

SURVEY LOCATION AT HANAUMA BAY

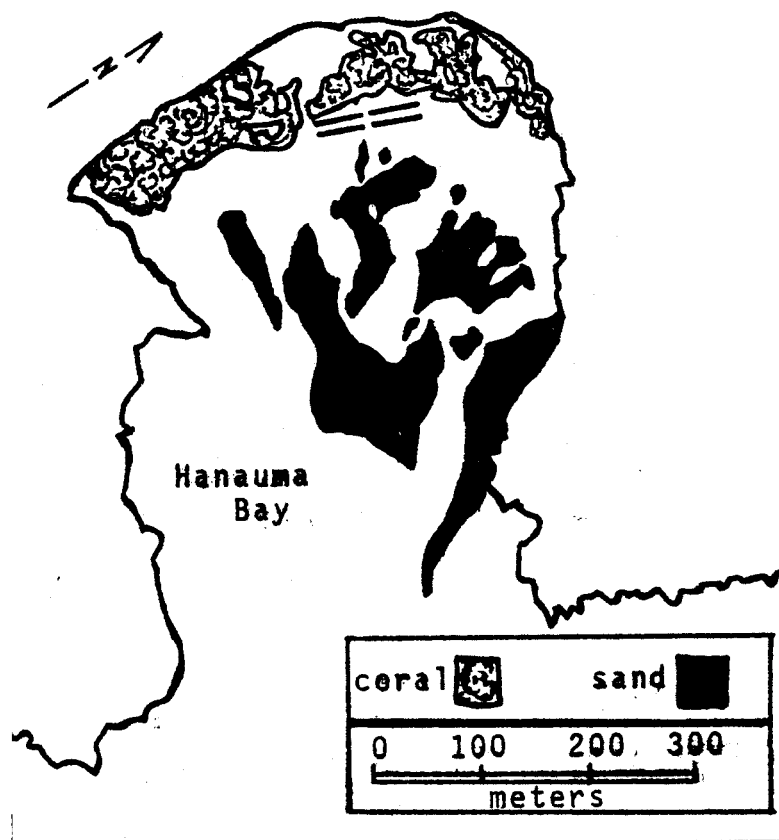


Figure 3. Two pairs of parallel 50 m lines were set end to end (==) at Hanauma Bay off Oahu.

