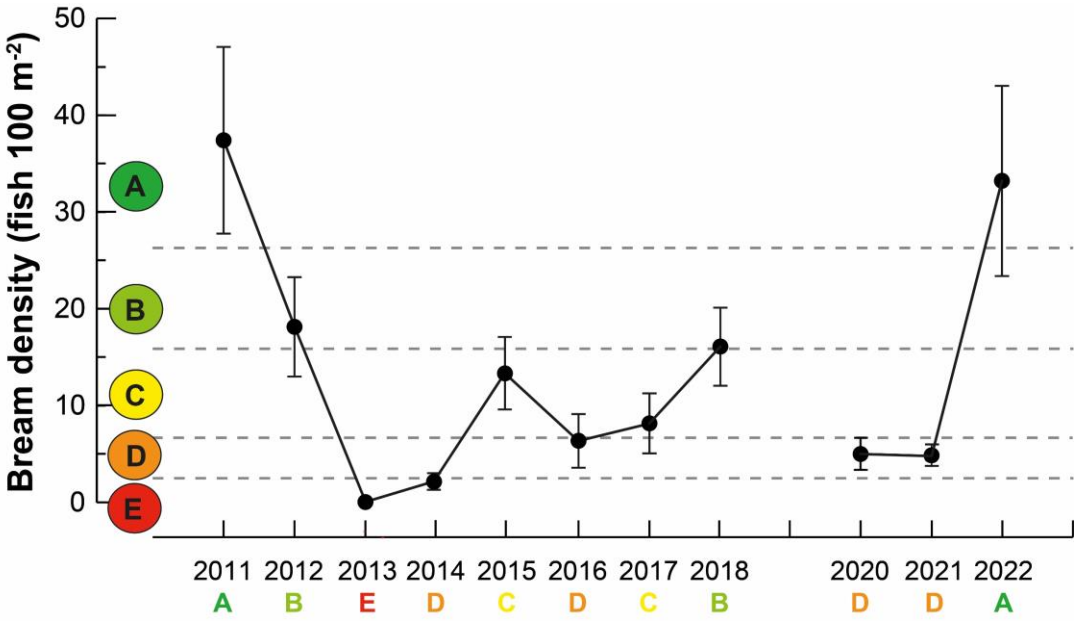
Table 4. Body condition grade for each year where data are available.

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	2022
Vasse-Wonnerup Wetlands	N/A	E	N/A	D	N/A	A

** Sampling was only conducted in 2013, 2014, 2018, 2020 and 2021. Note that on the basis of low catches following the 2021 fish kill, a reliable body condition index value was not able to be calculated in that year.*

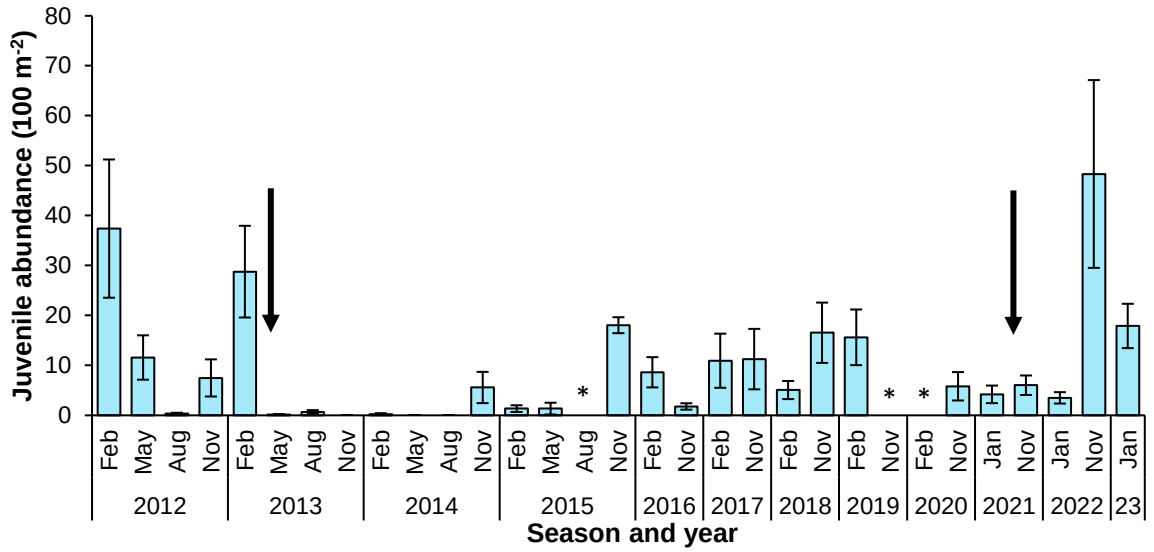
Appendices

Appendix 1. Average recruitment index scores (± 1 standard error) for the abundance of juvenile Black Bream in the Vasse-Wonnerup between 2011 and 2022. 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.

