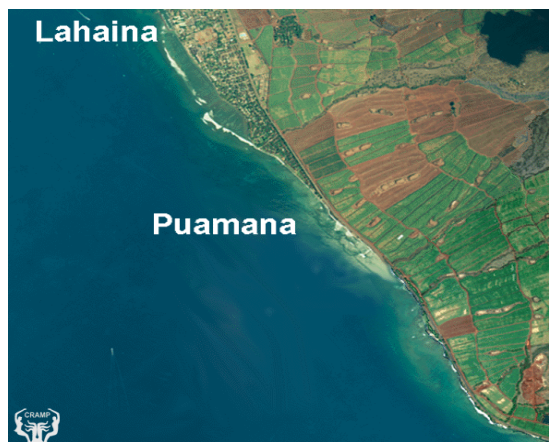


Puamana, Maui

20° 51.369' N 156° 4033' W

Management Status: Open Access

Area Description: Inland watershed with fallow sugar fields. Southern edge of Lahaina (National and State registered historical site). Residential shoreline with public sand beach. Broad, gradually sloping wave protected fringing reef (basalt with carbonate veneer) proceeds to offshore sand bottom. Southern site protected from all but southwest swell. Reef decimated by Hurricane Iniki, recovering. Terrestrial runoff, coastal erosion, frequent high turbidity and sedimentation. Water recreation with some fishing.



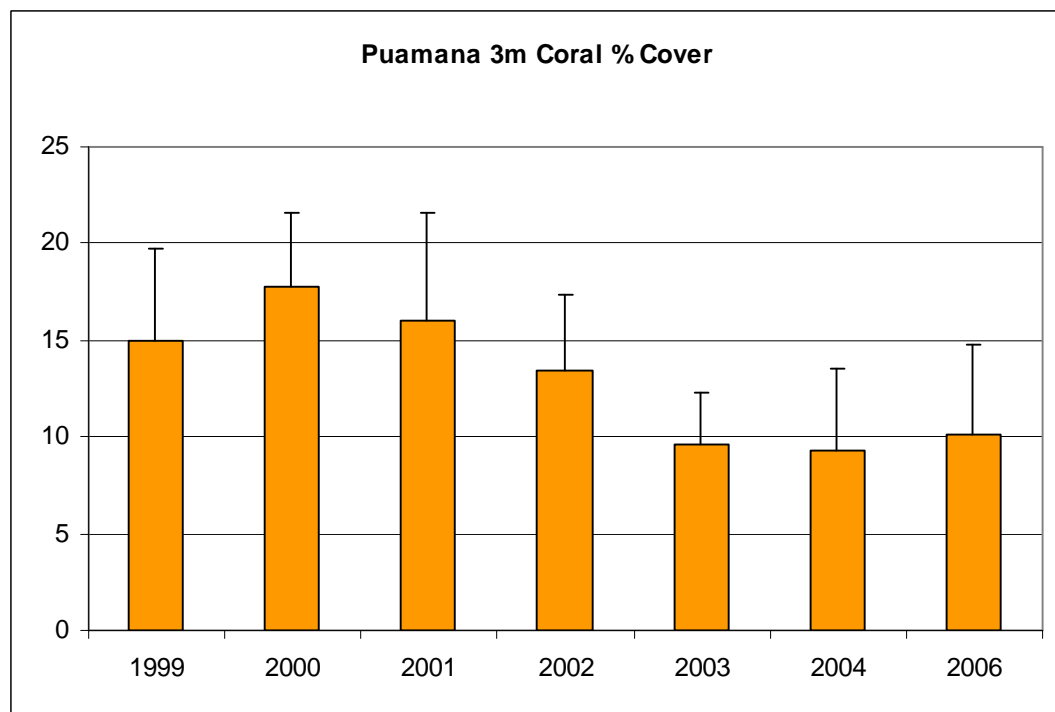
Benthic Habitat Data: 3 m

	Depth (m)	Rugosity	Sediment Composition (% wt.)		Sediment Grain Size (% wt.)			
			LOI	H ₂ CO ₃	Gravel	Coarse	Fine	Silt
Mean	3	1.31	3.91	35.05	4.52	17.61	77.27	0.61
S.D.		09	0.22	0.42	6.30	23.24	29.83	0.29

Video Transect data (3 m):

