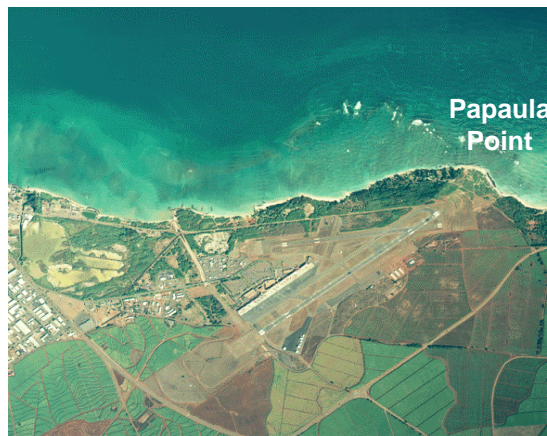


## Papaula Point, Maui

20° 55.307' N 156° 25.572' W

Management Status: Open access

Area Description: Agricultural in nearby saddle land. Colonized hard bottom with thin veneer over basalt pavement. Encrusting coral colonies dominant form. Pseudo spur and groove with narrow channels of coarse carbonate sand. Northern exposure with low rugosity and low reef relief due to extreme wave impacts. Low human activity due to inaccessibility.



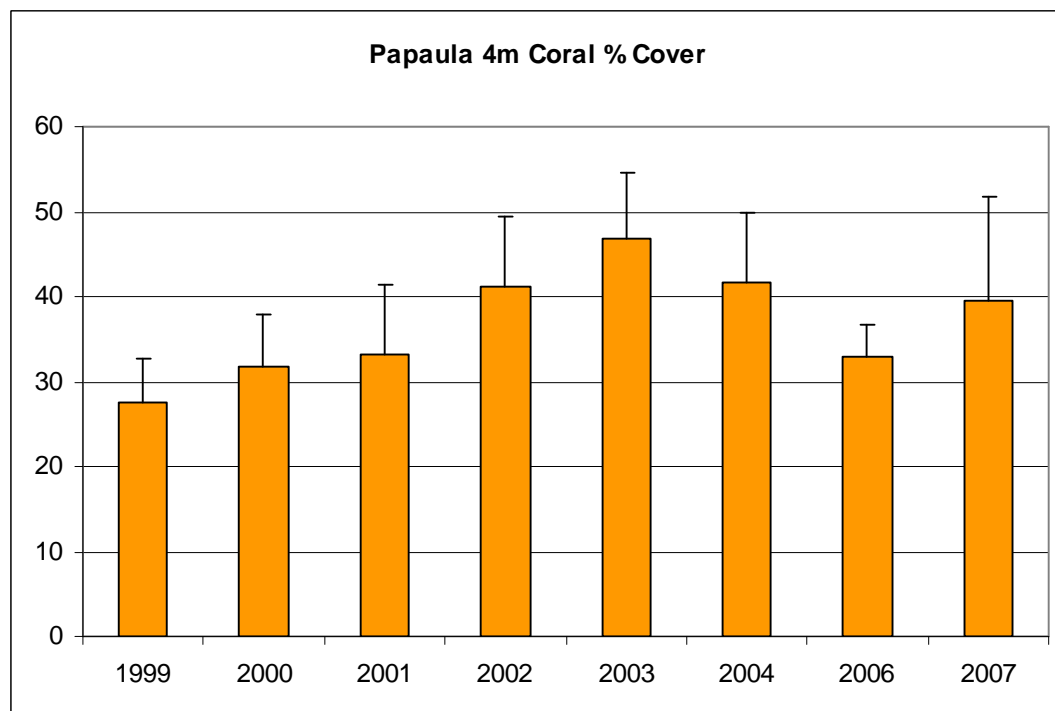
### Benthic Habitat Data: 4 m

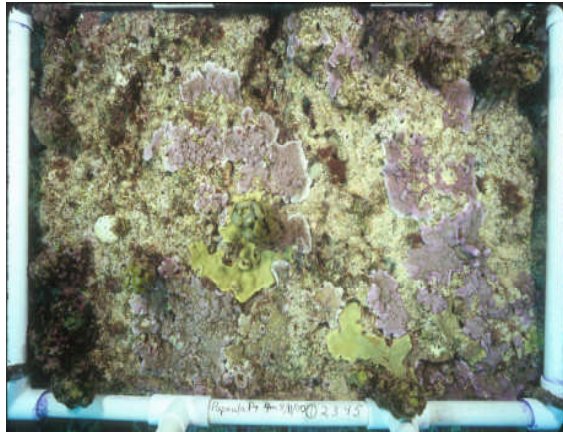
	Depth (m)	Rugosity	Sediment Composition (% wt.)		Sediment Grain Size (% wt.)			
			LOI	H <sub>2</sub> CO <sub>3</sub>	Gravel	Coarse	Fine	Silt
Mean	4	1.14	2.96	94.92	79.27	19.74	0.74	0.25
S.D.		06	0.15	0.19	21.83	21.55	0.29	02

Video Transect data (4 m):

Species	% Cover:		1999		2000		2001		2002		2003	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0	0	0	0	
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0	0	0	0	
<i>Leptastrea purpurea</i>	0	0	0	0	0	0	0	0	0	0	0	
<i>Montipora flabellata</i>	18.1	6.0	24.1	6.5	26.2	7.4	33.1	8.9	37.2	9.4		
<i>Montipora patula</i>	0.2	0.2	0.1	0.3	0.1	0.2	0.1	0.2	0.0	0.1		
