

FIGURE 25. Two views of *Porites lobata* community structure in outer reef face zone at Olowalu (Zone H in Figure 7). Upper photo shows area where numerous colonies have essentially fused into a massive "super-colony." Lower photo shows a solitary colony approximately 2 meters in height.

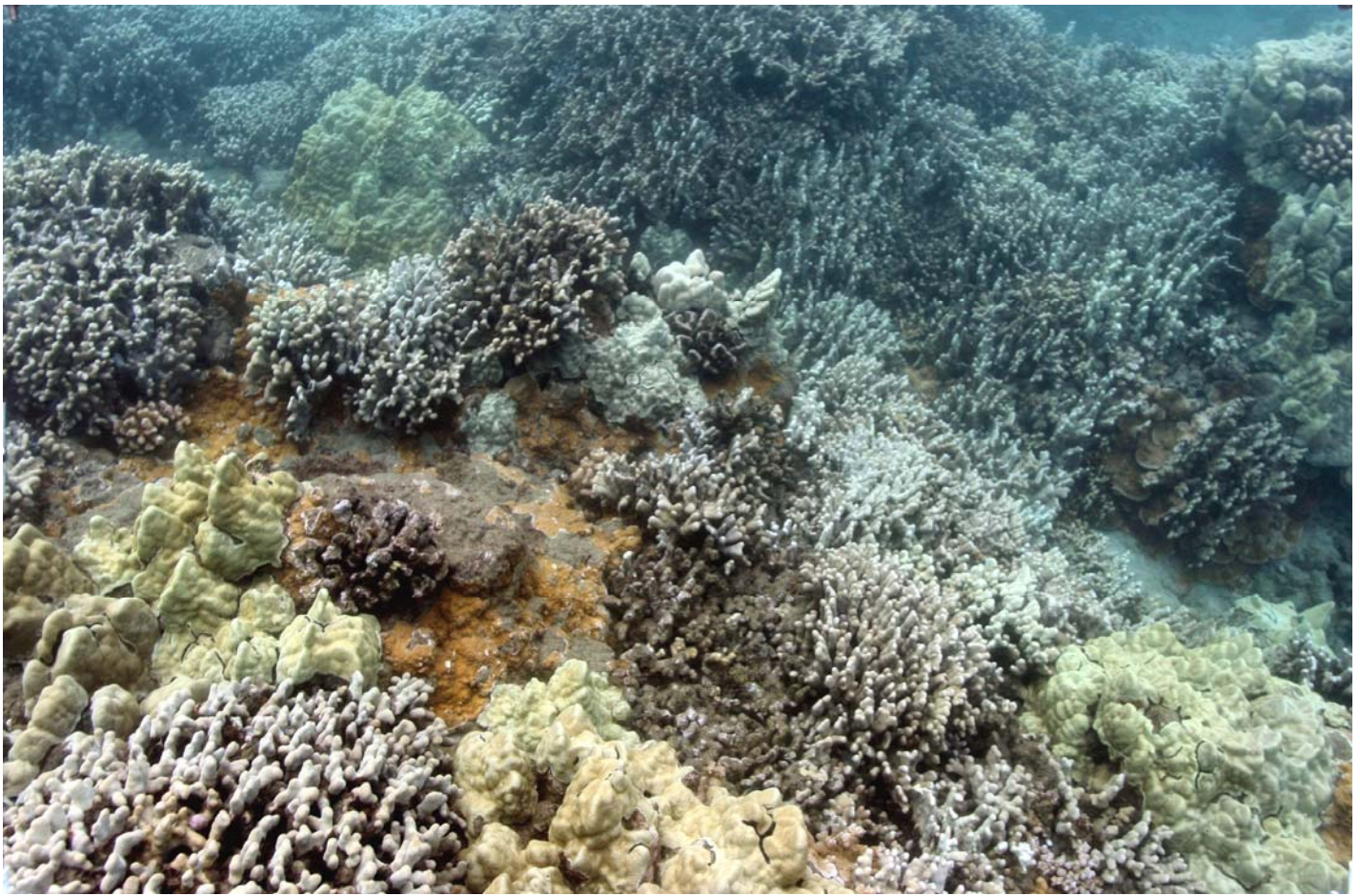


FIGURE 26. Outer reef face coral communities off Olowalu Point. Elevated accreting formations above the level of sand channels. Extensive coral growth covers essentially all of the hard substratum in the area.

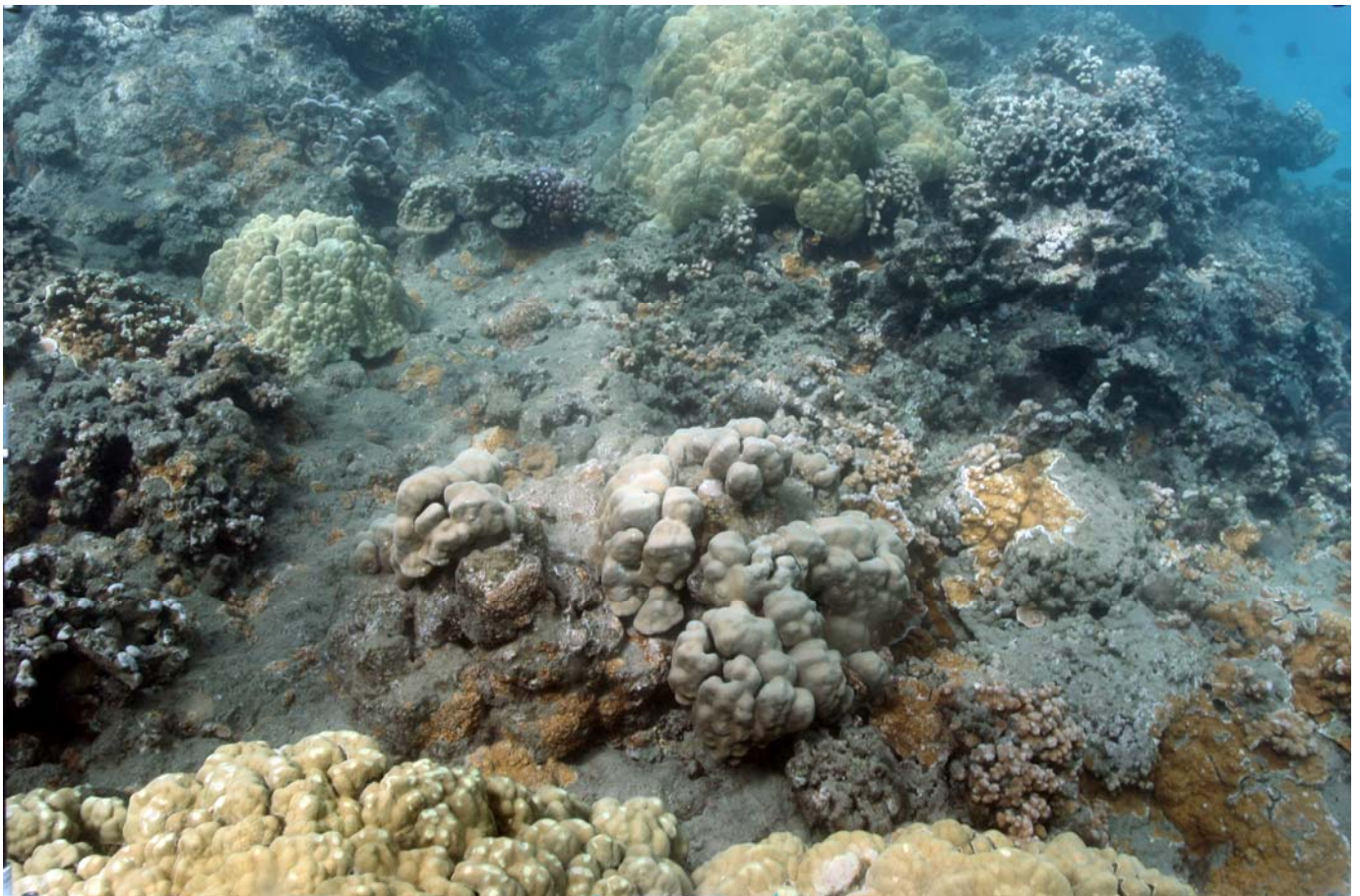
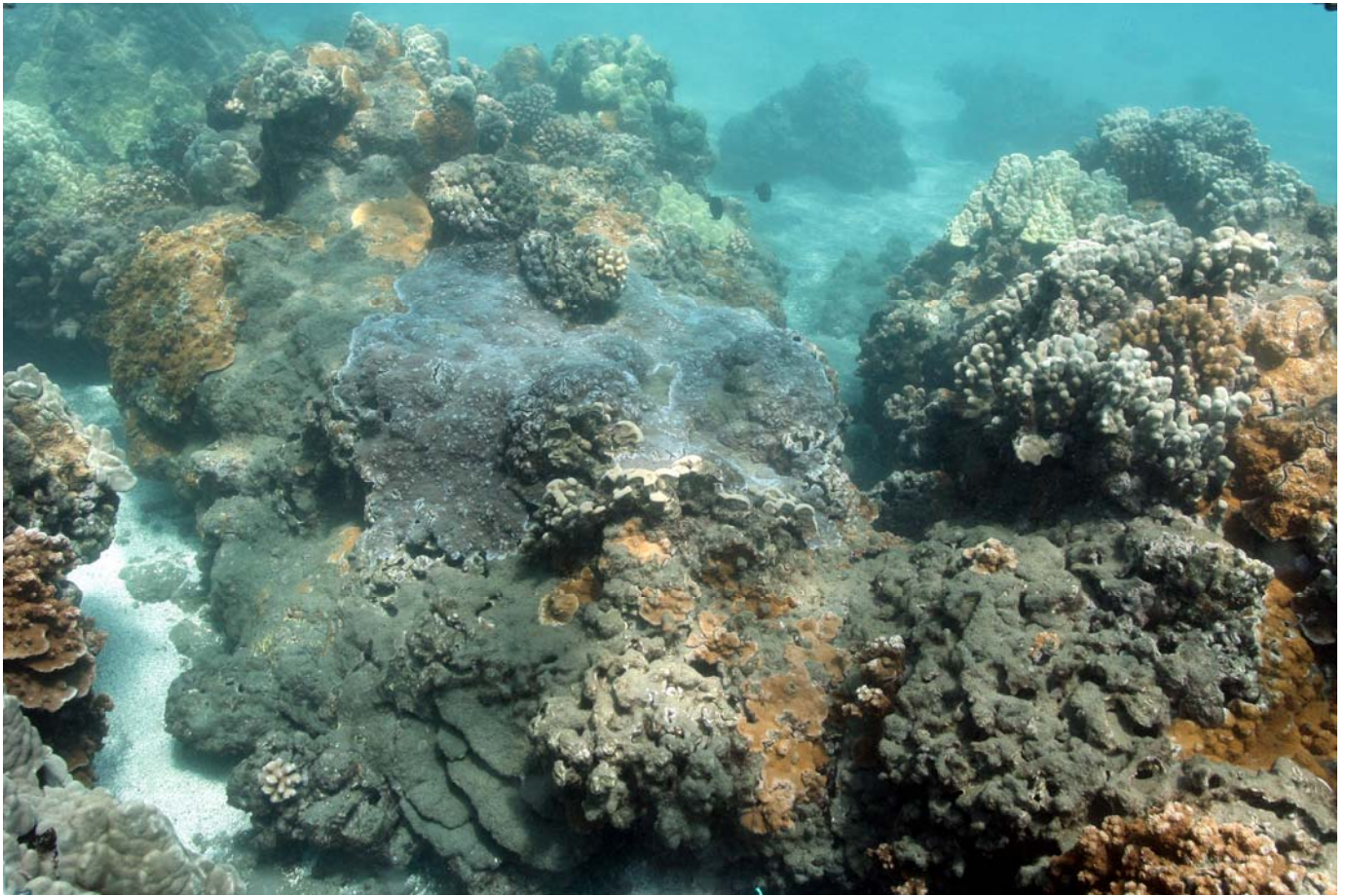


FIGURE 27. Reef surface off southern end of Olowalu Town project site, at dive site known as 14-Mile Marker (Zone I in Figure 7). Note substantial areas of the reef surface where coral is dead and covered with a layer of sediment.

