

Makua juvenile reef fish surveys

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Objectives: Examine the preferred habitat for newly settled and juvenile reef fishes at Makua, Kauai. The focus of this study was on parrotfishes, wrasses, and damselfishes, but other species were also examined to determine the importance of Makua as a juvenile nursery habitat for Hawaiian reef fishes.

Rationale: In the Hawaiian Archipelago, shelter-dependent juvenile stages of many reef fishes and their coral habitats are increasingly put at risk by multiple anthropogenic stressors (e.g. overfishing and habitat loss, coral bleaching and sedimentation, respectively, DeMartini et al. 2010).

Species of interest



Figure 1. UR – uhu uliuli (*Chlorurus perspicillatus* – spectacled parrotfish), UL – uhu (*Scarus psittacus* – palenose parrotfish), LL – Lauia (*Scarus dubius* – regal parrotfish), LR palukaluka (*Scarus rubroviolaceus* – redlip parrotfish), oval chromis (*Chromis ovalis*), blackfin chromis (*Chromis vanderbilti*). All photos by E. DeMartini.

Benthic habitat cover

The backreef habitat at Makua was dominated by limestone substrate with little turf algae (59%, Table 1). This was followed by sand (21%), low encrusting *Montipora* corals such as *M. patula* and *M. dilitata* (8%), reef rubble (8%), crustose coralline algae (1%), and encrusting and mounding-massive *Porites* growth forms including *P. lutea* and *P. rus* (1%).

Table 1. Benthic cover on backreef transects at Makua Reef, Kauai – July 2011.

HabTyp	average	stdev	se
L = consolidated limestone [karst] incl turf algae < 1-cm tall; too large to move by hand	59.17	11.63	4.75
S = sand and other unconsolidated with particle sizes no larger than shell gravel	21.33	8.09	3.30
Mo crust = low encrusting <i>Montipora</i> growth forms like <i>patula</i> and <i>dilitata</i>)	8.00	2.61	1.06
Ru = rubble or unconsolidated (readily moved) limestone rock; larger than shell gravel	7.83	4.17	1.70
CCA = crustose coralline algae (prostrate, encrusting)	1.00	0.63	0.26
Plobe = encrusting and mounding-massive <i>Porites</i> growth forms incl <i>lutea</i> and <i>rus</i>	1.00	1.26	0.52
Pfingr = <i>Porites compressa</i> (finger-like erect <i>Porites</i>)	0.83	0.75	0.31
Pknukl = erect, semi-digitate (“knuckle-like”) <i>Porites</i> growth forms like <i>duerdini</i>	0.67	1.21	0.49
Mo erect = erect <i>Montipora</i> growth forms like <i>capitata</i> and <i>flabellata</i>	0.17	0.41	0.17
EFA = erect (foliose) algae (eg, <i>Microdictyon</i> , <i>Dictyota</i> , <i>Halimeda</i>) \geq 1-cm tall	0.00	0.00	0.00
Poc spp = branched cauliflower corals incl <i>meandrina</i> , <i>damicornis</i> and <i>ligulata</i>	0.00	0.00	0.00

Recruit species

Recruit fish species at Makua were dominated by wrasses and parrotfishes (Table 2). The belted wrasse was the most common species (31% of the total), followed by the endemic saddle wrasse (*hinalea lauwili* - 21%), and the commercially and culturally important redlip parrotfish (*palukaluka* - 14%). *Manini* is an endemic sub-species with important cultural and commercial significance and this species accounted for 6% of all recruits at Makua.

Table 2. Recruit species encountered at Makua backreef, Kauai. **Endemics are in bold.**

Scientific name	Hawaiian name	Common name	Distribution	Total number	% total
<i>Stethojulis balteata</i>	omaka	Belted wrasse	Pacific	64	30.8%
<i>Thalassoma duperrey</i>	hinalea lauwili	Saddle wrasse	Endemic	43	20.7%
<i>Scarus rubroviolaceus</i>	palukaluka	redlip parrotfish	Pacific	30	14.4%
<i>Gomphosus varius</i>	hinalea I'iwi	bird wrasse	Endemic	20	9.6%
<i>Stegastes marginatus</i>		Pacific gregory	Endemic	13	6.3%
<i>Acanthurus triostegus</i>	manini	convict tang	Endemic sub-species	12	5.8%
<i>Plectroglyphidodon imparipennis</i>		brighteye damselfish	Pacific	10	4.8%
<i>Calatomus carolinus</i>	ponuhunuhu	stareye parrotfish	Pacific	4	1.9%
<i>Plectroglyphidodon johnstonianus</i>		blue-eye damselfish	Pacific	4	1.9%
<i>Dascyllus albisella</i>	alo'ilo'i	Hawaiian dascyllus	Endemic	3	1.4%
<i>Canthigaster jactator</i>		Hawaiian whitespotted toby	Pacific	1	0.5%
<i>Chlorurus perspicillatus</i>	uhu uliuli	Spectacled parrotfish	Endemic	1	0.5%
<i>Coris venusta</i>		Elegant coris	Pacific	1	0.5%
<i>Labroides phthirophagus</i>		Hawaiian clenaer wrasse	Pacific	1	0.5%
<i>Macropharyngodon geoffroy</i>		shortnose wrasse	Pacific	1	0.5%

Conclusions: The backreef at Makua is an important nursery habitat for culturally, commercially, and recreational important species. Overall coral cover was low (<10%) but the structure and habitat provides an important nursery area for a number of important species in Hawaii.

References

DeMartini EE, TW Anderson, JC Kenyon, JP Beets, **AM Friedlander**. 2010. Management implications of juvenile reef fish habitat preferences and coral susceptibility to stressors. *Marine and Freshwater Research*. 61:532-540