<i>Montipora studeri</i>	0	0	0	0	0	0	0	0	0	0		
<i>Montipora verrucosa</i>	0	0	0	0	0.0	0.1	0.1	0.1	0	0		
<i>Pavona duerdeni</i>	0.1	0.1	0.0	0.1	0.0	0.1	0	0	0	0		
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0	0	0		
<i>Pavona varians</i>	0	0	0	0	0.0	0.1	0	0	0	0		
<i>Pocillopora damicornis</i>	0	0	0.0	0.1	0	0	0.1	0.2	0	0		
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0	0	0	0	0		
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0	0	0		
<i>Pocillopora meandrina</i>	0.7	1.0	0.4	0.5	0.9	1.3	0.7	0.8	0.7	1.5		
<i>Porites brighami</i>	0	0	0	0	0	0	0	0	0	0		
<i>Porites compressa</i>	0	0	0	0	0	0	0	0	0	0		
<i>Porites evermanni</i>	0	0	0	0	0.2	0.6	0	0	0	0		
<i>Porites lichen</i>	0	0	0	0	0	0	0	0	0	0		
<i>Porites lobata</i>	8.4	2.8	7.0	2.6	5.8	2.8	7.1	3.1	9.0	4.4		
<i>Porites rus</i>	0	0	0	0	0	0	0	0	0	0		
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0	0	0		
Unknown Coral	0	0	0.0	0.1	0	0	0	0	0	0		
<b>Total Coral</b>	<b>27.5</b>	<b>5.2</b>	<b>31.7</b>	<b>6.2</b>	<b>33.2</b>	<b>8.3</b>	<b>41.1</b>	<b>8.4</b>	<b>46.8</b>	<b>7.8</b>		
<b>Species Richness:</b>	<b>5</b>		<b>6</b>		<b>8</b>		<b>6</b>		<b>4</b>			
Macroalgae	0.1	0.4	22.0	6.7	0	0	0	0	0.7	0.8		