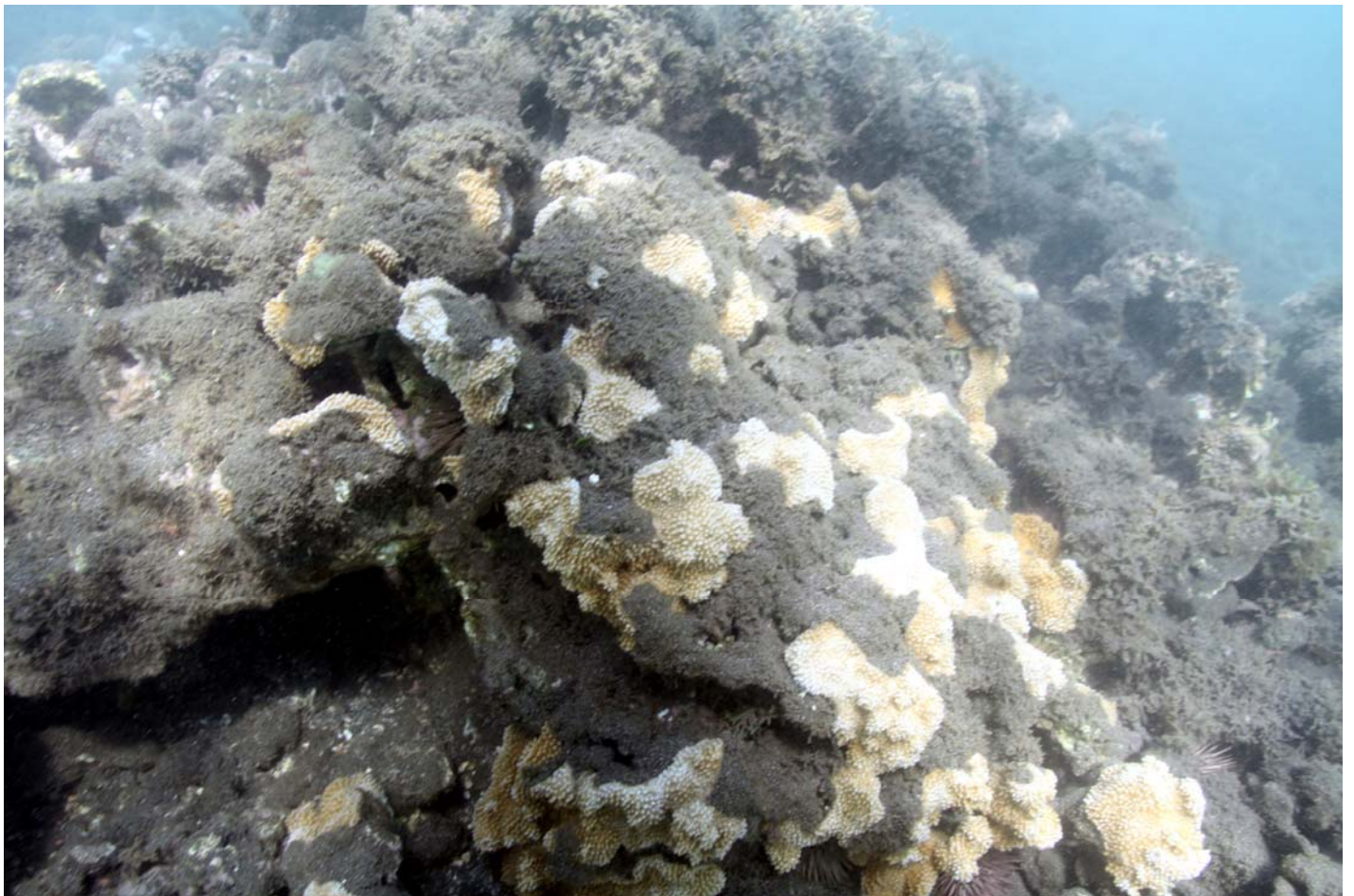
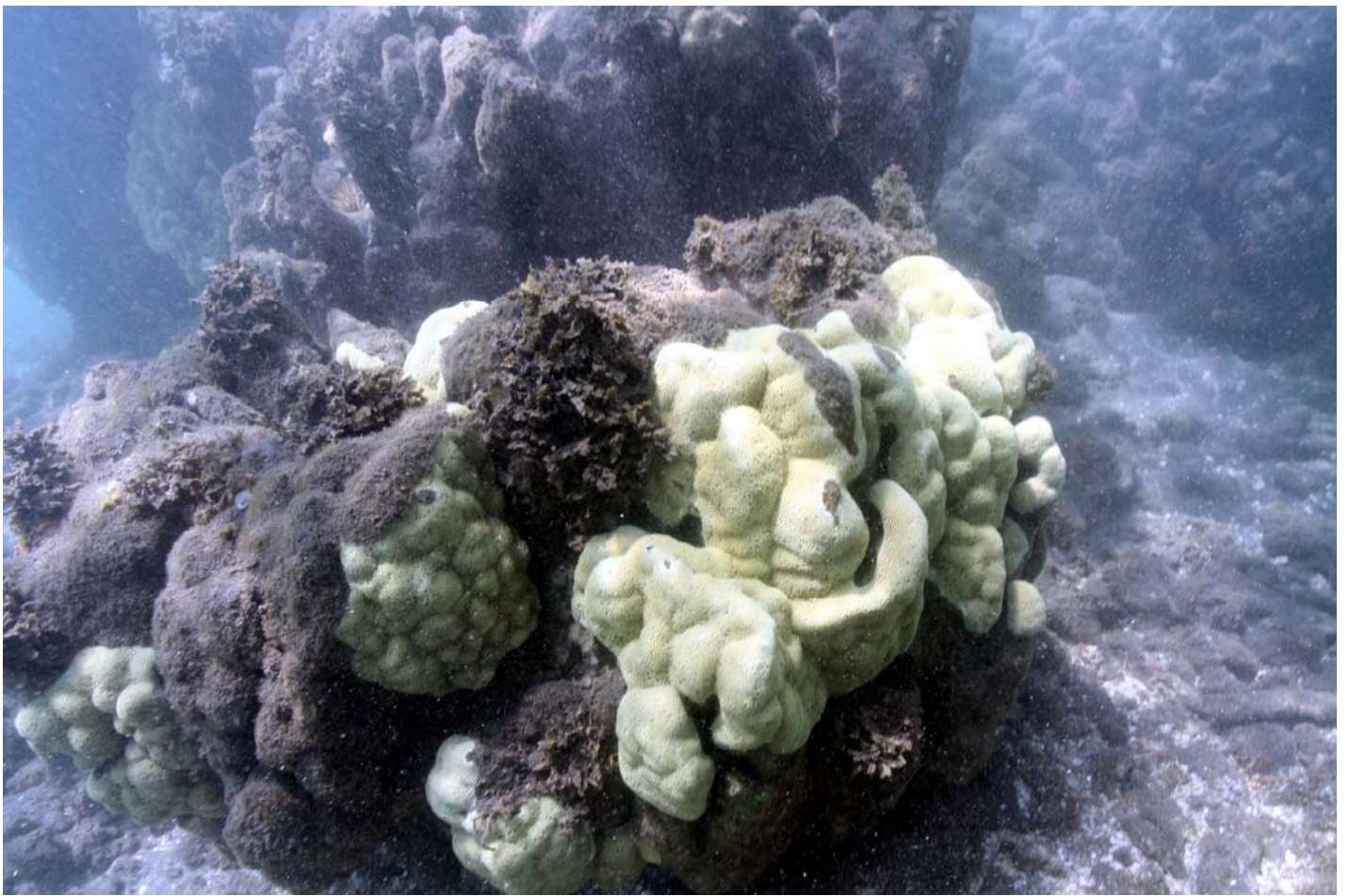


FIGURE 28. Partially dead and sediment covered corals at 14-Mile dive site at southern end of Olowalu (Zone I in Figure 7).

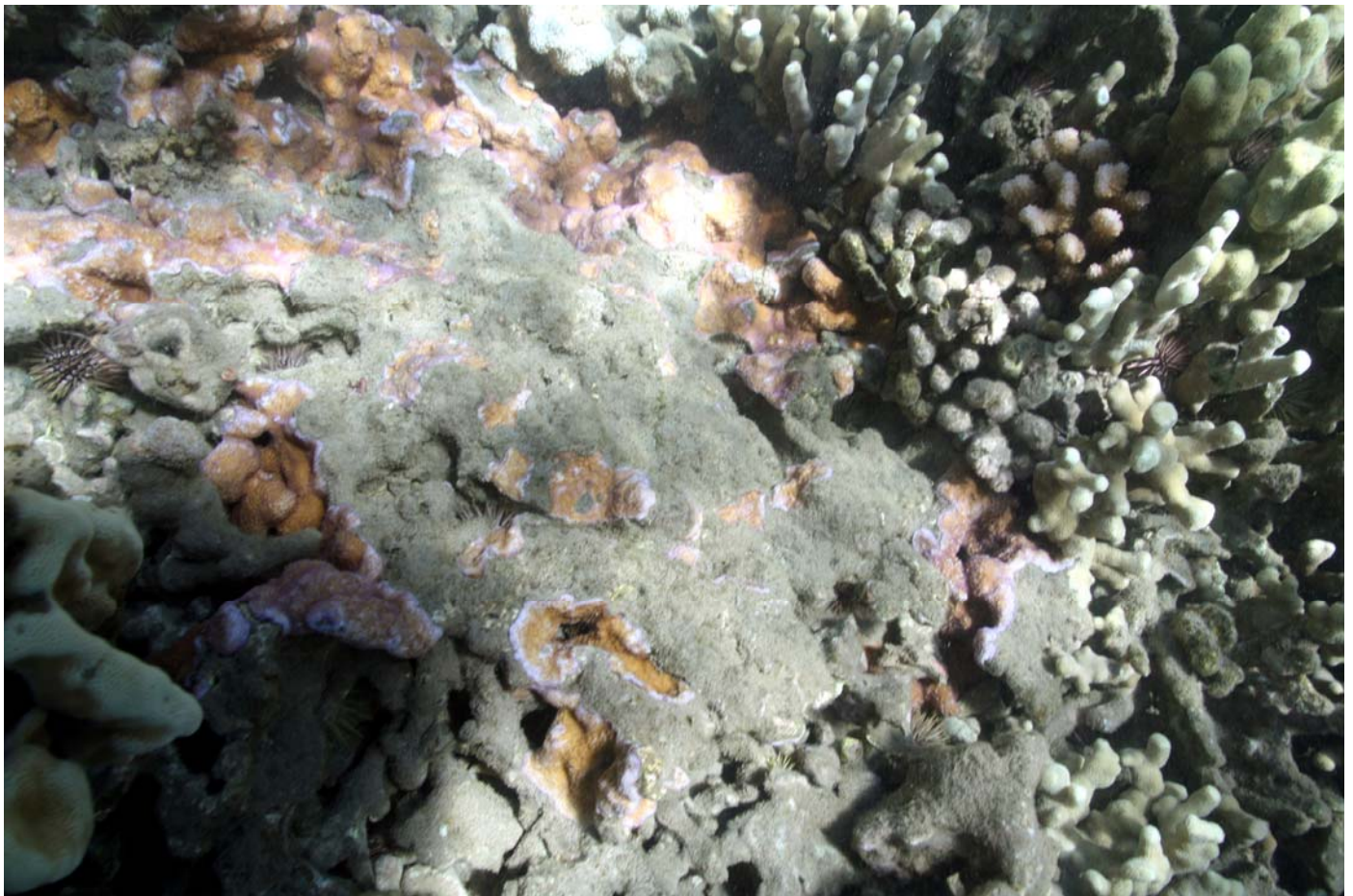
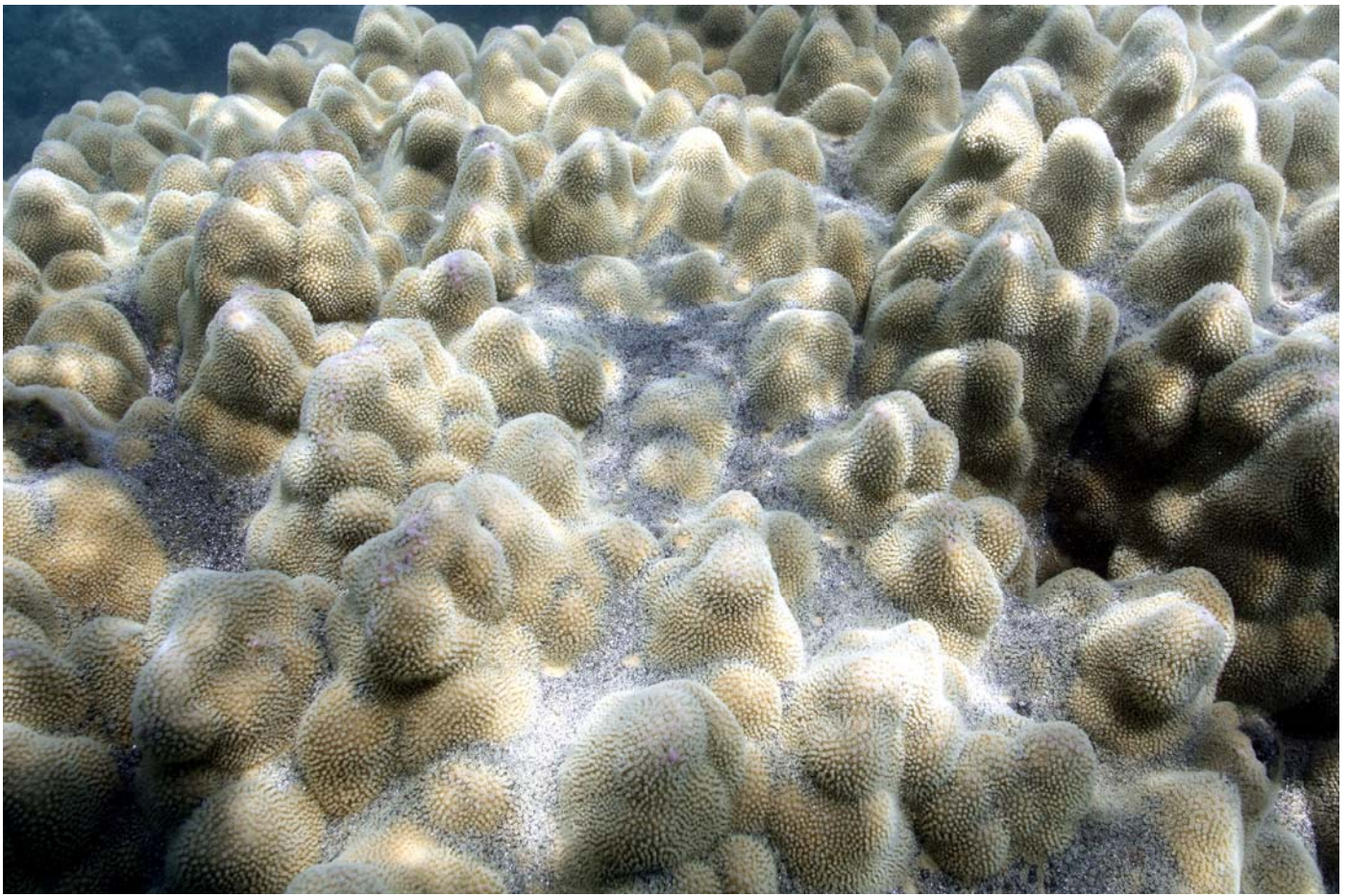