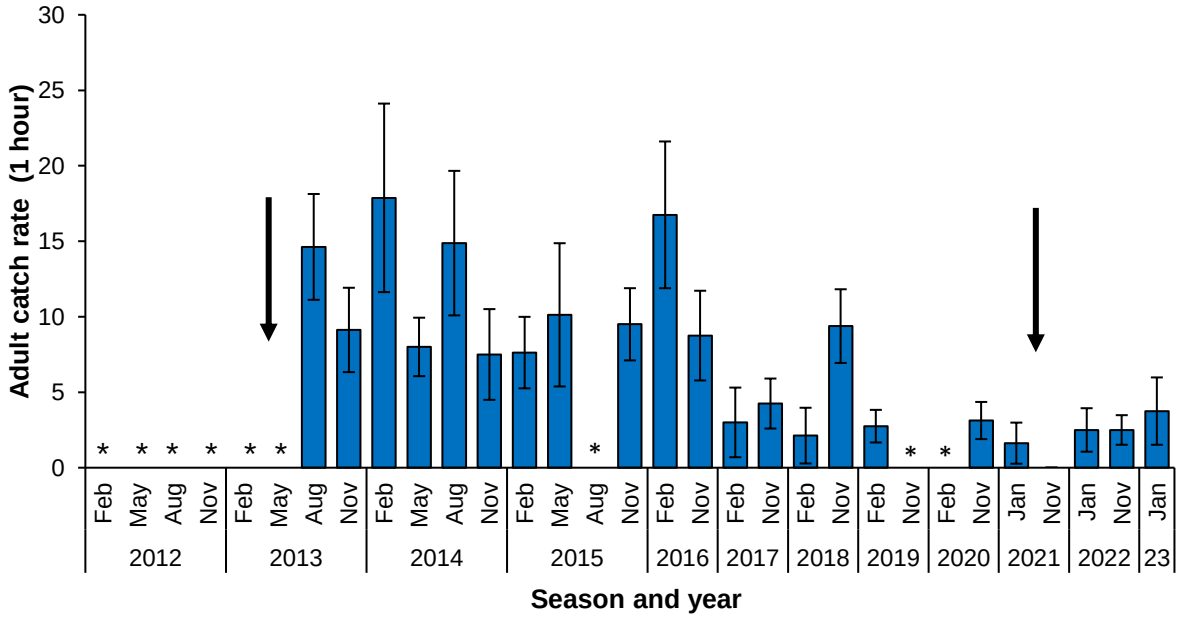


Appendix 2. (a**)** Average density (± 1 standard error) of juvenile Black Bream (fish 100 m^{-2}) recorded from 21.5 m seine nets in the shallow, nearshore waters and (bottom) mean catch rate (± 1 standard error) of adult Black Bream (fish $hour^{-1}$) recorded from 160 m gill nets in the deeper, offshore waters of the Wonnerup Inlet and Deadwater regions of the Vasse-Wonnerup in seasons between February 2012 and January 2023. Black arrows denotes the approximate time at which the large fish kills have occurred and * seasons in which no sampling was undertaken.

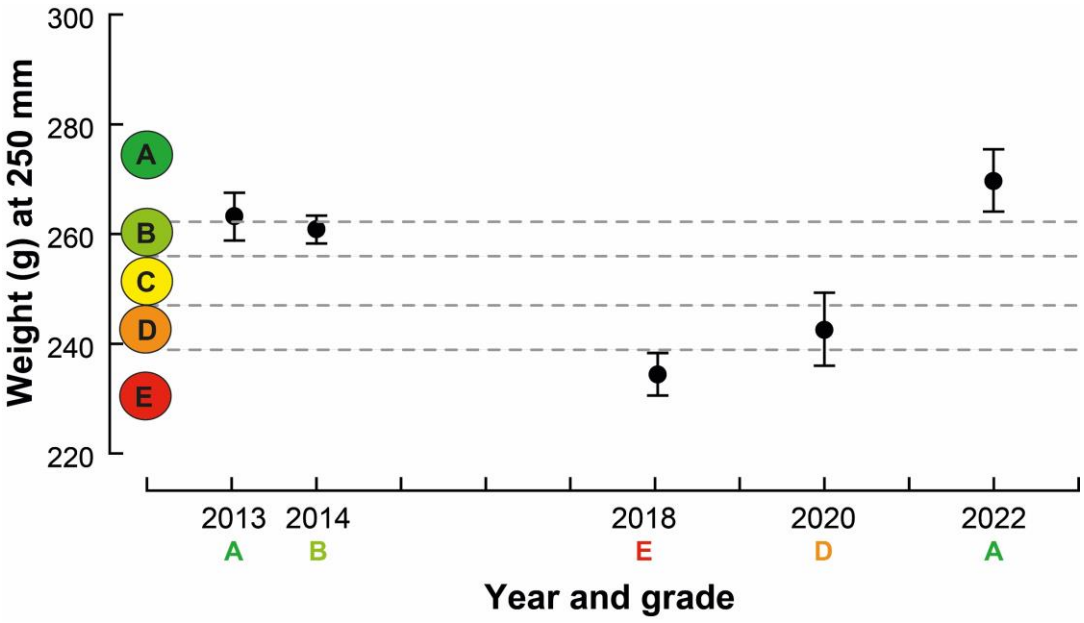
(a)



(b)



Appendix 3. Average body condition index scores (and 95% confidence interval) for Black Bream in the Vasse-Wonnerup between 2013 and 2022. 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.