

Competitive hierarchies among three species of juvenile coral reef fishes

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Supplement 1. The structure of the background fish community on experimental patch reefs

Table S1. The mean number of individuals for each species comprising the background fish community on live-coral patch reefs. Surveys were conducted the day immediately before deployment of fishes in each temporal block, with 30 reefs surveyed on 20 May 2008 and 24 reefs surveyed on 1 June 2008. Predator species that we suspect as agents of mortality of focal individuals are highlighted in **bold** but do not include transient species not captured in surveys that were observed visiting reefs during the course of the study, including Carangidae, *Aulostomus chinensis*, *Bothus* spp., *Cheilinus trilobatus*, *Saurida gracilis* and *Synodus binotatus*

Family	Species	Functional group	Mean	SE
Acanthuridae	<i>Acanthurus olivaceus</i>	Herbivore	0.10	0.05
	<i>Acanthurus triostegus</i>	Herbivore	1.08	0.20
	<i>Naso annulatus</i>	Planktivore/Herbivore	0.22	0.10
Apogonidae	<i>Apogon fraenatus</i>	Planktivore	0.08	0.05
	<i>Arothron hispidus</i>	Omnivore	0.02	0.02
Balistidae	<i>Balistapus undulatus</i>	Omnivore	0.02	0.02
Chaetodontidae	<i>Chaetodon citrinellus</i>	Omnivore	1.28	0.21
Diodontidae	<i>Diodon hystrix</i>	Carnivore	0.02	0.02
Holocentridae	<i>Neoniphon sammara</i>	Carnivore	0.12	0.08
Labridae	<i>Halichoeres trimaculatus</i>	Carnivore	1.18	0.19
	<i>Scarus psittacus</i>	Herbivore	0.05	0.04
	<i>Scarus sordidus</i>	Herbivore	1.35	0.21
	<i>Stethojulis bandanensis</i>	Carnivore	0.43	0.10
Lethrinidae	<i>Thalassoma amblycephalum</i>	Planktivore	0.03	0.02
	<i>Monotaxis grandoculis</i>	Carnivore	0.03	0.04
Mullidae	<i>Mulloidichthys flavolineatus</i>	Carnivore	0.02	0.02
	<i>Parupeneus multifasciatus</i>	Carnivore	0.03	0.02
Muraenidae	<i>Echnidna nebulosa</i>	Carnivore	0.02	0.02
	<i>Gymnothorax javanicus</i>	Carnivore	0.02	0.02
Pinguipedidae	<i>Parapercis millepunctata</i>	Carnivore	0.20	0.05
Pomacanthidae	<i>Centropyge flavissimus</i>	Herbivore	0.03	0.02
	<i>Pomacanthus imperator</i>	Omnivore	0.02	0.02
Pomacentridae	<i>Chrysiptera brownriggii</i>	Omnivore	0.23	0.06
	<i>Dascylus aruanus</i>	Planktivore/Herbivore	0.47	0.10
	<i>Dascylus flavicaudus</i>	Planktivore	0.92	0.18
	<i>Pomacentrus pavo</i>	Planktivore/Herbivore	2.65	0.31
Tetraodontidae	<i>Canthigaster bennetti</i>	Omnivore	0.52	0.16
	<i>Canthigaster solandri</i>	Omnivore	0.10	0.04
	<i>Canthigaster valantini</i>	Omnivore	0.03	0.02

Supplement 2. Illustration of randomization procedures to test for (A) competitor effects and (B) competitive asymmetry

Reef	Competitor present (<i>P</i>)				Competitor absent (<i>A</i>)			
	A	B	C	D	E	F	G	H
Sp_i	0.45	0.32	0.56	0.38	0.62	0.54	0.72	0.66
Sp_j	0.52	0.57	0.47	0.39	0.78	0.68	0.74	0.82

A. Illustration of metric calculations to test for competitor effects. The sample matrix has 2 species (Sp_i and Sp_j) and values of proportional survival for each species in the presence and absence of the other species. For the analysis of competitor effects, we calculate the mean proportional survival for each species on reefs where competitors are present ($\bar{P}_i = 0.428$; $\bar{P}_j = 0.488$) and absent ($\bar{A}_i = 0.635$; $\bar{A}_j = 0.755$). The difference between these 2 is the test metric ($D_{ij} = -0.207$; $D_{ji} = -0.275$) that is compared to randomizations. As we are interested in whether the presence of competitors affects proportional survival, we remove the effect of competitor presence by randomizing observed proportional survival for each focal species across all reefs. Red and blue boxes encompass reefs across which values are randomized for Sp_i and Sp_j , respectively

Reef	Competitor present (<i>P</i>)				Competitor absent (<i>A</i>)			
	A	B	C	D	E	F	G	H
Sp_i	0.45	0.32	0.56	0.38	0.62	0.54	0.72	0.66
Sp_j	0.52	0.57	0.47	0.39	0.78	0.68	0.74	0.82

B. Illustration of metric calculations to test for asymmetric competition. The sample matrix has 2 species (Sp_i and Sp_j) and values of proportional survival for each species in the presence and absence of the other species. For the analysis of competitor effects, we calculate mean proportional survival for each species on reefs where competitors are present ($\bar{P}_i = 0.428$; $\bar{P}_j = 0.488$) and absent ($\bar{A}_i = 0.635$; $\bar{A}_j = 0.755$). The difference between these 2 is D ($D_{ij} = -0.207$; $D_{ji} = -0.275$), which is compared to randomizations. The difference between D_{ij} and D_{ji} is the test metric ($CA_{ij} = 0.068$). If the null hypothesis is true (i.e. competitive effects are symmetric), $D_{ij} = D_{ji}$; alternatively, if competitive effects are asymmetric, $D_{ij} \neq D_{ji}$. As we are interested in whether D differs among the focal species, we remove the effect of focal species identity by randomizing observed proportional survival across all reefs within competitor-present (red box) and competitor-absent (blue box) treatments