FIGURE 29. Upper photos shows deposition of marine sand on living surface of colony of *Porites* sp. at 14-Mile Marker area. Inspection of the areas under the sand revealed areas of stressed tissue. Lower photo shows colony of *Montipora* sp. with significant portions of the colony dead, likely from sediment stress.

TABLE 3-1. continued

CAL/VAL SITE	LONGITUDE	LATITUDE	CORAL	ALGAE	TURF	SP	SAND	LS	DC	CCA	TBS	TBM	MUD	INV	RUB
172	-156.60968	20.80735	67	0	0	0	0	0	18	0	15	0	0	0	0
173	-156.60968	20.80674	84	0	0	0	1	0	14	0	1	0	0	0	0
174	-156.60979	20.80635	58	0	0	0	2	0	40	0	0	0	0	0	0
175	-156.60975	20.80604	84	0	0	0	0	0	3	0	13	0	0	0	0
176	-156.60980	20.80614	88	0	0	0	0	0	3	0	9	0	0	0	0
177	-156.60972	20.80568	0	0	0	0	100	0	0	0	0	0	0	0	0
178	-156.60981	20.80589	90	0	0	0	0	0	1	0	9	0	0	0	0
964	-156.62044	20.80471	83	0	0	0	0	0	0	0	0	17	0	0	0
965	-156.62041	20.80485	32	0	0	0	1	0	2	0	0	65	0	0	0
966	-156.62042	20.80522	42	0	0	0	0	0	2	0	0	56	0	0	0
967	-156.62046	20.80532	44	0	0	0	0	0	2	0	0	54	0	0	0
968	-156.62046	20.80535	83	0	0	0	0	0	3	0	14	0	0	0	0
969	-156.62007	20.80488	69	0	0	0	0	0	0	0	0	31	0	0	0
970	-156.61996	20.80471	57	0	0	0	0	0	3	3	0	37	0	0	0
971	-156.61990	20.80448	5	0	0	0	92	0	0	0	3	0	0	0	0
972	-156.61988	20.80434	0	0	0	0	79	0	0	0	21	0	0	0	0
973	-156.61999	20.80420	60	0	0	0	2	0	4	0	34	0	0	0	0
974	-156.62007	20.80398	94	0	0	0	0	0	2	0	4	0	0	0	0
975	-156.62021	20.80380	0	0	0	0	93	0	0	0	7	0	0	0	0
976	-156.62026	20.80351	98	0	0	0	0	0	2	0	0	0	0	0	0
977	-156.62041	20.80360	95	0	0	0	0	0	5	0	0	0	0	0	0
978	-156.62045	20.80374	0	0	0	0	100	0	0	0	0	0	0	0	0
979	-156.62054	20.80382	98	0	0	0	0	0	1	0	1	0	0	0	0
980	-156.62075	20.80404	88	0	0	0	0	0	12	0	0	0	0	0	0
981	-156.62070	20.80430	83	0	0	0	0	0	9	0	0	8	0	0	0
982	-156.62062	20.80451	80	0	0	0	5	0	3	0	12	0	0	0	0
983	-156.62052	20.80461	27	0	0	0	29	0	0	0	44	0	0	0	0
984	-156.62046	20.80477	65	0	0	0	0	0	0	0	0	35	0	0	0
985	-156.61847	20.80439	0	0	0	0	46	0	0	0	54	0	0	0	0
986	-156.61838	20.80430	47	0	0	0	2	0	16	0	35	0	0	0	0
987	-156.61830	20.80426	28	0	0	0	0	0	17	0	55	0	0	0	0
988	-156.61832	20.80404	2	0	0	0	8	0	0	0	90	0	0	0	0
989	-156.61834	20.80381	24	0	0	0	0	0	29	0	0	47	0	0	0
990	-156.61839	20.80355	62	0	0	0	0	0	9	0	0	29	0	0	0
991	-156.61856	20.80327	75	0	0	0	0	0	6	0	19	0	0	0	0
992	-156.61867	20.80302	72	0	0	0	1	0	7	0	20	0	0	0	0
993	-156.61862	20.80279	84	0	0	0	0	0	8	0	8	0	0	0	0
994	-156.61877	20.80279	0	0	0	0	100	0	0	0	0	0	0	0	0
995	-156.61883	20.80297	84	0	0	0	0	0	6	0	10	0	0	0	0
996	-156.61880	20.80315	66	0	0	0	0	0	14	0	0	20	0	0	0
997	-156.61872	20.80336	49	0	0	0	0	0	21	0	0	30	0	0	0
998	-156.61847	20.80393	65	0	0	0	0	0	2	0	0	33	0	0	0
999	-156.61841	20.80416	46	0	0	0	0	0	11	0	43	0	0	0	0

TABLE 3-2. Locations of cal/val sites and percent cover of each bottom type at Olowalu, Mau collected on November 5, 2010. Abbreviations for bottom cover categories are: TURF=algal turf; SP=sponge; LS=limestone; DC=dead coral; CCA=crustose calcareous algae; TBS=turb-bound marine sediment; TBM=turf bound mud; INV=mobile invertebrates; RUB=rubble.

5-Nov-2010

CAL/VAL SITE	DATE	LONGITUDE	LATITUDE	CORAL	ALGAE	TURF	SP	SAND	LS	DC	CCA	TBS	TBM	MUD	INV	RUB
560	20101105	-156.63098	20.81851	22	1	16	0	34	0	3	0	24	0	0	0	0
561	20101105	-156.63088	20.81845	0	0	0	0	100	0	0	0	0	0	0	0	0
562	20101105	-156.63077	20.81856	17	1	20	0	16	0	1	0	45	0	0	0	0
563	20101105	-156.63072	20.81864	0	0	0	0	100	0	0	0	0	0	0	0	0
564	20101105	-156.63072	20.81879	30	1	16	0	17	1	4	0	31	0	0	0	0
565	20101105	-156.63091	20.81873	38	2	9	0	8	0	14	0	29	0	0	0	0
566	20101105	-156.63095	20.81863	0	0	0	0	100	0	0	0	0	0	0	0	0
567	20101105	-156.63055	20.81564	33	0	0	0	3	0	3	0	0	61	0	0	0
568	20101105	-156.63062	20.81555	0	0	0	0	99	0	0	0	1	0	0	0	0
569	20101105	-156.63067	20.81544	0	0	0	0	100	0	0	0	0	0	0	0	0
570	20101105	-156.63056	20.81536	39	2	1	0	3	0	4	1	50	0	0	0	0
571	20101105	-156.63040	20.81539	37	5	0	0	2	0	6	0	0	50	0	0	0
572	20101105	-156.63046	20.81555	53	0	0	0	3	0	13	0	0	31	0	0	0
573	20101105	-156.63035	20.81568	52	0	0	0	1	0	9	0	0	38	0	0	0
574	20101105	-156.63031	20.81581	58	0	0	0	1	0	13	0	0	28	0	0	0
575	20101105	-156.63027	20.81592	29	5	0	0	14	0	4	0	48	0	0	0	0
576	20101105	-156.63045	20.81605	25	2	0	0	8	0	2	0	63	0	0	0	0
577	20101105	-156.63063	20.81585	44	1	0	0	2	0	8	0	45	0	0	0	0
578	20101105	-156.62830	20.81189	8	0	0	0	9	0	0	0	0	83	0	0	0
579	20101105	-156.62828	20.81200	18	0	0	0	1	0	0	0	0	81	0	0	0
580	20101105	-156.62820	20.81215	17	0	0	0	0	0	8	0	0	75	0	0	0
581	20101105	-156.62832	20.81226	24	0	0	0	0	0	3	0	0	73	0	0	0
582	20101105	-156.62854	20.81220	24	1	0	0	2	0	2	0	0	71	0	0	0
583	20101105	-156.62869	20.81210	0	1	0	0	16	0	0	0	0	73	10	0	0
584	20101105	-156.62847	20.81209	27	0	0	0	2	0	4	0	0	67	0	0	0
585	20101105	-156.62848	20.81195	33	1	0	0	4	0	6	0	0	56	0	0	0
587	20101105	-156.62674	20.81066	23	0	0	0	1	0	0	0	0	0	76	0	0
588	20101105	-156.62674	20.81077	27	0	0	0	1	0	7	0	0	0	65	0	0
589	20101105	-156.62673	20.81075	29	0	0	0	0	0	7	0	0	0	64	0	0
590	20101105	-156.62379	20.80650	2	0	67	0	31	0	0	0	0	0	0	0	0
591	20101105	-156.62369	20.80653	62	0	3	0	0	0	10	4	0	21	0	0	0
592	20101105	-156.62365	20.80646	0	0	39	0	61	0	0	0	0	0	0	0	0
593	20101105	-156.62353	20.80643	67	0	7	0	0	0	7	0	0	19	0	0	0
594	20101105	-156.62347	20.80666	48	0	40	0	0	4	7	0	0	0	0	1	0
595	20101105	-156.62355	20.80680	67	0	0	0	0	1	3	0	0	28	0	1	0
596	20101105	-156.62371	20.80674	57	0	2	0	2	1	5	0	0	33	0	0	0
597	20101105	-156.62383	20.80681	58	0	0	0	1	0	7	0	0	34	0	0	0
598	20101105	-156.62395	20.80689	76	0	0	0	0	0	2	0	0	21	0	1	0

TABLE 3-2. continued.

