

Ecography

**ECOG-01093**

Taylor, B. M., Lindfield, S. J. and Choat, J. H. 2014. Hierarchical and scale-dependent effects of fishing pressure and environment on the structure and size distribution of parrotfish communities. – *Ecography* doi: 10.1111/ecog.01093

**Supplementary material**

Supplementary material

Appendix 1

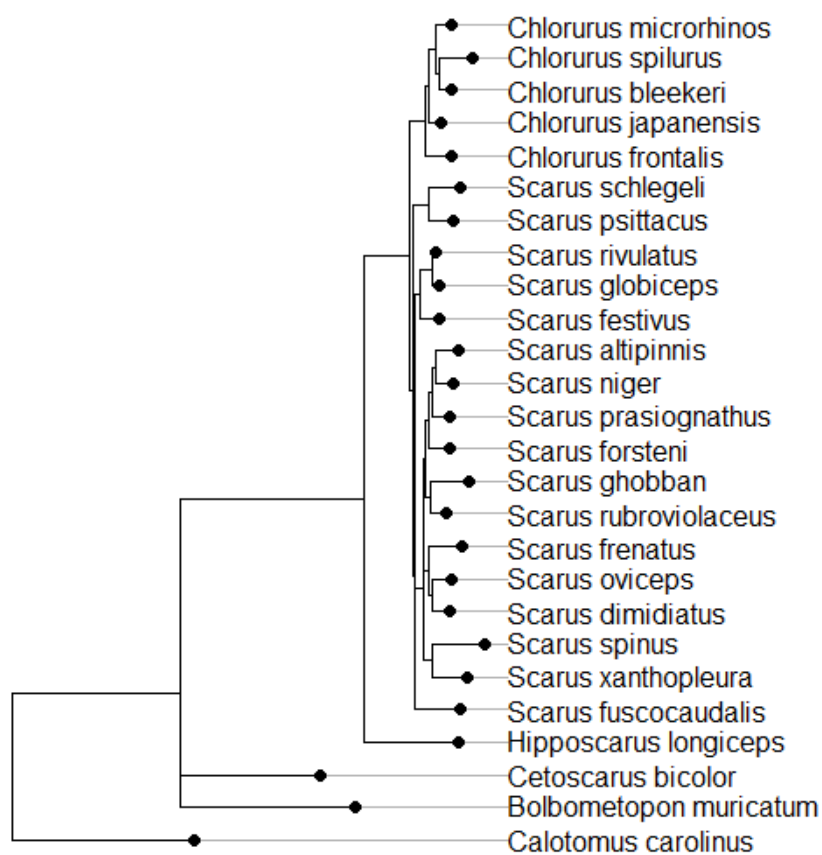


Figure A1. Phylogenetic tree of 26 parrotfish species surveyed in Micronesia. This reduced tree was derived from Choat et al. (2012) and was used in calculations of phylogenetic diversity.

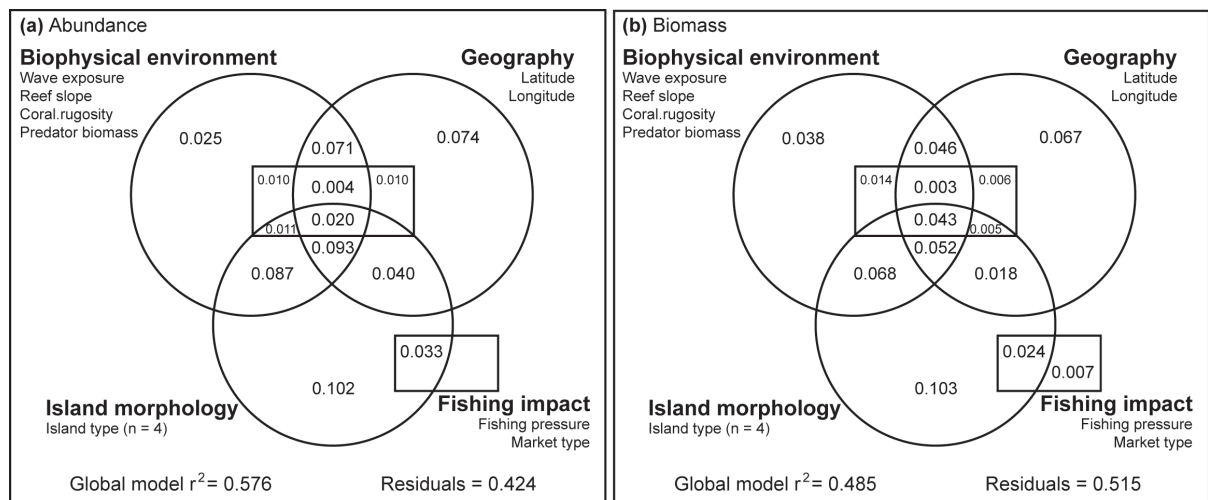


Figure A2. Venn diagrams describing the partitioning of variance among explanatory subsets for (a) abundance and (b) biomass trends of parrotfish assemblages across eight islands in Micronesia. Variance portions less than zero are not displayed.

