The following supplements accompany the article

Role of benthic habitat structure and riverine connectivity in controlling the spatial distribution and ecology of estuarine fish

Ryan J. Woodland*, Fiona Y. Warry, Yafei Zhu, Ralph Mac Nally, Paul Reich, Gregory P. Jenkins, David Brehm, Perran L.M. Cook

*Corresponding author: woodland@umces.edu

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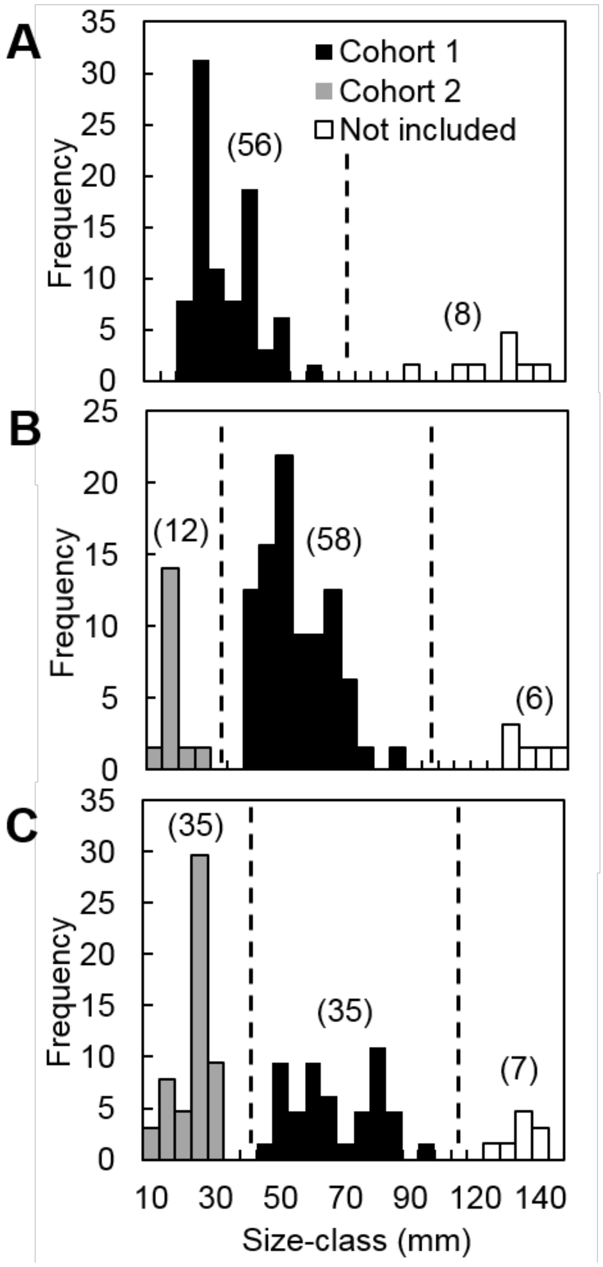
Supplementary material: Supplements S1, S2 and S3

Supplement S1. Cohort separation

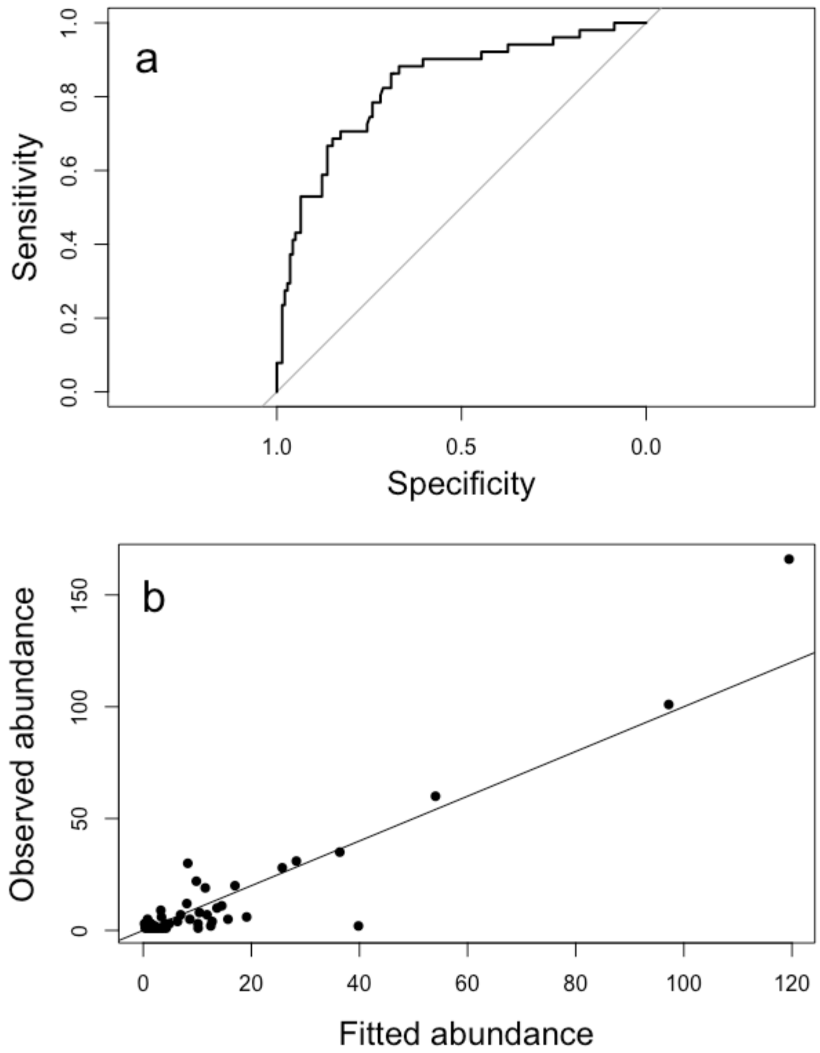
The size-structure of individuals of bream caught in 2016 indicated that individuals originated from multiple-spawning events given clearly demarcated length modes (Supplemental Material, Figure S.2). Size-at-settlement and subsequent growth can influence stable-isotope equilibration schedules (Herzka 2005) and juveniles spawning at different times can encounter different feeding conditions after settlement despite recruiting to the same geographic area. Thus, the identical treatment of multiple juveniles of different age and environmental histories could reduce the precision of model estimates. Modal length structure showed that there were at least two and possibly three cohorts. Initial testing showed that separation of the larger (i.e., older) cohort into two cohorts did not affect statistical results. Therefore, we allocated individual bream to one of two cohorts, an older cohort that was present at the start of sampling in February, or a younger cohort that recruited during the March sampling. These cohort assignments and size-based interactions were included as variables in stable-isotope statistical modelling. There is currently no evidence of size-based differences in habitat selection by post-settlement juvenile bream, so cohort variables were not considered for models of occurrence or abundance.