CAL/VAL SITE	DATE	LONGITUDE	LATITUDE	CORAL	ALGAE	TURF	SP	SAND	LS	DC	CCA	TBS	TBM	MUD	INV	RUB
599	20101105	-156.62394	20.80701	63	0	0	0	0	0	3	0	0	34	0	0	0
600	20101105	-156.62381	20.80695	10	0	0	0	20	0	0	0	13	57	0	0	0
601	20101105	-156.62174	20.80521	60	0	9	0	0	0	8	0	0	23	0	0	0
602	20101105	-156.62158	20.80521	60	0	15	0	0	0	10	0	0	15	0	0	0
603	20101105	-156.62149	20.80534	73	0	8	0	5	0	4	0	0	10	0	0	0
604	20101105	-156.62156	20.80549	68	0	16	0	3	0	9	0	4	0	0	0	0
605	20101105	-156.62169	20.80575	61	0	0	0	0	0	2	0	0	37	0	0	0
606	20101105	-156.62196	20.80571	64	0	3	0	0	0	9	0	0	24	0	0	0
607	20101105	-156.62208	20.80555	68	0	4	0	0	0	0	0	0	28	0	0	0
608	20101105	-156.62222	20.80542	0	0	14	0	85	0	1	0	0	0	0	0	0
609	20101105	-156.62228	20.80514	0	0	6	0	94	0	0	0	0	0	0	0	0
610	20101105	-156.62217	20.80502	74	0	0	0	0	0	11	0	0	15	0	0	0
611	20101105	-156.62204	20.80512	73	0	0	0	0	0	13	0	0	14	0	0	0
612	20101105	-156.62193	20.80506	0	1	1	0	88	0	0	0	10	0	0	0	0
613	20101105	-156.62183	20.80501	53	2	31	0	0	0	14	0	0	0	0	0	0
614	20101105	-156.62177	20.80510	63	0	0	0	0	0	3	0	2	32	0	0	0
615	20101105	-156.62160	20.80510	0	0	0	0	100	0	0	0	0	0	0	0	0
616	20101105	-156.62153	20.80528	71	0	0	0	0	0	3	0	0	26	0	0	0
617	20101105	-156.61990	20.80406	58	6	0	0	0	0	0	0	36	0	0	0	0
618	20101105	-156.61984	20.80395	67	3	4	0	0	0	8	0	18	0	0	0	0
619	20101105	-156.61975	20.80378	69	8	15	0	0	0	8	0	0	0	0	0	0
620	20101105	-156.61968	20.80390	1	0	0	0	98	0	0	0	1	0	0	0	0
621	20101105	-156.61960	20.80410	56	2	30	0	0	0	11	0	0	1	0	0	0
622	20101105	-156.61961	20.80430	55	3	35	0	1	0	6	0	0	0	0	0	0
623	20101105	-156.61972	20.80430	0	0	0	0	55	0	0	0	45	0	0	0	0
624	20101105	-156.61980	20.80439	0	0	0	0	82	0	0	0	18	0	0	0	0
625	20101105	-156.62003	20.80431	60	2	28	0	0	0	10	0	0	0	0	0	0
626	20101105	-156.62016	20.80422	73	0	17	0	2	0	3	0	5	0	0	0	0

TABLE 3-3. Locations of cal/val sites and percent cover of each bottom type at Olowalu, Mau collected on April 2, 2011. Abbreviations for bottom cover categories are: TURF=algal turf; SP=sponge; LS=limestone; DC=dead coral; CCA=crustose calcareous algae; TBS=turb-bound marine sediment; TBM=turf bound mud; INV=motile invertebrates; RUB=rubble.

2-Apr-2011

CAL/VAL SITE	DATE	LONGITUDE	LATITUDE	CORAL	ALGAE	TURF	SP	SAND	LS	DC	CCA	TBS	TBM	MUD	INV	RUB
063	20110402	-156.62277	20.80894	63	0	0	0	22	8	0	0	7	0	0	0	0
064	20110402	-156.62274	20.80890	65	0	0	0	0	15	0	0	20	0	0	0	0
066	20110402	-156.62288	20.80863	23	0	0	0	0	33	0	0	17	0	0	0	27
067	20110402	-156.62298	20.80846	38	0	0	0	7	13	0	0	2	0	0	0	40
068	20110402	-156.62256	20.80836	72	0	0	0	3	23	0	0	2	0	0	0	0
069	20110402	-156.62247	20.80814	47	10	0	0	15	25	0	0	0	0	0	0	3
070	20110402	-156.62220	20.80765	58	2	0	0	2	31	0	0	7	0	0	0	0
072	20110402	-156.62145	20.80750	30	2	0	0	33	17	0	0	1	0	0	0	17
073	20110402	-156.62132	20.80793	44	8	0	0	10	22	0	0	13	0	0	0	3
074	20110402	-156.62123	20.80831	66	9	0	0	2	16	0	0	7	0	0	0	0
075	20110402	-156.62111	20.80859	0	10	0	0	57	0	0	0	0	0	0	0	33
076	20110402	-156.62092	20.80889	0	3	0	0	47	0	0	0	0	0	0	0	50
077	20110402	-156.62036	20.80859	36	40	0	0	9	7	0	0	8	0	0	0	0
078	20110402	-156.62021	20.80836	53	42	0	0	0	2	0	0	3	0	0	0	0
079	20110402	-156.62013	20.80810	8	92	0	0	0	0	0	0	0	0	0	0	0
080	20110402	-156.62005	20.80787	36	47	0	0	1	0	0	0	16	0	0	0	0
081	20110402	-156.62021	20.80761	55	13	0	0	7	0	0	0	25	0	0	0	0
083	20110402	-156.62024	20.80760	59	9	0	0	3	0	0	0	29	0	0	0	0
084	20110402	-156.61375	20.80969	0	0	0	0	72	0	0	0	0	0	0	0	28
085	20110402	-156.61460	20.80881	30	0	0	0	70	0	0	0	0	0	0	0	0
086	20110402	-156.61610	20.80758	25	0	0	0	47	0	0	0	8	0	0	0	20
087	20110402	-156.61644	20.80721	11	0	0	0	35	13	0	0	36	0	0	0	5
088	20110402	-156.61744	20.80696	11	29	0	0	8	8	0	0	44	0	0	0	0
089	20110402	-156.61802	20.80710	29	18	0	0	0	0	0	0	53	0	0	0	0
090	20110402	-156.61922	20.80734	23	31	0	0	26	2	0	0	18	0	0	0	0
091	20110402	-156.61898	20.80718	16	27	0	0	37	0	0	0	12	0	0	0	8
092	20110402	-156.61852	20.80704	0	70	0	0	26	0	0	0	0	0	0	0	4
093	20110402	-156.61808	20.80701	63	0	0	0	0	0	0	0	37	0	0	0	0
094	20110402	-156.61763	20.80694	16	0	0	0	4	0	0	0	80	0	0	0	0
095	20110402	-156.61684	20.80722	1	71	0	0	9	0	0	0	19	0	0	0	0
096	20110402	-156.61471	20.80859	16	2	0	0	0	0	0	0	82	0	0	0	0
098	20110402	-156.60805	20.80857	67	0	0	0	0	0	0	0	33	0	0	0	0
099	20110402	-156.60783	20.80872	60	8	0	0	0	0	0	0	32	0	0	0	0
100	20110402	-156.60707	20.80889	44	3	0	0	0	0	0	0	53	0	0	0	0

TABLE 3-4. Locations of cal/val sites and percent cover of each bottom type at Olowalu, Mau collected on June 12, 2011. Abbreviations for bottom cover categories are: TURF=algal turf; SP=sponge; LS=limestone; DC=dead coral; CCA=crustose calcareous algae; TBS=turb-bound marine sediment; TBM=turf bound mud; INV=motile invertebrates; RUB=rubble.

12-Jun-2011

CAL/VAL SITE	DATE	LONGITUDE	LATITUDE	CORAL	ALGAE	TURF	SP	SAND	LS	DC	CCA	TBS	TBM	MUD	INV	RUB
180	20110612	-156.63019	20.81866	30	0	0	0	0	13	0	0	50	0	0	0	7
181	20110612	-156.62969	20.81761	3	9	0	0	6	2	0	0	80	0	0	0	0
183	20110612	-156.62942	20.81511	46	0	0	0	0	10	0	0	44	0	0	0	0
184	20110612	-156.62820	20.81373	3	0	0	0	2	0	0	0	95	0	0	0	0
185	20110612	-156.62801	20.81339	16	0	0	0	0	6	0	0	78	0	0	0	0
186	20110612	-156.62721	20.81164	47	0	0	0	0	5	0	0	48	0	0	0	0
187	20110612	-156.62627	20.81123	27	0	0	0	0	5	0	0	58	0	0	0	10
188	20110612	-156.62592	20.81021	6	0	0	0	50	10	0	0	34	0	0	0	0
190	20110612	-156.62685	20.80929	10	0	0	0	50	0	0	0	0	0	0	0	40
191	20110612	-156.62442	20.80942	6	6	0	0	0	15	0	0	23	0	0	0	50
192	20110612	-156.62424	20.80957	0	60	0	0	0	15	0	0	5	0	0	0	20
193	20110612	-156.62494	20.80941	46	0	0	0	0	15	0	0	39	0	0	0	0
194	20110612	-156.62284	20.80546	40	0	0	0	40	0	0	0	0	0	0	0	20
196	20110612	-156.62195	20.80633	27	0	0	0	0	0	0	0	48	0	0	0	25
197	20110612	-156.61879	20.80548	35	0	0	0	0	5	0	0	60	0	0	0	0
198	20110612	-156.61658	20.80532	57	0	0	0	0	25	0	0	18	0	0	0	0
199	20110612	-156.61534	20.80677	65	6	0	0	0	5	0	0	24	0	0	0	0
200	20110612	-156.63267	20.81577	0	0	0	0	60	0	0	0	40	0	0	0	0

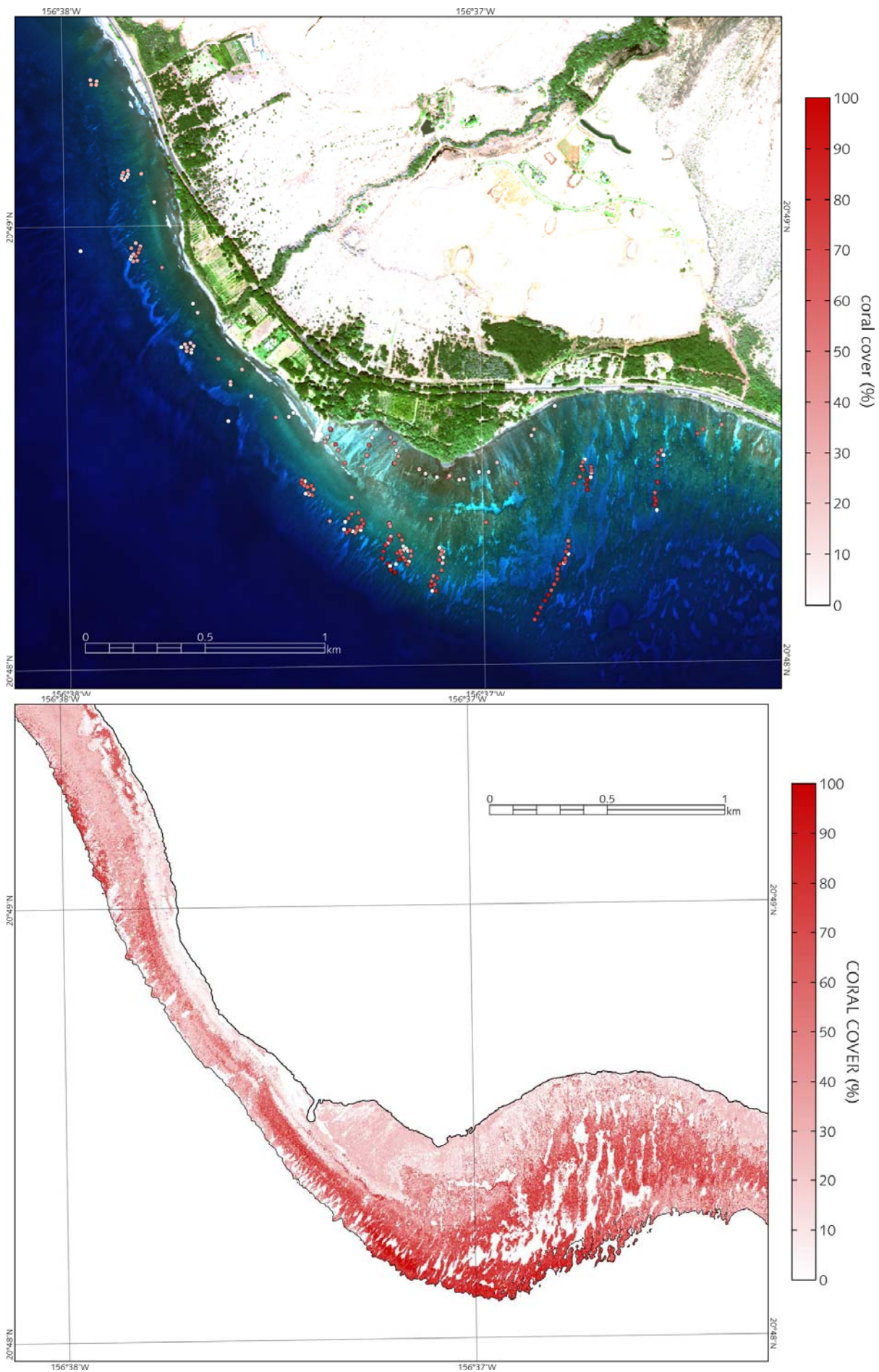


FIGURE 30. Satellite image showing coral cover at Olowalu with cal/val sites color-coded to indicate intensity of cover (top). Map of coral cover created from cal/val data (bottom).