Species	% Cover:		1999		2000		2001		2002		2003	
	Mean	SD	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	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0	0	0	0.0	0.1
<i>Leptastrea purpurea</i>	0.1	0.2	0.2	0.3	0.2	0.3	0.1	0.2	0.1	0.2	0.2	0.6
<i>Montipora flabellata</i>	0	0	0	0	0.0	0.1	0	0	0	0	0	0
<i>Montipora patula</i>	0.6	0.4	1.0	0.7	1.1	0.7	1.1	0.6	0	0	0	0
<i>Montipora studeri</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Montipora verrucosa</i>	0.2	0.3	0.7	0.3	1.0	0.6	0.9	0.4	0.24	0.4	0.4	0.4
<i>Pavona duerdeni</i>	0	0	0.1	0.3	0.0	0.1	0.1	0.4	0	0	0	0
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0.2	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.3	0.3
<i>Pocillopora damicornis</i>	0	0	0.0	0.1	0.0	0.1	0	0	0.0	0.1	0.1	0.1
<i>Pocillopora eydouxi</i>	0	0	0.4	1.1	0.1	0.2	0.1	0.3	0.2	0.4	0.2	0.4
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.2
<i>Pocillopora meandrina</i>	8.6	1.7	8.3	2.1	6.0	1.8	5.0	1.7	2.5	1.3	2.5	1.3
<i>Porites brighami</i>	0	0	0.0	0.1	0.0	0.1	0	0	0	0	0	0
<i>Porites compressa</i>	0.2	0.3	0.5	0.4	0.2	0.1	0.2	0.3	0	0	0	0
<i>Porites evermanni</i>	0.0	0.1	0	0	0.0	0.1	0.0	0.1	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0.0	0.1	0.0	0.1	0	0	0	0
<i>Porites lobata</i>	5.1	4.9	6.5	5.2	7.2	4.2	5.8	2.5	6.1	2.6	6.1	2.6
<i>Porites rus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0	0	0	0	0
Unknown Coral	0.0	0.1	0	0	0	0	0	0	0	0	0	0
Total Coral	15.0	4.7	17.8	3.8	16.0	5.6	13.4	3.9	9.6	2.6	9.6	2.6
Species Richness:	8		11		14		11		9		9	
Macroalgae	12.1	4.8	4.2	3.5	2.2	2.6	17.5	7.2	11.4	6.2	11.4	6.2

Species	% Cover: 2004		2006	
	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0
<i>Fungia scutaria</i>	0.1	0.4	0	0
<i>Leptastrea purpurea</i>	0	0	0.1	0.3
<i>Montipora flabellata</i>	0	0	0	0
<i>Montipora patula</i>	0.1	0.2	0.1	0.3
<i>Montipora studeri</i>	0	0	0	0
<i>Montipora verrucosa</i>	0.2	0.3	0.0	0.1
<i>Pavona duerdeni</i>	0	0	0.0	0.1
<i>Pavona maldivensis</i>	0	0	0	0
<i>Pavona varians</i>	0	0	0	0
<i>Pocillopora damicornis</i>	0.2	0.4	0.0	0.1
<i>Pocillopora eydouxi</i>	0.0	0.1	0	0
<i>Pocillopora ligulata</i>	0.2	0.4	0	0
<i>Pocillopora meandrina</i>	1.8	1.2	2.3	1.7
<i>Porites brighami</i>	0	0	0	0
<i>Porites compressa</i>	0	0	0	0
<i>Porites evermanni</i>	0	0	0	0
<i>Porites lichen</i>	0	0	0	0
<i>Porites lobata</i>	6.8	3.7	7.6	4.0
<i>Porites rus</i>	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0
Unknown Coral	0	0	0	0
Total Coral	9.3	4.3	10.2	4.7
Species Richness:	8		7	
Macroalgae	10.6	3.9	3.2	2.5





Photoquadrat Data (3m): Photo analysis pending

Findings: Initial coral cover rank is 35 among 60 reefs. Coral cover continues to increase slowly after Hurricane Iniki. Moderate level of macroalgae with *Neomeris annulata* and *Halimeda discoidea* prevalent. High percentage of turf algae. High percentage of fine sediments with high content of terrigenous material. No rare or unusual species observed.