% Cover: Species	2004		2006		2007	
	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0.0	0.1	0	0	0	0
<i>Montipora flabellata</i>	31.6	6.8	22.2	6.5	27.7	12.6
<i>Montipora patula</i>	0	0	0	0	0	0
<i>Montipora studeri</i>	0	0	0	0	0	0
<i>Montipora verrucosa</i>	0	0	0	0	0.0	0.1
<i>Pavona duerdeni</i>	0	0	0	0	0	0
<i>Pavona maldivensis</i>	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0	0	0	0
<i>Pocillopora damicornis</i>	0	0	0.0	0.1	0	0
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0
<i>Pocillopora ligulata</i>	0	0	0.1	0.3	0	0
<i>Pocillopora meandrina</i>	0.8	1.0	0.6	0.8	1.9	3.6
<i>Porites brighami</i>	0	0	0	0	0	0
<i>Porites compressa</i>	0	0	0	0	0	0
<i>Porites evermanni</i>	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0
<i>Porites lobata</i>	9.4	4.2	10.0	5.0	10.0	5.4
<i>Porites rus</i>	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0
Unknown Coral	0	0	0	0	0	0
<b>Total Coral</b>	<b>41.8</b>	<b>8.1</b>	<b>32.9</b>	<b>3.7</b>	<b>39.6</b>	<b>12.1</b>
<b>Species Richness:</b>	<b>4</b>		<b>5</b>		<b>4</b>	
Macroalgae	11.7	3.7	21.0	7.9	1.3	1.5





Photoquadrat Data (4 m): Photo analysis pending

**Findings:** Initial coral cover rank is 22 among 60 reefs. Coral cover stayed roughly the same between the 2 sampling periods with a high percentage of *Montipora flabellata*. High diversity of macroalgae with occasional blooms of *Turbinaria ornata*. High percentage of crustose coralline algae and turf algae. Low content of terrigenous material in sediments. No rare or unusual species observed.