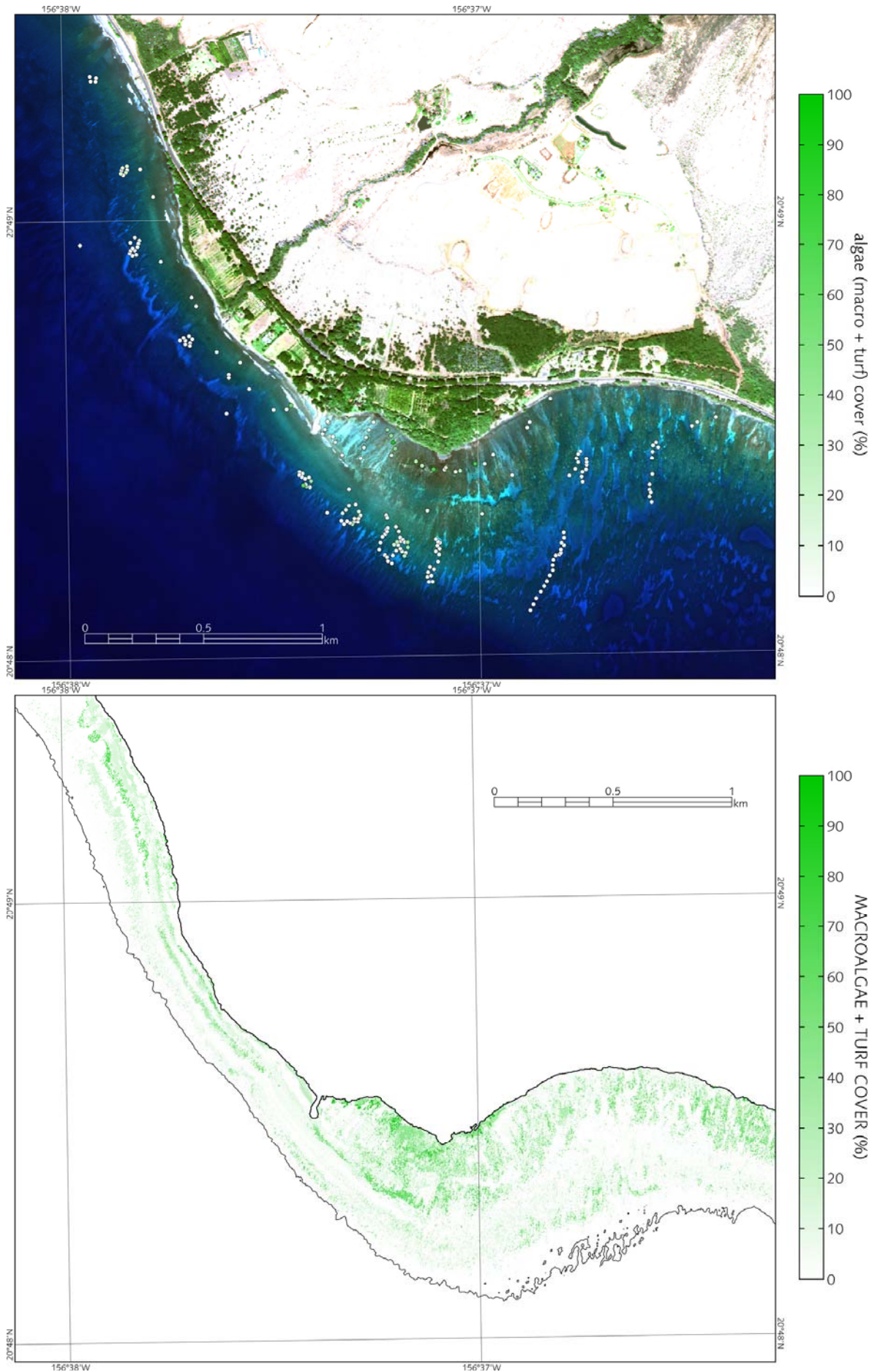


FIGURE 31. Satellite image showing algal cover at Olowalu with cal/val sites color-coded to indicate intensity of cover (top). Map of algal cover created from cal/val data (bottom).

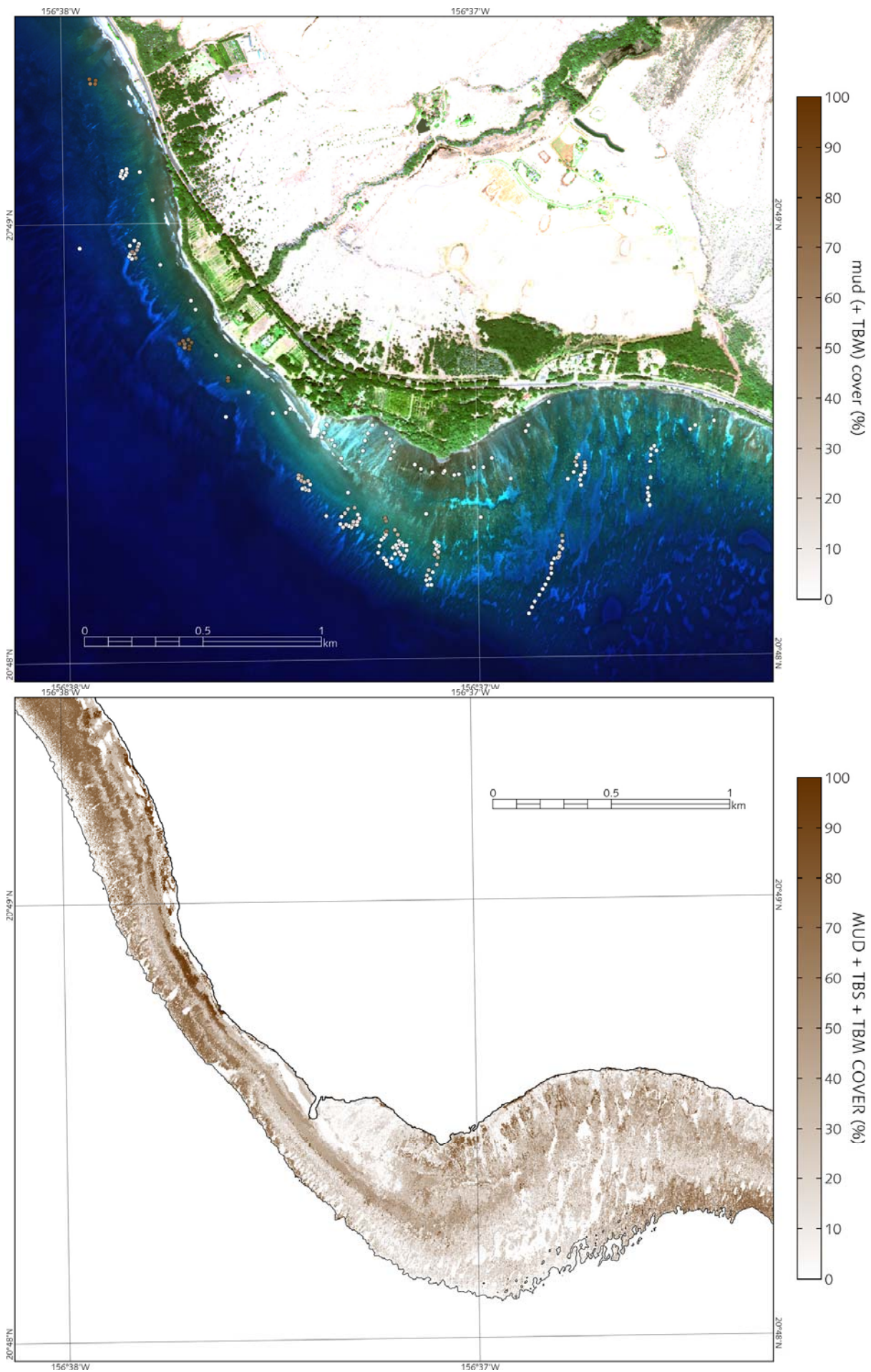


FIGURE 32. Satellite image showing mud and sediment cover at Olowalu with cal/val sites color-coded to indicate intensity of cover (top). Map of mud and sediment cover created from cal/val data (bottom).

TABLE 4. Cross-validation accuracy assessment matrix for coral cover in map product produced for Olowalu survey sites. In cross-validation, all but one data point are used to build a classifier, and the classifier is tested on the withheld point. This process is repeated on every point in the data set. The result is a matrix of classification rates, comparing the actual classes with classes predicted from the classifier. Correct classifications on the diagonal and incorrect classification off-diagonal. The highest accuracy (98%) occurred in the class with no coral, indicating that only 2% of the time pixels were classified as containing coral when none was present. The lowest accuracy (70%) occurred in the class with the highest coral cover (>90%), where 30% of the pixels expressed coral coverage below 90%.

		ACTUAL CLASSES						
		coral = 0	0 < coral ≤ 10	10 < coral ≤ 30	30 < coral ≤ 50	50 < coral ≤ 70	70 < coral ≤ 90	coral > 90
PREDICTED CLASSES	coral = 0	98.0	1.6	1.1	0.8	0.4	0.9	2.9
	0 < coral ≤ 10	0.3	91.0	3.5	1.5	1.4	0.5	2.0
	10 < coral ≤ 30	1.1	3.6	88.2	8.0	3.7	0.9	0.6
	30 < coral ≤ 50	0.1	1.3	2.9	77.8	4.4	3.0	1.5
	50 < coral ≤ 70	0.1	1.2	2.9	7.0	74.6	11.7	6.4
	70 < coral ≤ 90	0.3	0.8	1.1	4.8	13.1	78.6	16.6
	coral > 90	0.1	0.4	0.3	0.2	2.4	4.5	70.0

TABLE 5. Total area cover (in 10^3m^2) of classes of coral, algae, sand and mud (including turf-bound sediment) in Olowalu map area.

COVER CLASS	CORAL	ALGAE	SAND	MUD/SEDIMENT
$x = 0$	317	1,107	845	348
$0 < x \leq 10$	235	390	400	250
$10 < x \leq 30$	476	153	136	449
$30 < x \leq 50$	234	53	159	385
$50 < x \leq 70$	257	78	36	160
$70 < x \leq 90$	226	7	50	183
$x > 90$	51	9	171	23
TOTAL % COVER	37.6	8.3	21.2	32.9

TABLE 6-a. Reef fish abundance in Zone A (See Figure 7) off Olowalu. Site ID corresponds to cal/val site designation shown in Table 3.

ZONE A			
Site ID	564	576	100
Depth (ft)	16	18	21
Sample Date:			
FAMILY			
Species			
CIRRHITIDAE			
<i>Paracirrhites arcatus</i>	2	2	1
<i>P. forsteri</i>		1	
<i>Cirrhites pinnulatus</i>	1		
MULLIDAE			
<i>Parupeneus multifasciatus</i>		3	1
<i>Mulloidichthys flavolineatus</i>			
CHAETODONTIDAE			
<i>Chaetodon ornitissimus</i>	1	2	
<i>C. lunula</i>			1
POMACENTRIDAE			
<i>Chromis vanderbilti</i>	76	33	5
<i>C. hanui</i>			
<i>C. agilis</i>			
<i>Stegastes fasciolatus</i>		5	2
<i>Plectroglyphidodon johnstonianus</i>	3	5	1
<i>P. imparipennis</i>			
LABRIDAE			
<i>Gomphosus varius</i>		4	
<i>Thalassoma duperrey</i>	9	35	8
<i>Halichoeres ornatissimus</i>	4	2	
<i>Stethojulis balteata</i>	4	5	2
<i>Pseudocheilinus octotaenia</i>	2		
<i>P. evanidus</i>		1	
ACANTHURIDAE			
<i>Acanthurus olivaceus</i>	4	3	
<i>A. nigrofuscus</i>	3	27	9
<i>A. dussumieri</i>		1	
<i>Naso lituratus</i>			1
BALISTIDAE			
<i>Sufflamen bursa</i>			
<i>S. psittacus</i>		10	
<i>Melichthys niger</i>		3	2
<i>M. vidua</i>			3
<i>Rhinecanthus rectangulus</i>		3	4
TETRADONTIDAE			
<i>Canthigaster jactator</i>	3	2	5
SERRANIDAE			
<i>Cephalopholis argus</i>	1		
MONCANTHIDAE			
<i>Cantherhines dumerilii</i>		1	
AULOSTOMIDAE			
<i>Aulostomus chinensis</i>			1
NUMBER SPECIES	13	20	15
NUMBER INDIVIDUALS	113	148	45

TABLE 6-b. Reef fish abundance in Zone F (See Figure 7) off Olowalu. Site ID corresponds to cal/val site designation shown in Table 3.