Puamana, Maui

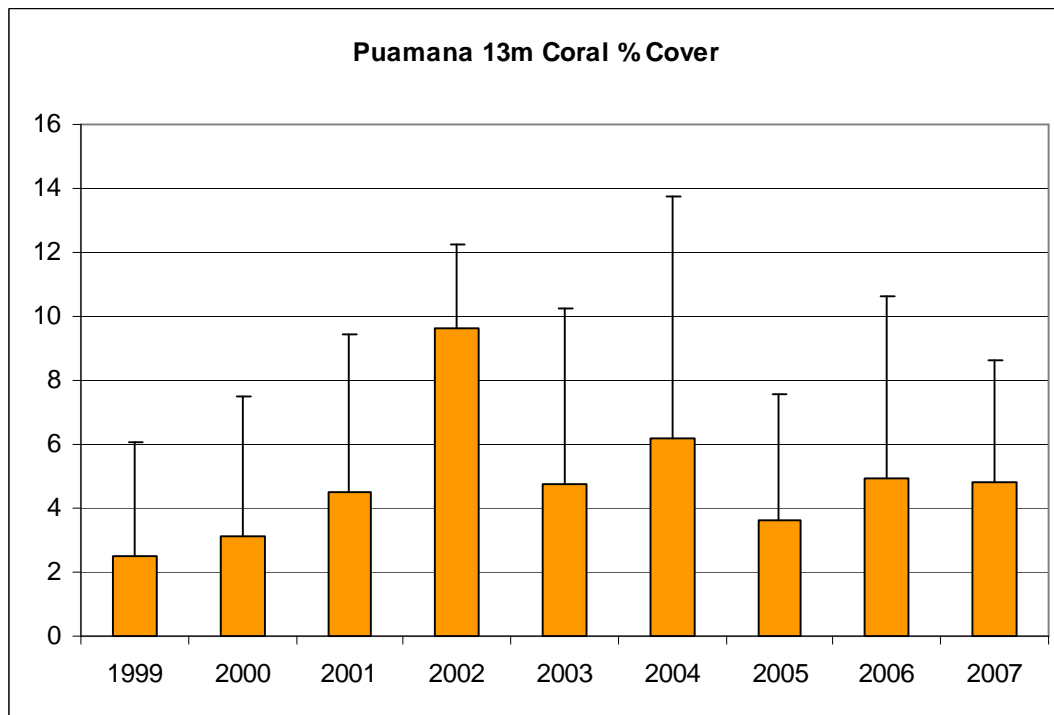
Benthic Habitat: 13 m

	Depth (m)	Rugosity	Sediment Composition (% wt.)		Sediment Grain Size (% wt.)			
			LOI	H ₂ CO ₃	Gravel	Coarse	Fine	Silt
Mean	13	1.19	4.82	62.86	33.58	18.14	44.36	3.92
S.D.		06	0.43	3.58	12.83	0.84	12.06	1.61

Video Transect data (13 m):

Species	% Cover:		1999		2000		2001		2002		2003	
	Mean	SD	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	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0	0.0	0.1	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0	0	0.0	0.1	0.2	0.6	0	0
<i>Montipora flabellata</i>	0	0	0	0	0	0	0	0	0.2	0.4	0	0
<i>Montipora patula</i>	0.1	0.2	0.0	0.1	0.1	0.2	0	0	0	0	0	0
<i>Montipora studeri</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Montipora verrucosa</i>	0.1	0.1	0.3	0.3	0.2	0.2	0	0	0	0	0.1	0.2
<i>Pavona duerdeni</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0	0	0.1	0.0	0.1	0.1	0.3	0	0	0
<i>Pocillopora damicornis</i>	0	0	0	0	0	0	0	0.0	0.1	0	0	0
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0	0	0.2	0.4	0.2	0.3	0.3
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0.2	0.2	0.2	0.3	0.3
<i>Pocillopora meandrina</i>	0.3	0.3	0.5	0.5	0.7	0.8	2.5	1.3	0.8	0.7	0.7	0.7
<i>Porites brighami</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Porites compressa</i>	0.4	1.1	0.9	2.1	1.1	1.6	0	0	0	0	0	0
<i>Porites evermanni</i>	0	0	0	0	0.0	0.1	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Porites lobata</i>	1.6	2.1	1.4	1.9	2.3	2.6	6.1	2.6	3.4	4.5	4.5	4.5
<i>Porites rus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0	0	0	0	0
Unknown Coral	0	0	0	0	0	0	0	0	0	0	0	0
Total Coral	2.5	3.5	3.1	4.4	4.5	4.9	9.6	2.6	4.7	5.5	5.5	5.5
Species Richness:	8		6		8		8		5		5	
Macroalgae	17.7	9.0	5.0	4.2	3.5	5.5	11.4	6.2	4.8	7.5	7.5	7.5