Table A1. Parsimoniously selected optimal redundancy analysis models for Guam and atoll reef systems based on patterns of parrotfish biomass and abundance. Significance levels based on permutation tests are indicated for individual explanatory variables and for models (\*\*  $P < 0.01$ , \*  $P < 0.05$ , -  $P < 0.10$ , NS  $P > 0.10$ ).

System	Optimal model components	Variance explained (%)	Significance level
Guam (biomass)	Fishing pressure	16.9	**
	Wave exposure	9.6	*
	Adjacent habitat	6.0	NS
	Total variance explained	<b>29.4</b>	**
Guam (abundance)	Coral rugosity	12.6	**
	Wave exposure	9.4	*
	Fishing pressure	8.8	*
	Adjacent habitat	7.4	-
	Total variance explained	<b>31.8</b>	**
Atolls (biomass)	Coral rugosity	13.5	*
	Total variance explained	<b>13.5</b>	*
Atolls (abundance)	Coral rugosity	13.7	*
	Predator biomass	3.9	NS
	Total variance explained	<b>23.4</b>	**

Table A2. Analysis of variance table for the optimal linear mixed effects models (based on AICc) for mean length across eight islands in Micronesia for (a) all parrotfishes combined and widespread species (b) *Chlorurus microrhinos*, (c) *Chlorurus spilurus*, (d) *Scarus forsteni*, (e) *Scarus rubroviolaceus* and (f) *Scarus schlegeli*.

(a) All parrotfishes combined

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	45	2988	<0.0001	
Fishing pressure	1	45	7.7	0.0082	-
Island type	3	4	10.4	0.0234	(categorical variable)

(b) *Chlorurus microrhinos*

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	39	577.1	<0.0001	
Fishing pressure	1	39	6.0	0.0188	-
Exposure	1	39	3.7	0.0611	+

(c) *Chlorurus spilurus*

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	41	4320.2	<0.0001	
Fishing pressure	1	41	8.9	0.0048	-
Island type	3	4	6.8	0.048	(categorical variable)

(d) *Scarus forsteni*

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	38	1148.9	<0.0001	
Island type	3	4	3.0	0.1548	(categorical variable)
Exposure	1	38	3.0	0.0898	+

(e) *Scarus rubroviolaceus*

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	31	1098.5	<0.0001	
Fishing pressure	1	31	3.0	0.0919	-
Slope	1	31	10.2	0.0033	+

(f) *Scarus schlegeli*

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	35	3381.4	<0.0001	
Island type	3	4	10.6	0.0225	(categorical variable)
Latitude	1	35	4.5	0.0416	-
Longitude	1	35	10.8	0.0024	-

Table A3. Analysis of variance table for the optimal linear mixed effects models (based on AICc) for (a) species richness, (b) biomass-weighted phylogenetic diversity and (c) abundance-weighted phylogenetic diversity of parrotfish assemblages across eight islands in Micronesia. Directions of responses (positive or negative) to each explanatory variable are indicated.

(a) Species richness

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	45	1112.9	<0.0001	
Island type	3	4	13.2	0.0153	(see Fig. 5)
Coral.rugosity	1	45	4.9	0.0315	+
Slope	1	45	5.4	0.0249	-

(b) Biomass-weighted phylogenetic diversity

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	47	617.0	<0.0001	
Island type	3	4	18.0	0.0087	(see Fig. 5)

(c) Abundance-weighted phylogenetic diversity

Variable	numDF	denDF	F	P	Coefficient response
Intercept	1	45	617.0	<0.0001	
Coral.rugosity	1	45	7.56	0.0086	-
Fishing pressure	1	45	3.77	0.0585	-

### Supplemental References

Choat, J. H., et al. 2012. Patterns and processes in the evolutionary history of parrotfishes (Family Labridae). – Biol. J. Linn. Soc. 107: 529-557.