ZONE F

Transect Site ID	73	80	87	99	100
Depth	3	3	12	15	18
Sample Date:	4/2/11	4/2/11	4/2/11	4/2/11	4/2/11
FAMILY					
Species					
CIRRHITIDAE					
<i>Cirrhichthys fasciatus</i>		1			
MULLIDAE					
<i>Parupeneus multifasciatus</i>			4		1
<i>Mulloidichthys flavolineatus</i>	60				
CHAETODONTIDAE					
<i>Chaetodon ornatissimus</i>					2
<i>C. auriga</i>			1		1
<i>C. lunula</i>			1		
POMACENTRIDAE					
<i>Abudefduf abdominalis</i>	2	7		61	11
<i>Stegastes fasciolatus</i>	1	1			1
<i>P. imparipennis</i>					1
LABRIDAE					
<i>Gomphosus varius</i>		1		2	4
<i>Thalassoma duperrey</i>	2	6	2	8	4
<i>Halichoeres ornatissimus</i>		3		2	
<i>Labroides phthirophagus</i>					3
<i>Stethojulis balteata</i>	1	2		4	1
ACANTHURIDAE					
<i>Acanthurus nigrofuscus</i>			10	13	13
<i>A. triostegus</i>			1		
<i>Naso lituratus</i>					4
<i>Naso unicornis</i>					3
<i>Ctenochaetus strigosus</i>					1
BALISTIDAE					
<i>Melichthys niger</i>					4
<i>Rhinecanthus rectangulus</i>				1	
TETRADONTIDAE					
<i>Canthigaster jactator</i>		1			
<i>C. amboinensis</i>				2	
<i>Ostracion meleagris</i>				1	
<i>Arothron meleagris</i>				1	
SCARIDAE					
<i>Scarus psittacus</i>		31	13	8	2
<i>Chlorurus sordidus</i>		4			3
ZANCLIDAE					
<i>Zanclus cornutus</i>			1		
BLENNIIDAE					
<i>Cirripectes vanderbilti</i>					1
NUMBER SPECIES	5	10	8	11	18
NUMBER INDIVIDUALS	66	57	33	103	60

TABLE 6-c. Reef fish abundance in Zone H (See Figure 7) off Olowalu. Site ID corresponds to cal/val site designation shown in Table 3.

ZONE H

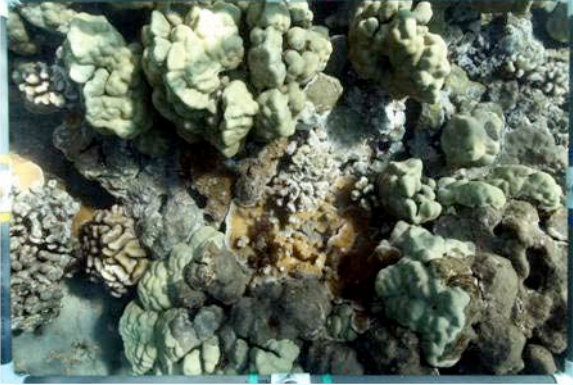
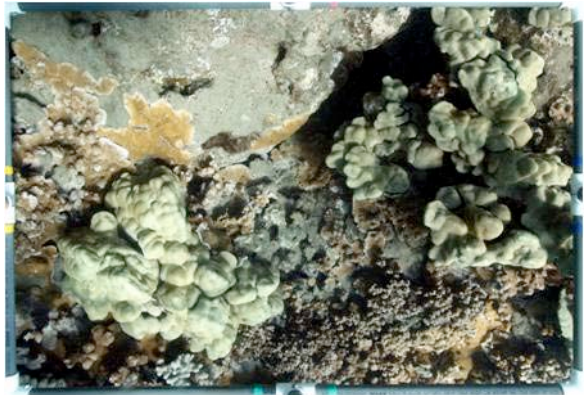
Transect Site ID	590	610	615	964	980	991	84	95
Depth (feet)	30	25	27	24	29	27	25	30
Sample Date:	11/15/10	11/15/10	11/15/10	2/27/11	2/27/11	2/27/11	2/27/11	2/27/11
FAMILY								
Species								
CIRRHITIDAE								
<i>Paracirrhites arcatus</i>	8	3	2	1		2		1
<i>P. forsteri</i>				2				
MULLIDAE								
<i>Parupeneus multifasciatus</i>	3	2	2		1	1	1	
<i>Mulloidichthys flavolineatus</i>							30	
CHAETODONTIDAE								
<i>Chaetodon ornatissimus</i>		1				1	1	1
<i>C. auriga</i>		1				2	2	
<i>C. lunula</i>		2		1		1	1	
<i>C. unimaculatus</i>							4	2
<i>C. quadrimaculatus</i>							1	
<i>Forcipiger flavissimus</i>				1				
POMACENTRIDAE								
<i>Chromis vanderbilti</i>		300		60		40	25	10
<i>C. hanui</i>		4	3					
<i>C. agilis</i>		2						
<i>Stegastes fasciolatus</i>	1	17	11	3	2	1		2
<i>Plectroglyphidodon johnstonianus</i>	2	7	2			1		2
<i>P. imparipennis</i>	2							
LABRIDAE								
<i>Coris gaimard</i>		2						
<i>Gomphosus varius</i>		6	3	6	5	3		2
<i>Thalassoma duperrey</i>	25	30	22	3	7	4	10	5
<i>T. ballieui</i>						1		
<i>Halichoeres ornatissimus</i>		3		2		1	1	
<i>Labroides phthirophagus</i>				2		1		
<i>Stethojulis balteata</i>	18	5	1	2	7		5	
<i>Pseudocheilinus octotaenia</i>	1	4						
<i>P. evanidus</i>	3							
<i>Macropharyngodon geoffroy</i>		2						
<i>Anampses chrysocephalus</i>			1					
ACANTHURIDAE								
<i>Acanthurus olivaceus</i>		12						
<i>A. achilles</i>					3			
<i>A. nigrofuscus</i>	1	28	25	61	17	18	30	25
<i>A. leucopareius</i>				1		1		
<i>A. blochii</i>				10		3	4	1
<i>A. dussumieri</i>				1				
<i>A. triostegus</i>				1			3	15
<i>A. olivaceus</i>				9		22	1	
<i>Naso lituratus</i>						6	2	
<i>N. unicornis</i>			1					
<i>N. brevirostris</i>			1				9	1
<i>Ctenochaetus strigosus</i>		7	25					
<i>Zebrasoma flavescens</i>	1	5	1					
BALISTIDAE								
<i>Sufflamen bursa</i>	2	4				2	3	2
<i>S. psittacus</i>	5	8	1					
<i>Melichthys niger</i>	3	4		3	2	7	5	43
<i>M. vidua</i>	1	1		3	2		1	3
<i>Rhinecanthus rectangulus</i>	6			1	2			
TETRADONTIDAE								
<i>Canthigaster jactator</i>	16	3		2		1		1
<i>Arothron hispidus</i>								1
SCARIDAE								
<i>Scarus rubroviolaceus</i>		1	1					1
<i>S. psittacus</i>				9	6	20	1	
<i>Chlorurus sordidus</i>	1	5	10	4		12	5	5
<i>C. perspicillatus</i>						1		
BLENNIIDAE								
<i>Cirripectes vanderbilti</i>		1						
HOLOCENTRIDAE								
<i>Sargocentron esifer</i>		1						
NUMBER SPECIES	18	30	17	23	11	24	22	19
NUMBER INDIVIDUALS	99	471	112	188	54	152	145	123

APPENDIX A.

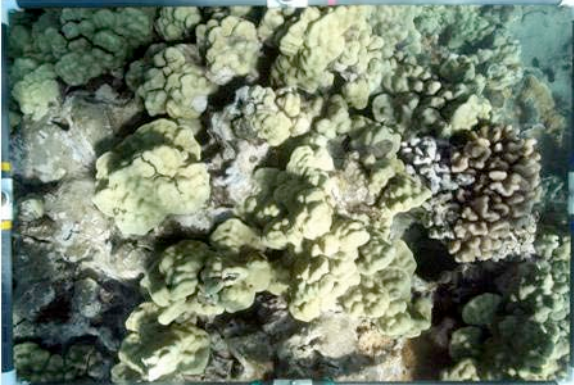
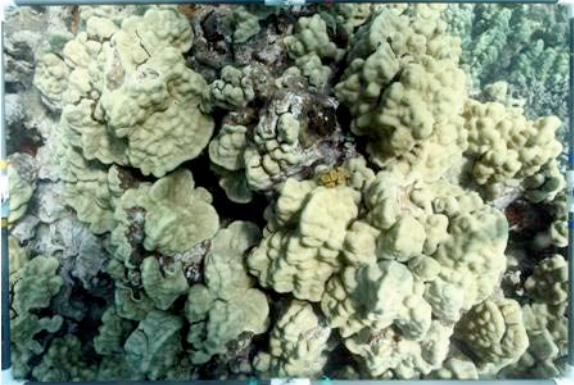
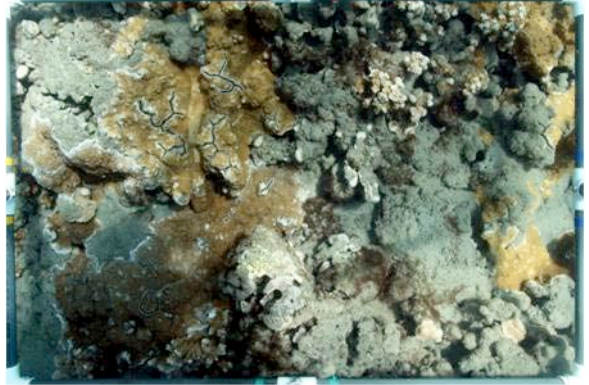
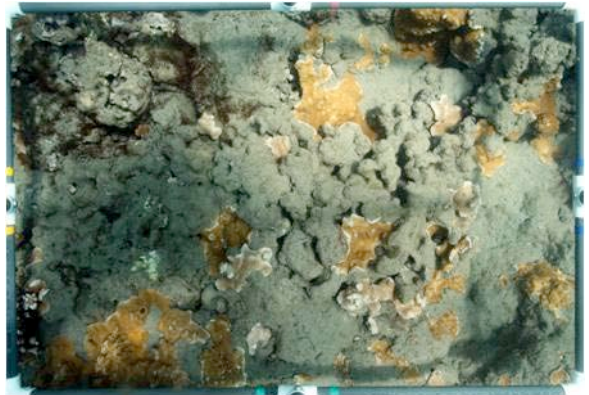
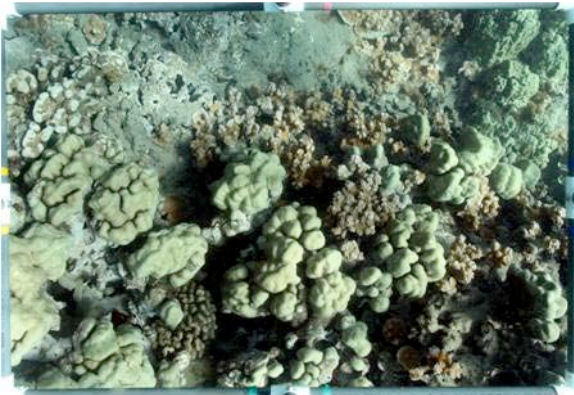
Photoquadrats

**ASSESSMENT OF MARINE WATER CHEMISTRY AND BIOTIC
COMMUNITY STRUCTURE IN THE VICINITY OF THE OLOWALU
TOWN MASTER PLAN, OLOWALU, MAUI, HAWAII**