Species	2004		2005		2006		2007	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0	0	0	0
<i>Montipora flabellata</i>	0	0	0	0	0	0	0	0
<i>Montipora patula</i>	0	0	0	0	0	0	0	0
<i>Montipora studeri</i>	0	0	0	0	0	0	0	0
<i>Montipora verrucosa</i>	0.2	0.4	0	0	0	0	0	0
<i>Pavona duerdeni</i>	0	0	0	0	0	0	0	0
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0	0	0	0	0.0	0.1
<i>Pocillopora damicornis</i>	0.0	0.1	0	0	0	0	0	0
<i>Pocillopora eydouxi</i>	0.1	0.3	0	0	0	0	0	0
<i>Pocillopora ligulata</i>	0	0	0	0	0.1	0.2	0	0
<i>Pocillopora meandrina</i>	0.6	0.9	0.6	0.8	0.6	1.0	0.4	0.5
<i>Porites brighami</i>	0	0	0	0	0	0	0	0
<i>Porites compressa</i>	0	0	0	0	0	0	0.1	0.3
<i>Porites evermanni</i>	0	0	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0.0	0.1	0	0	0	0
<i>Porites lobata</i>	5.2	7.2	2.9	3.2	4.2	4.9	4.3	3.6
<i>Porites rus</i>	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0
Unknown Coral	0	0	0	0	0	0	0	0
Total Coral	6.2	7.6	3.6	4.0	5.0	5.7	4.8	3.9
Species Richness:	5		3		3		4	
Macroalgae	3.4	5.5	4.6	8.7	1.6	2.6	0	0





Photoquadrat Data (13 m): Photo analysis pending **Findings:** Initial coral cover rank is 59 among 60 reefs. Coral cover continues to increase slowly after Hurricane Iniki. High level of macroalgae with *Halimeda incrassata* dominant. Low level of macroinvertebrates with occasional *Echinothrix calamaris*. High percentage of turf algae. High percentage of fine sediments with high content of terrigenous material. No rare or unusual species observed.

Puamana, Maui

Fish Data: 3 m and 13 m

Species	Density (#/125m ²)				Biomass (g/125m ²)			
	3 m		13 m		3 m		13 m	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Acanthurus nigrofuscus</i>	37.5	17.4	4.5	5.3	1421.6	978.3	44.4	51.5
<i>Acanthurus olivaceus</i>	2.0	2.3	1.0	1.2	389.8	516.1	171.1	206.9
<i>Anampses chrysocephalus</i>			0.5	1.0			0.1	0.3
<i>Anampses cuvier</i>	1.0	2.0	1.0	1.2	4.2	8.4	5.3	6.1
<i>Apogon kallopterus</i>			1.5	3.0			33.9	67.9
<i>Bodianus bilunulatus</i>			1.0	2.0			2.4	4.8
<i>Calotomus carolinus</i>			0.5	1.0			3.8	7.6
<i>Canthigaster amboinensis</i>	1.0	1.2			18.9	26.3		
<i>Canthigaster jactator</i>	10	3.7	7.0	6.0	67.2	26.6	46.7	39.1
<i>Cephalopholis argus</i>	1.5	1.0			200	142.2		
<i>Chaetodon auriga</i>			1.0	2.0			122.5	244.9
<i>Chaetodon miliaris</i>			0.5	1.0			1.9	3.8
<i>Chlorurus perspicillatus</i>	0.5	1.0			177.4	354.7		
<i>Chlorurus sordidus</i>	1.5	1.0			12.0	8.8		
<i>Chromis hanui</i>			0.5	1.0			1.0	2.0
<i>Chromis ovalis</i>	1.0	2.0			6.5	13.1		
<i>Chromis vanderbilti</i>	80	34.9			289.7	116.9		
<i>Cirrhitops fasciatus</i>	0.5	1.0			7.6	15.2		
<i>Coris venusta</i>			2.0	2.8			22.7	39.8
<i>Ctenochaetus strigosus</i>	0.5	1.0			1.8	3.6		
<i>Dascyllus albisella</i>			4.5	9.0			27.9	55.9
<i>Gomphosus varius</i>	0.5	1.0			10.6	21.1		
<i>Gunnellichthys curiosus</i>			0.5	1.0			2.5	4.9
<i>Halichoeres ornatissimus</i>	3.0	2.0	0.5	1.0	21.0	14.3	3.0	6.1