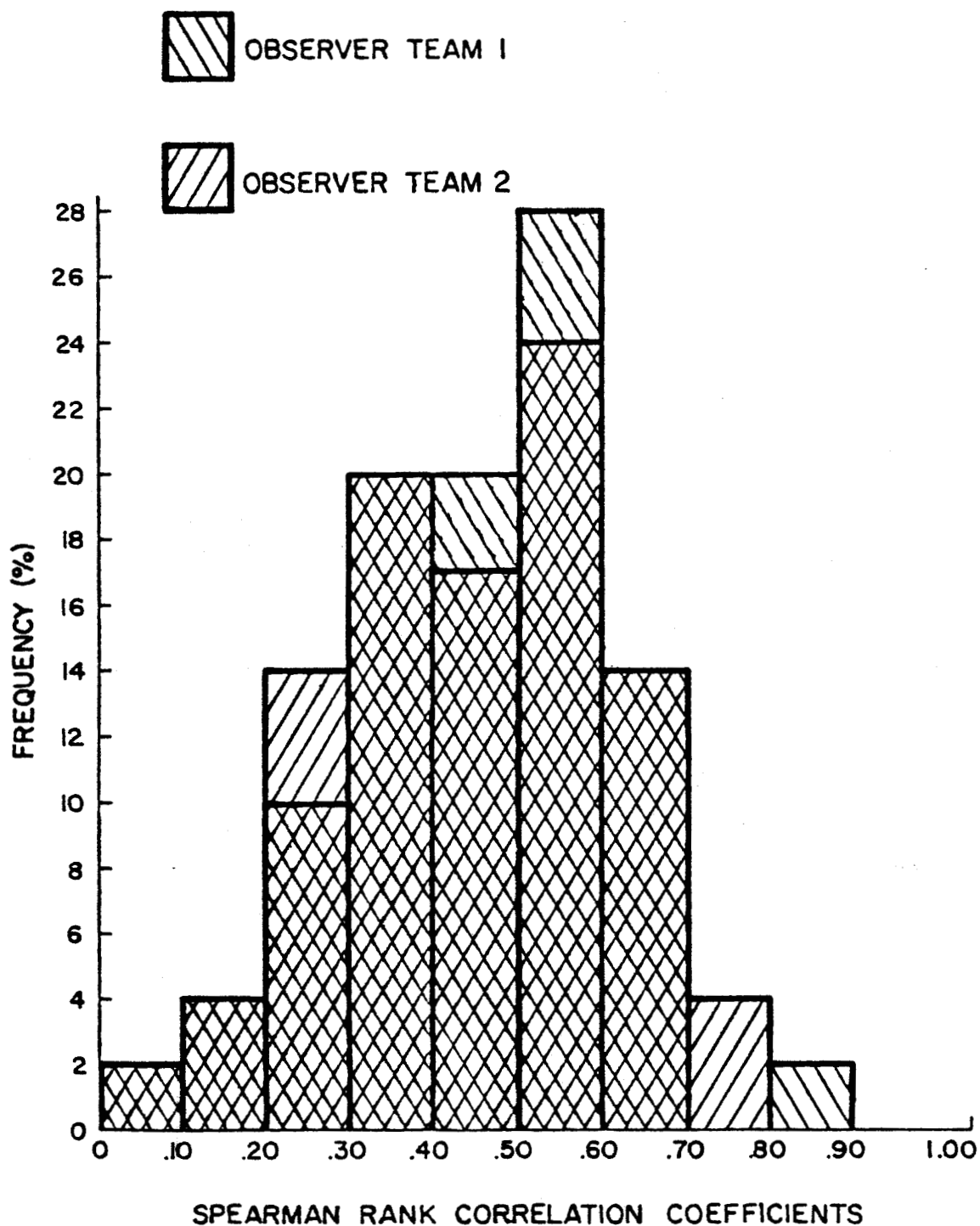


Figure 4. Frequency histogram for the ninety-nine correlation coefficients calculated from data collected by two observer teams at five areas off Molokai. The lack of statistically significant differences between the frequency distributions for the two observer teams suggested that the degree of correlation between methods did not change with different observers.

