

The following supplement accompanies the article

Coupling remote sensing with *in situ* surveys to determine reef fish habitat associations for the design of marine protected areas

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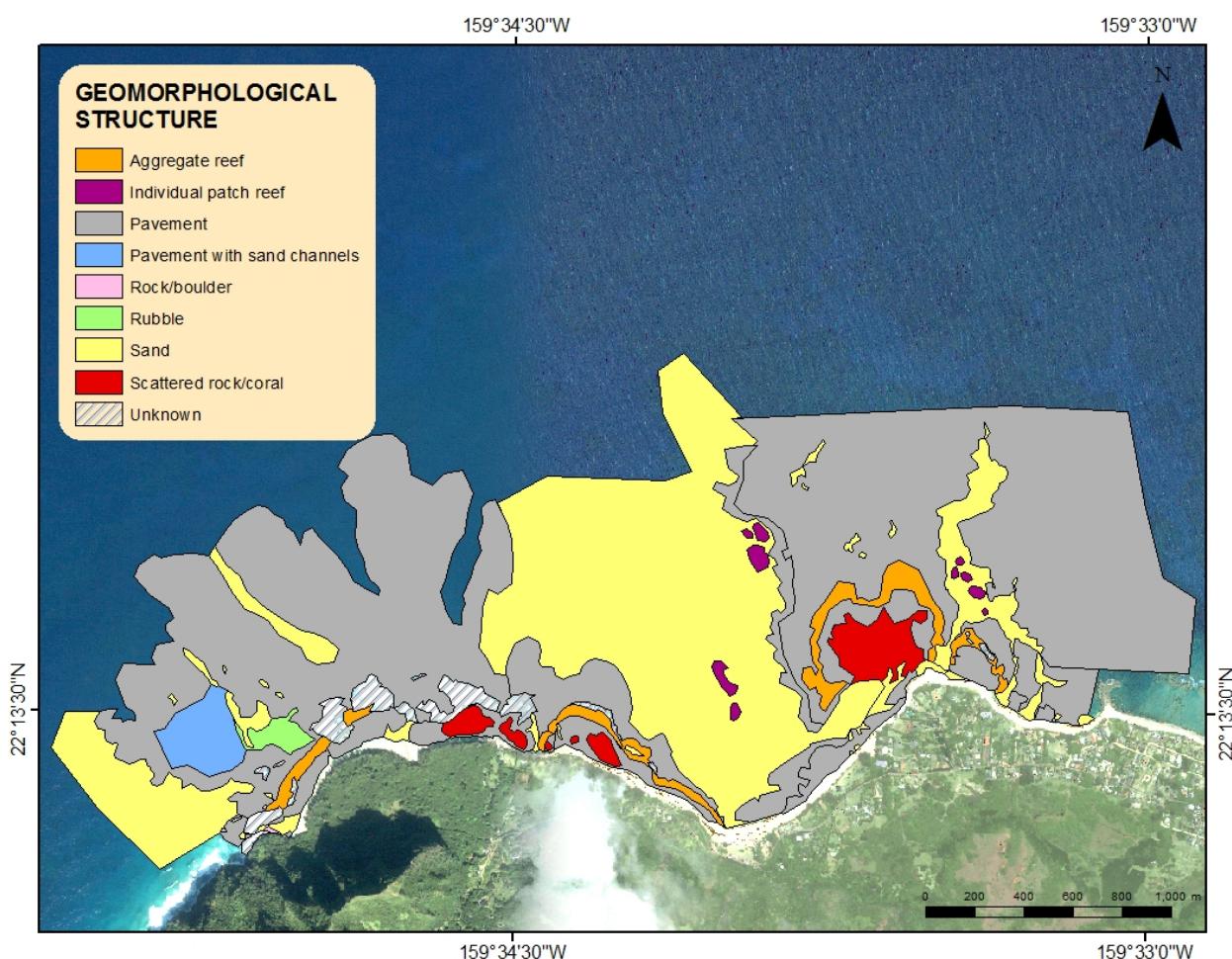


Fig. S1. Geomorphological structure habitat map of study area of Hā'ena, Kaua'i, based on visual interpretation of satellite imagery.

Table S1. Explanatory variable transformations. The same transformations were applied to remotely sensed explanatory variables among all spatial scales (20, 40, 60, 80, 100, 150, 200, and 300 m radii). “Log” is log base 10.

Dataset	Explanatory variable	Transformation
<i>In situ</i> biological cover	Coral	$\text{Arcsin}(\sqrt{X})$
	Coralline algae	$\text{Log}(1000X + 1)$
	Macroalgae	$\text{Arcsin}(\sqrt{X})$
	Substrate	$\text{Log}(1000X + 1)$
	Turf algae	(none)
	Depth	$\text{Log}(X)$
	Rugosity	$\text{Log}(X)$
	Shannon-Wiener diversity index	(none)
Remotely sensed geomorphological structure	Aggregate reef	$\text{Log}(1000X + 1)$
	Pavement	$\text{Arcsin}(\sqrt{X})$
	Sand	$\text{Log}(1000X + 1)$
	Scattered rock and coral	$\text{Log}(1000X + 1)$
	Distance to shore	$\text{Log}(X + 1)$
	Distance to reef crest	$\text{Log}(X + 1)$
	Shannon-Wiener diversity index	(none)

Table S2. Correlation matrix for variables included in the integrated analysis. Strongest correlations are in bold.