Figure S1. Modal total length frequencies of black bream *Acanthopagrus butcheri* showing cohort-specific size-distribution by 5-mm increment size-classes from (a) February, (b) March, and (c) April sampling of the Gippsland Lakes, Australia, in 2016. Individual size-classes were allocated to cohorts by visual examination of the progression of length modes. Parenthetical numbers next to color-coded histograms indicate number of individuals per size-class.



Supplement S2. Statistical model fit figure

Figure S2. (a) ROC (receiver-operator curve) illustrating the performance of the occurrence model for juvenile black bream *Acanthopagrus* butcheri. (b) Observed vs fitted abundance values for the abundance-when-present model for juvenile bream.



Supplement S3. Fish assemblage composition

Table S1. A summary of the taxa included in the multivariate analysis and calculations of taxonomic richness. Total number of occurrences (N_O), % frequency of occurrence (%FO) and %FO for each taxon within each of the four habitat types (Unveg. = unvegetated, Frag. = fragmented vegetation and unvegetated bottom, Veg. = continuous vegetation cover, Struct. = non-biogenic structure) is shown. Aggregations of higher resolution taxa into lower resolution taxonomic categories were necessary to standardize interannual differences in field methods (see footnotes).

			Habitat type			
Taxonomic group	N_O	%FO	Unveg.	Frag.	Veg.	Struct.
Acanthopagrus butcheri	1	25%	6%	32%	40%	29%
Ambassis jacksoniensis	48	26%	21%	16%	33%	43%
Ammotretis rostratus	50	3%	4%	3%	1%	14%
Anguilla australis	6	2%			5%	
Arripis trutta	4	3%	4%		1%	14%
Atherinosoma microstoma	5	53%	54%	55%	53%	29%
Blenniidae	100	1%	1%			
Diodon nicthemerus	1	1%		3%	1%	
Engraulis sp.	2	2%	1%		4%	
Enoplosus armatus	4	2%			5%	
Euprymna tasmanica	4	2%	1%		2%	
Galaxias maculatus	3	7%	6%	10%	6%	14%
Girella tricuspidata	13	16%	1%	13%	31%	
Gobiidae[1]	30	92%	93%	84%	94%	86%
Gymnapistes marmoratus	174	22%	8%	13%	37%	29%
Hyperlophus vittatus	42	1%	1%			
Hyphoramphus spp.[2]	33	17%	17%	19%	19%	
Macquaria colonorum	4	2%	1%	3%	2%	
Monocanthidae[3]	9	5%	1%		9%	14%
Mugilidae[4]	23	12%	13%	16%	10%	14%
Neoodax balteatus	3	2%		3%	2%	
Pictilabrus laticlavius	1	1%			1%	
Platycephalus sp.	1	1%	1%			
Pomatomus saltratrix	5	3%	3%	3%	2%	
Pseudaphritis urvillii	5	3%		3%	5%	
Retropinna semoni	2	1%	1%		1%	
Rhombosolea tapirina	1	1%		3%		
Sillaginodes punctatus	2	1%	3%			
Sphyraena novaehollandiae	1	1%			1%	
Syngnathidae[5]	82	43%	27%	35%	63%	14%
Tetractenos glaber	8	4%	4%	3%	5%	
Triglidae	1	1%	1%			

[1] The following species were aggregated within the Gobiidae family: *Afurcagobius tamarensis, Arenigobius bifrenatus, Arenigobius frenatus, Favonigobius lateralis, Gobiopterus semivestitus, Redigobius macrostoma, Pseudogobius olorum*.

[2] The following species were aggregated within the Hyporhamphus genus: *Hyporhamphus melanochir, Hyporhamphus regularis.*

[3] The following species were aggregated within the Monacanthidae family: *Meuschenia freycineti, Scobinichthys granulatus.*

[4] The following species was assigned to the Mugilidae family: *Aldrichetta forsteri*.

[5] The following species were aggregated within the Syngnathidae family: *Stigmatopora argus, Stigmatopora nigra, Pugnaso curtirostris.*

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