## Papaula Point, Maui

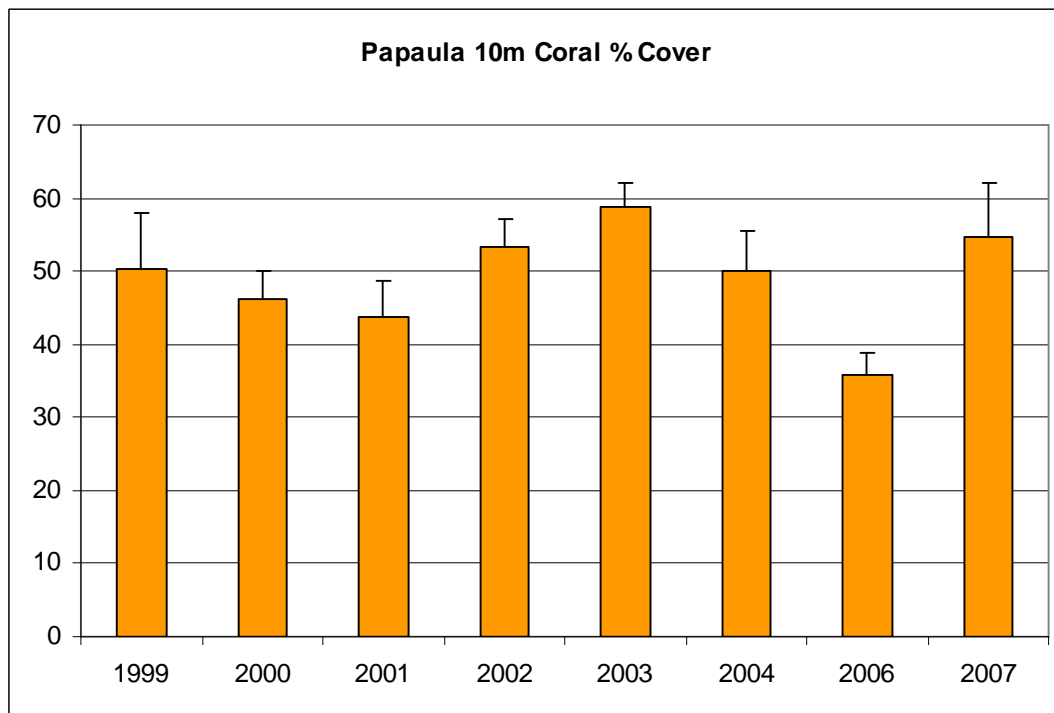
Benthic Habitat: 10 m

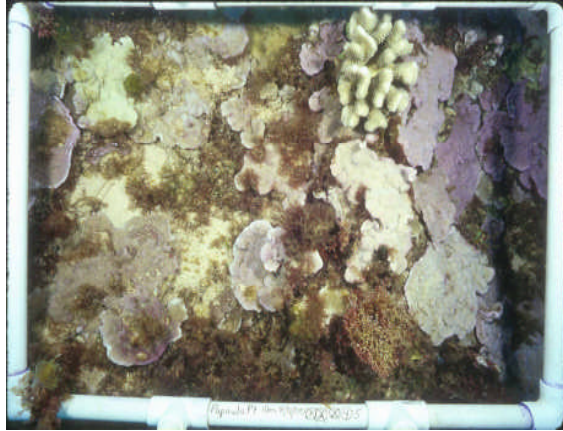
	Depth (m)	Rugosity	Sediment Composition (% wt.)		Sediment Grain Size (% wt.)			
			LOI	H <sub>2</sub> CO <sub>3</sub>	Gravel	Coarse	Fine	Silt
Mean	10	1.12	3.15	94.33	73.72	22.33	3.51	0.44
S.D.		05	03	0.50	9.46	6.99	2.45	02

### Video Transect data (10 m):

Species	% Cover:		1999		2000		2001		2002		2003	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0	0	0	0	
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0	0	0	0	
<i>Leptastrea purpurea</i>	0	0	0	0	0	0	0	0	0	0	0	
<i>Montipora flabellata</i>	28.3	7.4	29.1	5.9	28.0	5.1	35.3	6.1	40.9	5.3		
<i>Montipora patula</i>	4.4	3.2	3.4	1.7	3.0	1.3	5.1	3.0	3.5	1.6		
<i>Montipora studeri</i>	0	0	0.0	0.1	0	0	0	0	0	0		
<i>Montipora verrucosa</i>	8.0	3.6	8.0	3.9	7.7	1.3	8.5	3.5	8.5	3.6		
<i>Pavona duerdeni</i>	0.1	0.1	0	0	0	0	0.0	0.1	0.0	0.1		
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0	0	0		
<i>Pavona varians</i>	0.9	0.8	0.0	0.1	0	0	0	0	0	0		
<i>Pocillopora damicornis</i>	0	0	0	0	0	0	0.0	0.1	0.0	0.1		
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0	0.0	0.1	0	0		
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0	0	0		
<i>Pocillopora meandrina</i>	0.5	0.3	0.6	0.9	0.7	0.8	0.6	0.8	0.5	0.5		
<i>Porites brighami</i>	0	0	0	0	0	0	0	0	0.1	0.2		
<i>Porites compressa</i>	0.0	0.1	0.5	0.6	0.2	0.3	0.2	0.4	0.4	0.5		
<i>Porites evermanni</i>	0	0	0	0	0	0	0	0	0.4	1.1		
<i>Porites lichen</i>	0	0	0	0	0	0	0	0	0	0		
<i>Porites lobata</i>	8.4	3.3	4.3	0.8	4.3	1.3	3.8	1.5	4.5	2.5		
<i>Porites rus</i>	0	0	0	0	0	0	0	0	0	0		
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0	0	0		
Unknown Coral	0	0	0.2	0.4	0.0	0.1	0	0	0	0		
<b>Total Coral</b>	<b>50.3</b>	<b>7.7</b>	<b>46.2</b>	<b>3.8</b>	<b>43.8</b>	<b>4.8</b>	<b>53.4</b>	<b>3.7</b>	<b>58.7</b>	<b>3.3</b>		
<b>Species Richness:</b>	<b>8</b>		<b>9</b>		<b>6</b>		<b>9</b>		<b>10</b>			
Macroalgae	25.7	12.0	42.5	6.4	0	0	0	0	5.5	2.2		