<i>Labroides phthiropagus</i>	0.5	1.0			3.0	6.1		
<i>Macropharyngodon geoffroyi</i>	1.5	1.9			8.2	12.5		
<i>Melichthys niger</i>	9.0	4.2			2897.1	1273.0		
<i>Melichthys vidua</i>			2.5	1.9			741.8	628.6
<i>Naso brevirostris</i>			5.5	5.0			577.5	545.7
<i>Naso lituratus</i>	3.0	2.6	2.0	2.3	314.1	264.8	336.4	389.0
<i>Naso unicornis</i>	30	32.5			31166.0	27377.0		
<i>Ostracion meleagris</i>			0.5	1.0			11.3	22.7
<i>Oxycheilinus bimaculatus</i>			2.5	2.5			20	32.4
<i>Paracirrhites arcatus</i>	4.0	1.6	1.0	1.2	90.5	74.7	6.7	11.1
<i>Paracirrhites forsteri</i>	1.0	1.2			27.0	33.5		
<i>Parapercis schauinslandi</i>			1.0	2.0			11.2	22.4
<i>Parupeneus bifasciatus</i>	0.5	1.0			26.3	52.5		
<i>Parupeneus multifasciatus</i>	3.0	1.2	0.5	1.0	268.7	73.6	3.8	7.5
<i>Plagiotremus goslinei</i>	2.0	2.3			2.8	3.2		
<i>Plectroglyphidodon imparipennis</i>	5.5	1.9			21.1	10.7		

Puamana, Maui Fish Data: 3 m and 13 m

Species	Density (#/125m ²)				Biomass (g/125m ²)			
	3 m		13 m		3 m		13 m	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Plectroglyphidodon johnstonianus</i>	6.5	4.4			26.4	20.5		
<i>Pseudocheilinus octotaenia</i>			4.5	3.4			78.6	63.5
<i>Pseudocheilinus tetrataenia</i>	1.0	1.2	2.0	2.8	4.9	5.9	9.7	12.7
<i>Pseudojuloides cerasinus</i>			4.0	4.6			32.0	38.3
<i>Rhinecanthus rectangulus</i>	2.5	3.0			318.2	423.9		
<i>Scarus psittacus</i>	1.0	2.0	1.0	1.2	6.9	13.9	8.2	9.9
<i>Stegastes fasciolatus</i>	13.5	2.5	2.5	3.0	127.8	42.6	35.0	43.8
<i>Stethojulis balteata</i>	8.0	2.8	2.5	1.9	50.9	22.7	31.5	21.3
<i>Sufflamen bursa</i>			5.5	2.5			671.3	286.4
<i>Thalassoma duperrey</i>	52.0	3.7	1.0	1.2	576.4	149.0	14.0	16.2
<i>Thalassoma purpuraceum</i>	0.5	1.0			189.5	379.1		
<i>Xyrichtys umbrilatus</i>			0.5	1.0			13.7	27.4
<i>Zebrasoma flavescens</i>			1.0	1.2			14.1	16.9
Total/Depth Avg ± SD:	285.5	4.3	66.5	2.4	38753.8	984.4	3106.3	89.0
Species Richness	33		33					
Species Diversity	2.23		2.40					

Findings: Among 60 reefs, Puamana 3m ranked 24 in species richness, 20 in density, 5 in biomass, and 25 in diversity. Puamana 13m ranked 47 in species richness, 56 in density, 53 in biomass, and 14 in diversity. The most abundant species were the Blackfin chromis (*Chromis vanderbilti*) and the Hawaiian whitespotted toby (*Canthigaster jactator*) at the 3m and 13m reefs respectively. The species with the highest biomass were the Bluespine unicornfish (*Naso unicornis*) and the Pinktail durgon (*Melichthys vidua*) at the 3m and 13m reefs respectively. *Gunnellichthys curiosus*, *Parapercis schauinslandi*, *Xyrichtys umbrilatus*, *Anampses chrysocephalus*, and *Apogon kallopterus* presence is notable as these species are not common to sites surveyed.