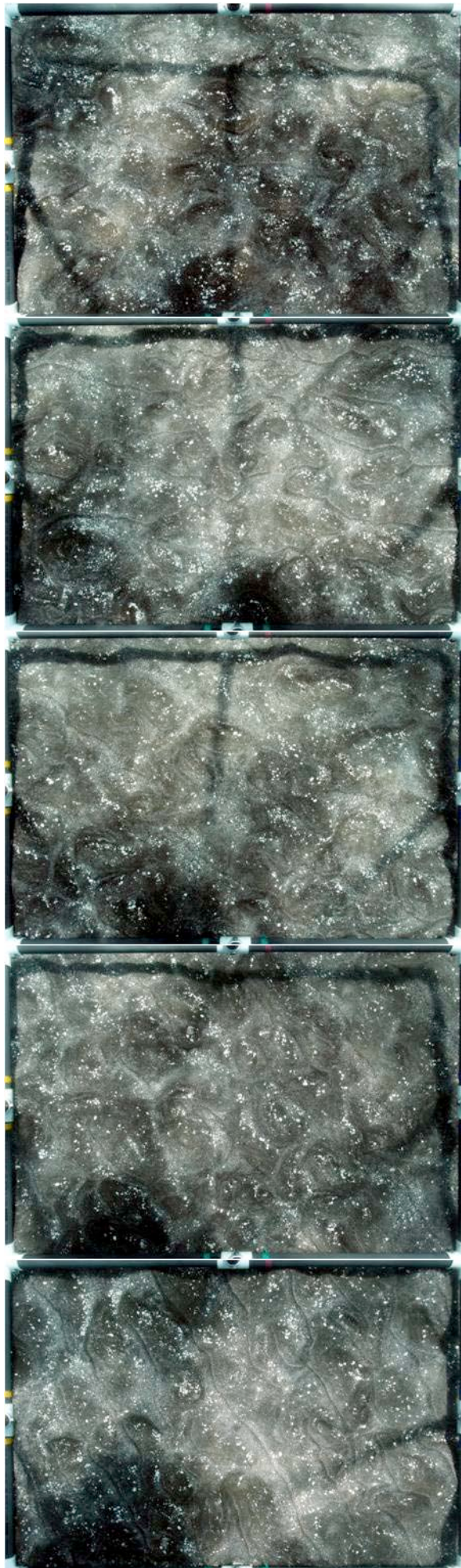
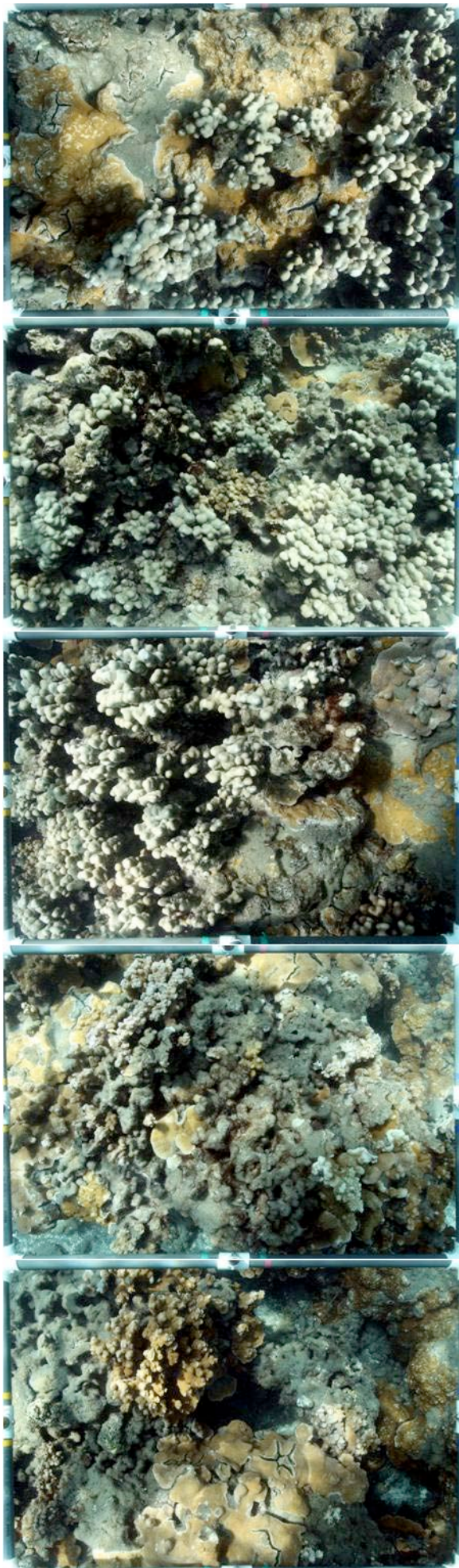
July 2011



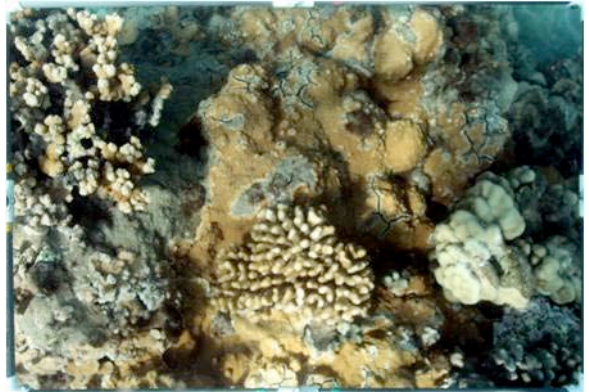
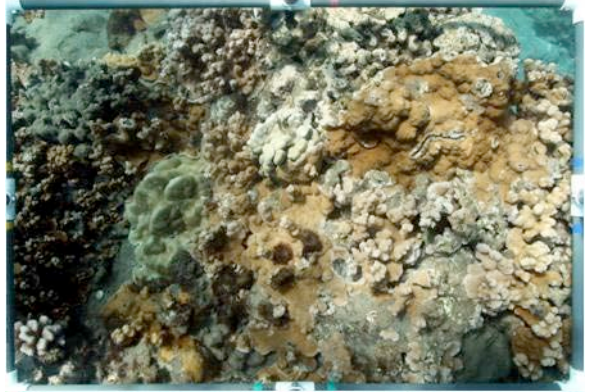
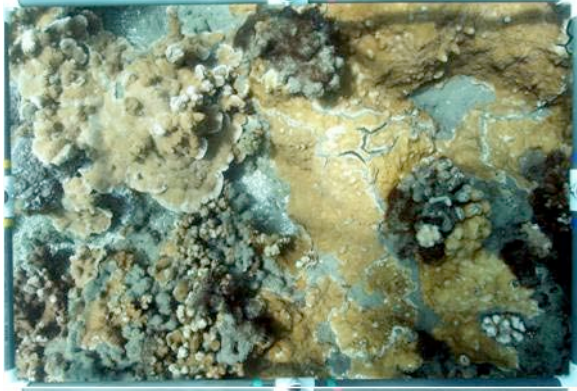
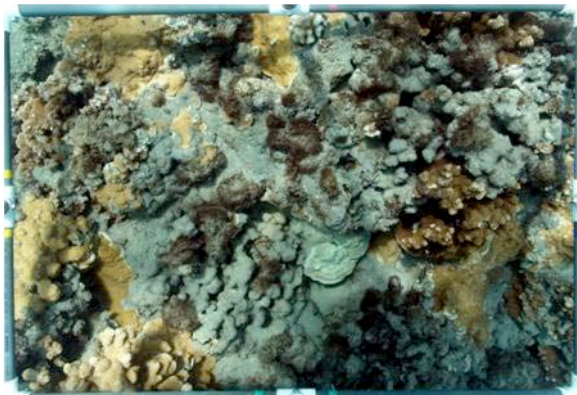
Olowalu Town Project Sites 001 and 002



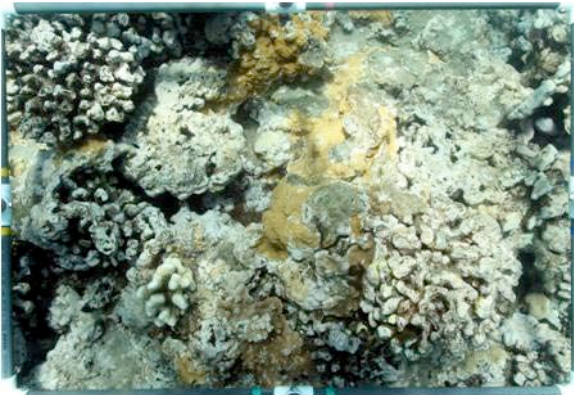
Olowalu Town Project Sites 003 and 004



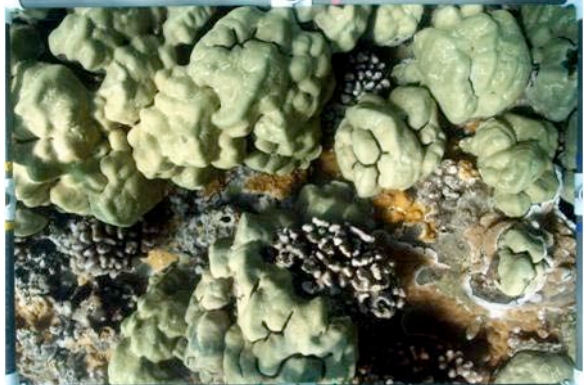
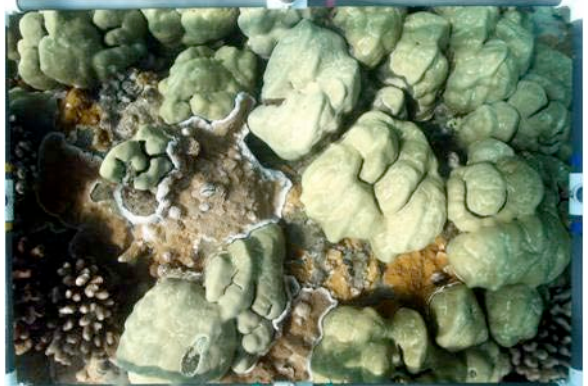
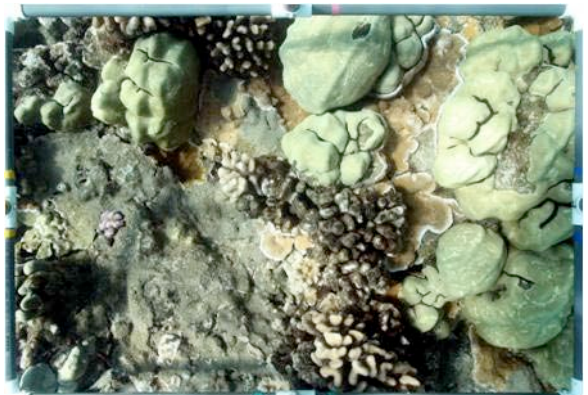
Olowalu Town Project Sites 005 and 006



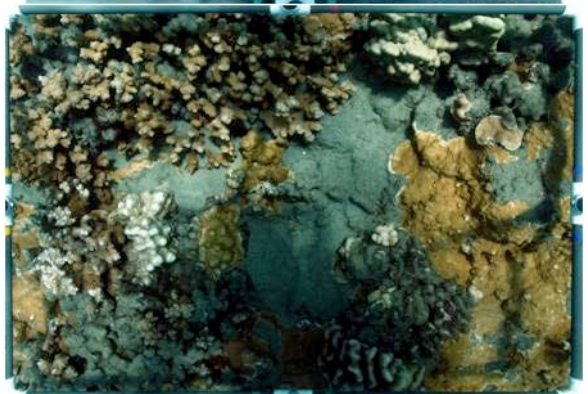
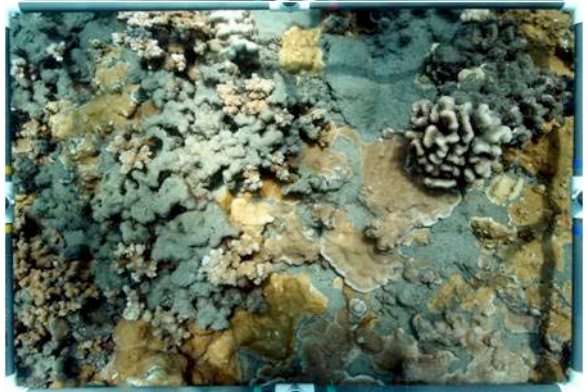
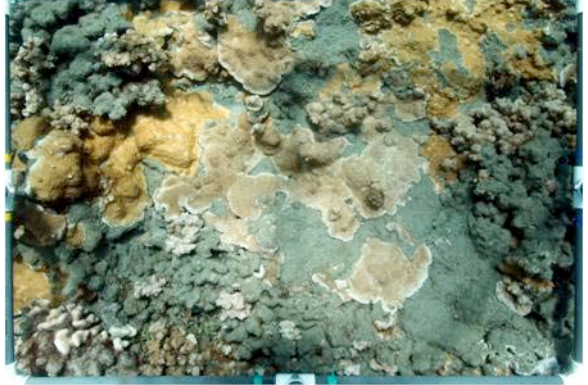
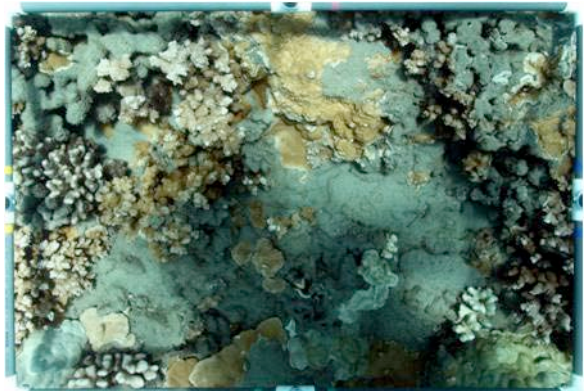
Olowalu Town Project Sites 072 and 073