	AggReef	Pavement	Sand	ScatRockCor	DtoShore	DtoReef	CorAlg	Unconsol	Turf	Depth	Rugosity	Coral	Macro	H'-insitu	H'-remote	Agg Reef	Pvmt	Sand	ScatRock andCor	D to Shore	D to Reef	CorAlg	Uncons	Turf	Depth	Rugos	Coral	Macro	H'-insitu	H'-remt
AggReef	1.00																													
Pavement	0.03	1.00																												
Sand	-0.26	0.10	1.00																											
ScatRockCor	-0.07	-0.77	-0.32	1.00																										
DtoShore	-0.06	0.04	0.16	0.04	1.00																									
DtoReef	-0.68	-0.01	0.17	0.01	0.06	1.00																								
CorAlg	0.04	0.58	0.08	-0.51	0.35	-0.19	1.00																							
Unconsol	0.04	-0.37	-0.18	0.43	-0.32	0.11	-0.54	1.00																						
Turf	-0.17	-0.16	0.11	-0.02	-0.19	0.09	-0.24	-0.18	1.00																					
Depth	-0.46	0.16	0.39	-0.21	0.64	0.44	0.34	-0.41	0.06	1.00																				
Rugosity	-0.13	-0.11	0.09	0.01	0.37	0.06	0.23	-0.31	-0.01	0.39	1.00																			
Coral	0.17	-0.28	-0.21	0.44	0.54	-0.06	0.01	0.05	-0.32	0.15	0.29	1.00																		
Macro	0.05	0.25	0.02	-0.27	-0.38	-0.13	0.18	-0.01	-0.35	-0.31	-0.28	-0.44	1.00																	
H'-insitu	0.11	0.21	-0.17	0.02	0.21	-0.07	0.40	0.25	-0.69	0.01	-0.03	0.33	0.39	1.00																
H'-remote	0.61	-0.35	0.05	0.38	-0.06	-0.50	-0.29	0.27	-0.20	-0.44	-0.10	0.28	-0.03	0.05	1.00															

Table S3. Top 25 observed juvenile species (by abundance) in 126 transects.

	Species	Common Name	Hawaiian Name¹	n	Density (#*100m⁻²)
1	<i>Stethojulis balteata</i>	Belted Wrasse	‘ōmaka	557	8.84
2	<i>Thalassoma duperrey</i>	Saddle Wrasse	hīnālea lauwili	428	6.79
3	<i>Acanthurus triostegus</i>	Convict tang	manini	292	4.63
4	<i>Plectroglyphidodon imparipennis</i>	Brighteye Damselfish		167	2.65
5	<i>Gomphosus varius</i>	Bird wrasse	hīnālea ‘i‘iwi	114	1.81
6	<i>Stegastes marginatus</i>	Pacific Gregory		89	1.41
7	<i>Macropharyngodon geoffroy</i>	Shortnose Wrasse		50	0.79
8	<i>Plectroglyphidodon johnstonianus</i>	Blue-eye Damselfish		35	0.56
9	<i>Scarus rubroviolaceus</i>	Redlip Parrotfish	pālukaluka	35	0.56
10	<i>Mulloidichthys flavolineatus</i>	Yellowstripe			
		Goatfish	weke‘ā	33	0.52
11	<i>Chromis vanderbilti</i>	Blackfin chromis		30	0.48
12	<i>Acanthurus leucopareius</i>	Whitebar			
		Surgeonfish	māikoiko	27	0.43
13	<i>Coris venusta</i>	Elegant coris		23	0.37
14	<i>Chlorurus perspicillatus</i>	Spectacled parrotfish	uhu uliuli	21	0.33
15	<i>Dascyllus albisella</i>	HI dascyllus	‘alo‘ilo‘i	15	0.24
16	<i>Paracirrhites arcatus</i>	Arc-eye Hawkfish	piliko‘a	13	0.21
17	<i>Acanthurus nigrofasciatus</i>	Brown Surgeonfish	mā‘i‘i‘i	12	0.19
18	<i>Canthigaster jactator</i>	HI Whitespotted toby		12	0.19
19	<i>Halichoeres ornatissimus</i>	Ornate Wrasse	lā‘ō	12	0.19
20	<i>Ctenochaetus strigosus</i>	Goldring surgeonfish	kole	8	0.13
21	<i>Coris gaimard</i>	Yellowtail coris	hīnālea ‘akilolo	5	0.08
22	<i>Cirrhitops fasciatus</i>	Redbar Hawkfish	piliko‘a	4	0.06
23	<i>Scarus psittacus</i>	Palenose Parrotfish	uhu	4	0.06
24	<i>Thalassoma purpureum</i>	Surge Wrasse	hou	4	0.06
25	<i>Anampsese cuvier</i>	Pearl wrasse	‘opule	3	0.05

¹ Randall, J. E. 2010. Shore fishes of Hawai‘i. Revised edition. University of Hawaii Press.