Species	2004		2006		2007	
	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0	0
<i>Montipora flabellata</i>	33.0	7.3	19.6	4.5	32.5	10.2
<i>Montipora patula</i>	2.5	1.9	1.7	1.4	1.5	1.6
<i>Montipora studeri</i>	0	0	0	0	0	0
<i>Montipora verrucosa</i>	8.8	3.7	8.4	3.3	11.4	3.4
<i>Pavona duerdeni</i>	0.1	0.2	0	0	0	0
<i>Pavona maldivensis</i>	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0	0	0	0
<i>Pocillopora damicornis</i>	0	0	0	0	0	0
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0
<i>Pocillopora ligulata</i>	0	0	0.1	0.3	0	0
<i>Pocillopora meandrina</i>	0.9	0.8	0.6	1.0	2.1	2.1
<i>Porites brighami</i>	0	0	0	0	0	0
<i>Porites compressa</i>	0.4	0.8	0.1	0.4	0.4	1.2
<i>Porites evermanni</i>	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0
<i>Porites lobata</i>	4.3	2.0	5.4	2.4	6.8	1.9
<i>Porites rus</i>	0.1	0.3	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0
Unknown Coral	0	0	0	0	0	0
<b>Total Coral</b>	<b>50.0</b>	<b>5.5</b>	<b>35.8</b>	<b>3.2</b>	<b>54.6</b>	<b>7.6</b>
<b>Species Richness:</b>	<b>8</b>		<b>7</b>		<b>6</b>	
Macroalgae	38.5	7.8	57.6	3.8	18.9	8.1





Photoquadrat Data (10 m): Photo analysis pending

Findings: Initial coral cover rank is 9 among 60 reefs. Coral cover stayed roughly the same between the 2 sampling periods with a high percentage of *Montipora flabellata*. High coverage and diversity of macroalgae with occasional blooms of *Turbinaria ornata*. High percentage of crustose coralline algae and turf algae. Low content of terrigenous material in sediments. *Montipora studeri* not common at sites surveyed.