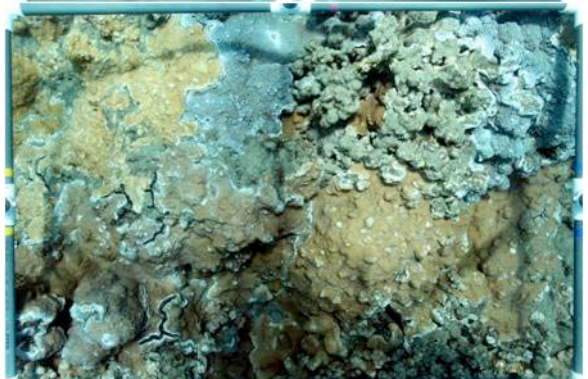
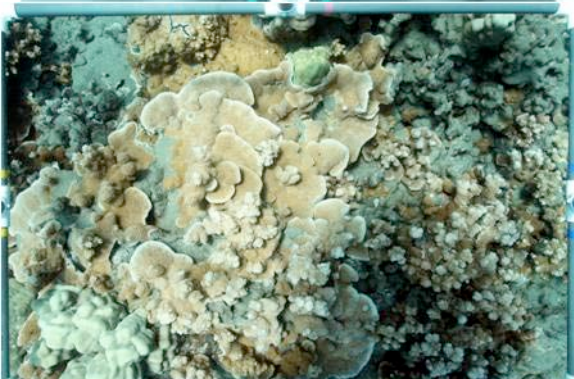
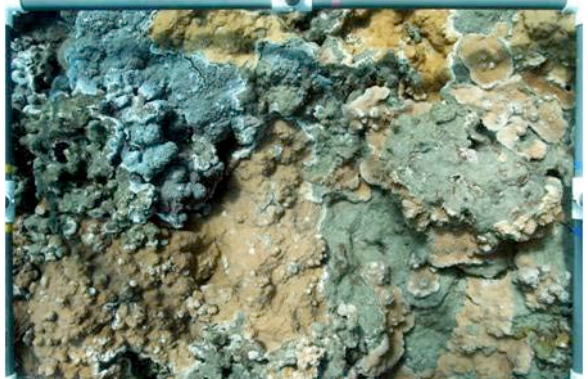
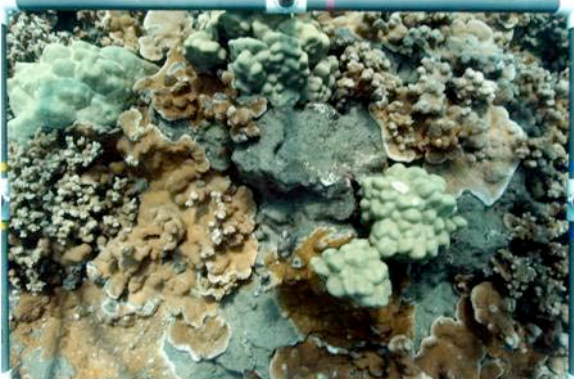
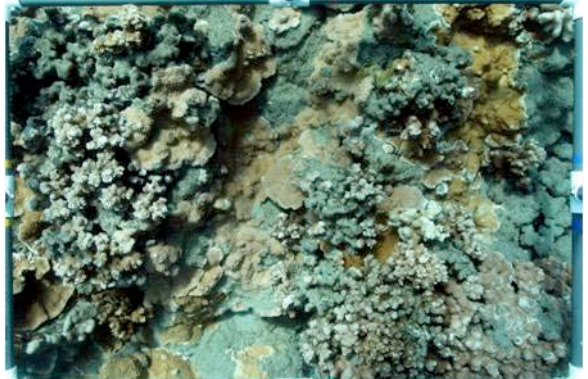
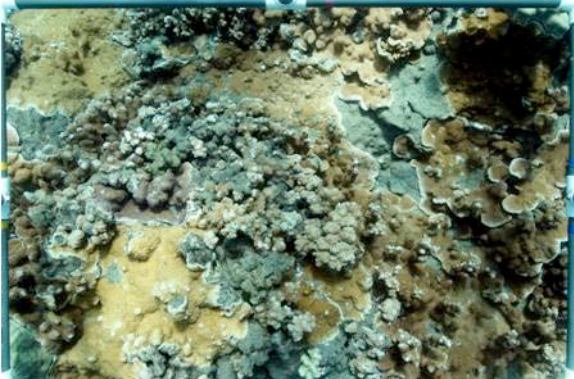
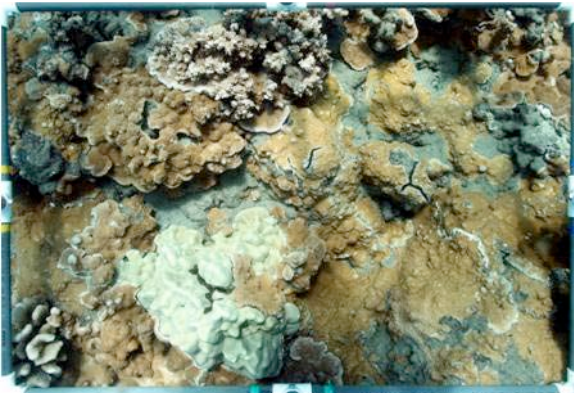
Olowalu Town Project Sites 074 and 075



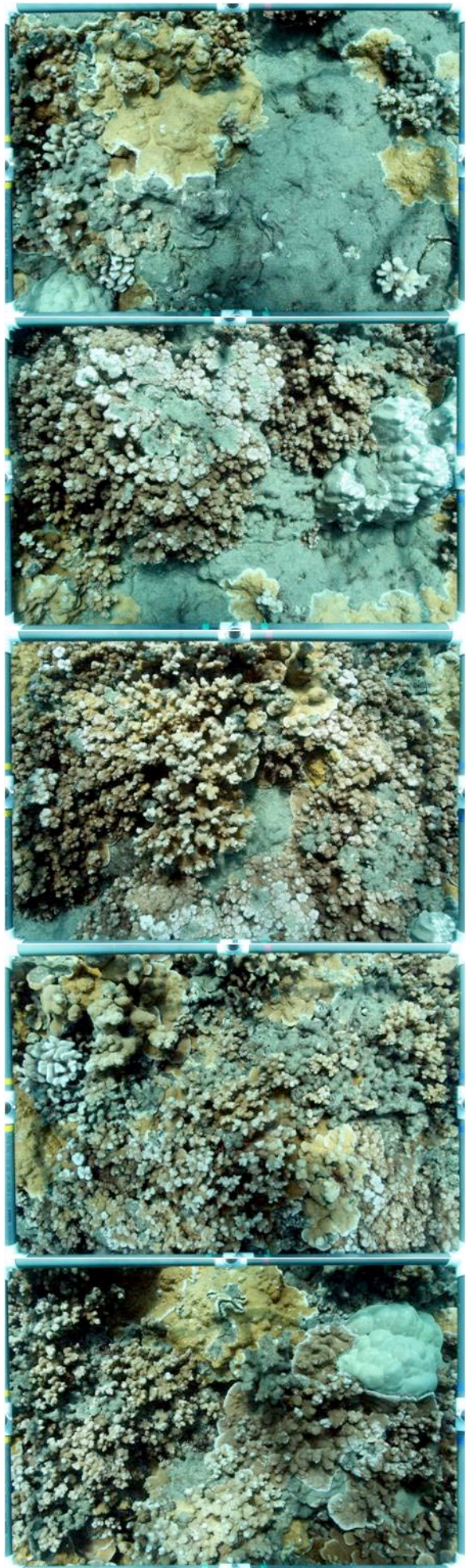
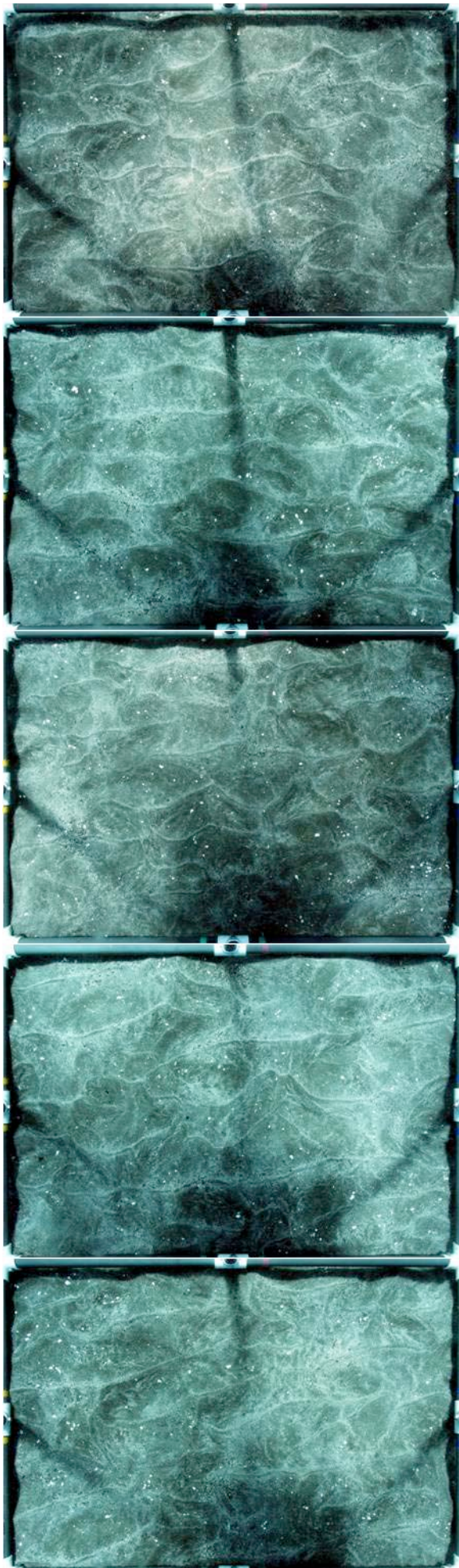
Olowalu Town Project Sites 076 and 077



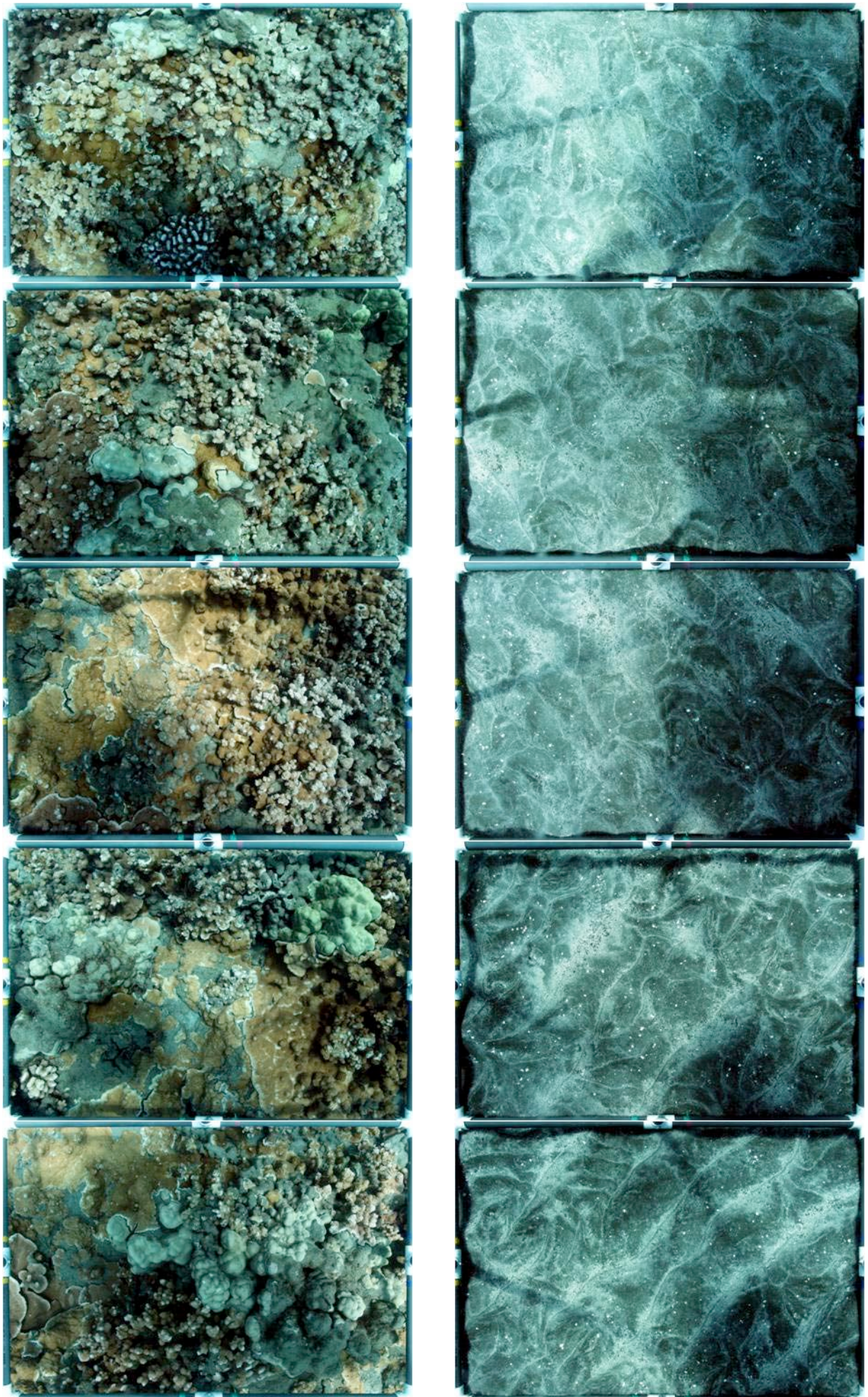
Olowalu Town Project Sites 078 and 079



Olowalu Town Project Sites 080 and 081



Olowalu Town Project Sites 082 and 083



Olowalu Town Project Sites 084 and 085