**Papaula Point, Maui**  
**Fish Data: 4 m and 10 m**

Species	Density (#/125m <sup>2</sup> )				Biomass (g/125m <sup>2</sup> )			
	4 m		10 m		4 m		10 m	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Acanthurus dussumieri</i>	0.5	1.0			133.1	266.2		
<i>Acanthurus leucopareius</i>	15.0	22.4			2177.0	3280.5		
<i>Acanthurus nigrofuscus</i>	40.5	34.4	0.5	1.0	2713.2	2232.2	4.1	8.3
<i>Acanthurus olivaceus</i>			1.0	2.0			138.1	276.2
<i>Acanthurus triostegus</i>	29.5	24.8			2511.7	2178.1		
<i>Anampses cuvier</i>	0.5	1.0			135.2	270.3		
<i>Aprion virescens</i>			0.5	1.0			268.4	536.8
<i>Bodianus bilunulatus</i>	3.5	1.9	4.0	1.6	2343.6	1301.5	1433.3	806.0
<i>Calotomus carolinus</i>	2.5	5.0			166.0	332.0		
<i>Cantherhines dumerilii</i>			1.0	2.0			503.4	1006.7
<i>Canthigaster jactator</i>			5.0	2.6			40	19.2
<i>Cantherhines sandwichiensis</i>	0.5	1.0			34.4	68.9		
<i>Centropyge potteri</i>			0.5	1.0			1.8	3.6
<i>Cephalopholis argus</i>	0.5	1.0			50.4	100.9		
<i>Chaetodon quadrimaculatus</i>	2.5	3.0			223.1	261.8		
<i>Chaetodon unimaculatus</i>	1.0	2.0			57.6	115.2		
<i>Chromis ovalis</i>	1.5	1.9	11.0	22.0	5.3	7.8	38.3	76.5
<i>Chromis vanderbilti</i>	6.5	9.1	66.0	36.7	16.5	24.4	209.7	114.6
<i>Cirrhitops fasciatus</i>			3.0	2.6			51.0	55.0
<i>Cirrhites pinnulatus</i>	0.5	1.0			132.0	264.0		
<i>Cirripectes vanderbilti</i>			1.0	2.0			9.3	18.7
<i>Coris venusta</i>			6.5	5.5			76.1	74.9
<i>Halichoeres ornatissimus</i>			1.0	2.0			9.9	19.8
<i>Kyphosus species</i>	0.5	1.0			277.8	555.7		
<i>Macropharyngodon geoffroyi</i>			1.5	1.9			4.9	5.7
<i>Ostracion meleagris</i>	1.0	1.2			56.5	65.3		
<i>Oxycheilinus bimaculatus</i>			12.5	5.7			98.6	59.6
<i>Paracirrhites arcatus</i>	2.0	1.6	3.5	2.5	38.7	34.1	28.6	21.3
<i>Parupeneus bifasciatus</i>	0.5	1.0			112.0	224.0		
<i>Plagiotremus ewaensis</i>			0.5	1.0			1.1	2.2
<i>Plagiotremus goslinei</i>	2.5	1.9	4.5	4.1	2.8	2.0	4.3	3.7
<i>Plectroglyphidodon imparipennis</i>	4.5	5.3			22.5	26.5		
<i>Plectroglyphidodon johnstonianus</i>			5.0	8.7			23.1	41.6
<i>Pseudojuloides cerasinus</i>			0.5	1.0			0.7	1.5
<i>Rhinecanthus rectangulus</i>	3.0	2.6	2.0	1.6	225.9	265.8	215.8	202.9

<i>Scarus psittacus</i>	7.5	13.7	4.0	0	1016.8	1807.6	22.7	7.5
<i>Stegastes fasciolatus</i>	5.5	3.8	2.5	3.8	15.3	17.6	15.0	27.8
<i>Stethojulis balteata</i>	21.0	9.3	28.0	5.9	79.5	56.3	208.5	89.9
<i>Sufflamen fraenatus</i>			0.5	1.0			338.6	677.1
<i>Synodus variegatus</i>			1.0	2.0			9.4	18.8
<i>Thalassoma ballieui</i>	3.5	1.9			1004.8	211.4		
<i>Thalassoma duperrey</i>	51.0	20.6	68.5	5.7	416.9	106.1	1037.1	121.4
<i>Thalassoma trilobatum</i>	1.5	1.9			58.8	70.4		
<i>Zanclus cornutus</i>	0.5	1.0			63.1	126.2		
<b>Total/Depth Avg ± SD:</b>	<b>209.5</b>	6.3	<b>235.5</b>	4.7	<b>14090.5</b>	509.7	<b>4791.9</b>	159.2
<b>Species Richness</b>	<b>28</b>		<b>27</b>					
<b>Species Diversity</b>	2.04		1.94					

Findings: Among 60 reefs, Papaula Pt. 4m ranked 43 in species richness, 29 in density, 31 in biomass, and 39 in diversity. Papaula Pt. 10m ranked 45 in species richness, 25 in density, 48 in biomass, and 49 in diversity. The most abundant species was the Saddle wrasse (*Thalassoma duperrey*) at both the 4m and 10m reefs respectively. The species with the highest biomass were the Brown surgeonfish

## Papaula Point, Maui

(*Acnathurus nigrofuscus*) and the Hawaiian hogfish (*Bodianus bilunulatus*) at the 4m and 10m reefs respectively. *Synodus variegates* and *Plagiotremus ewaensis* presence notable as these species are not common to sites surveyed.