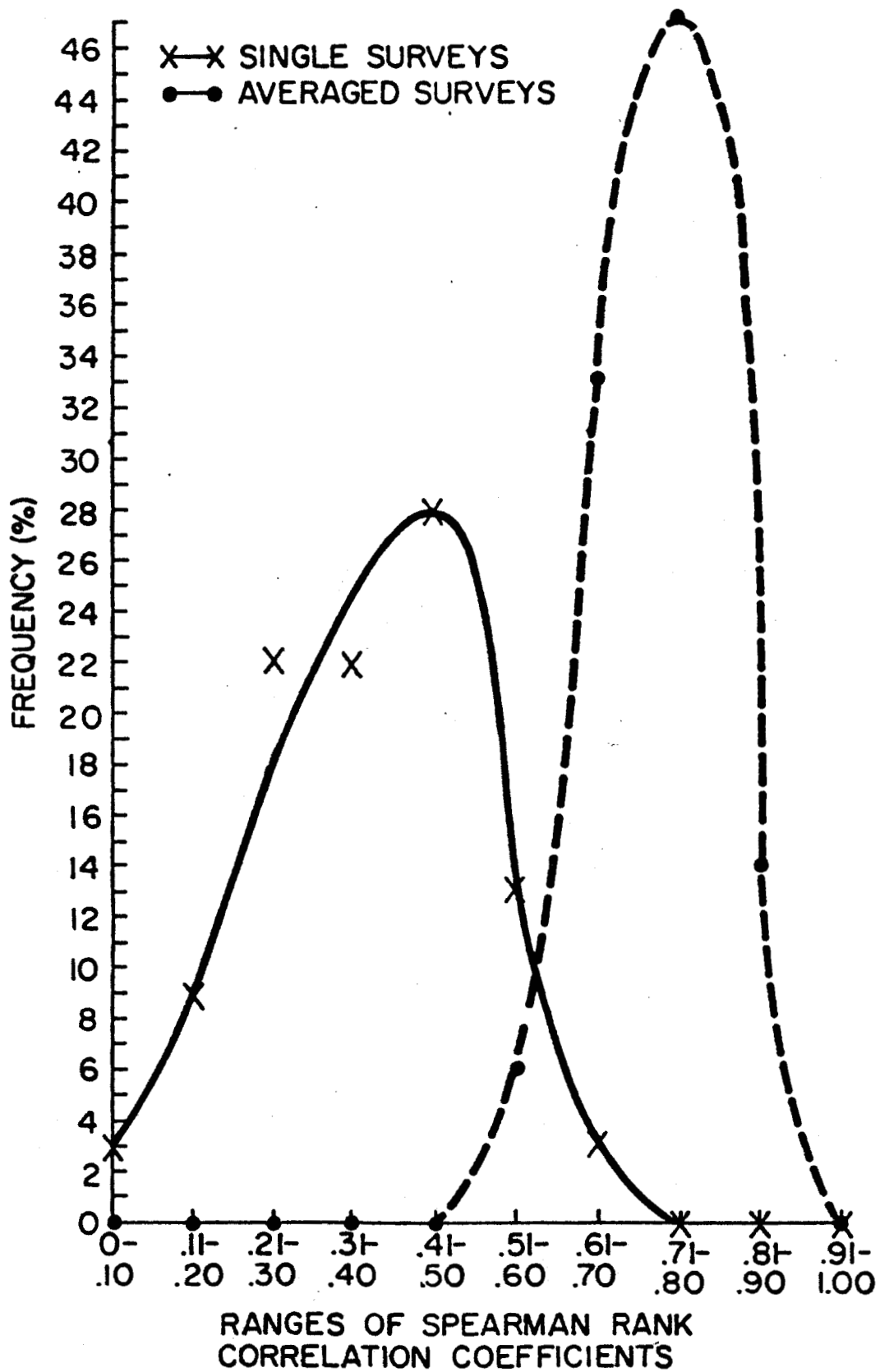
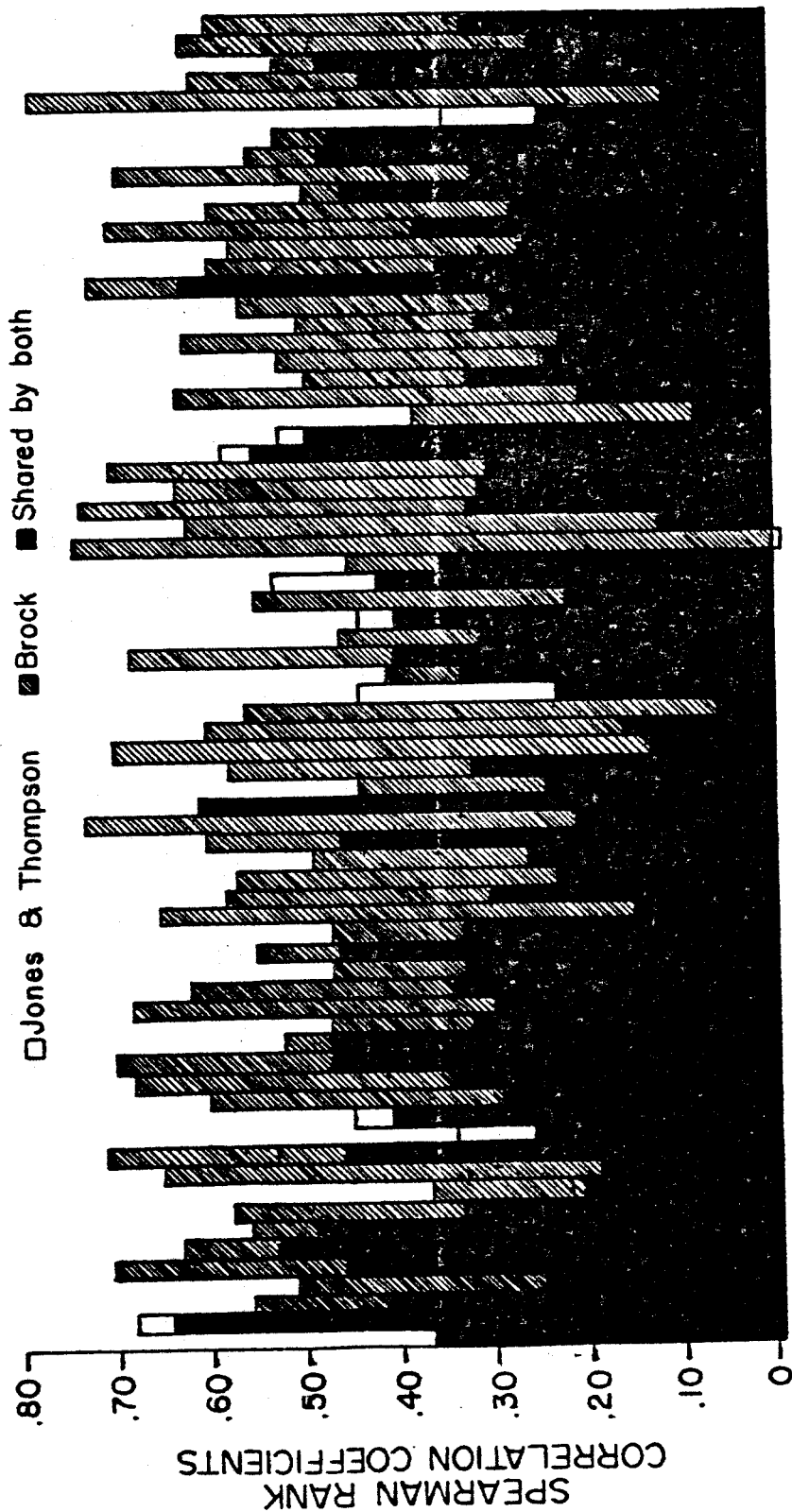


Figure 5. Frequency distributions for correlation coefficients calculated between methods. The correlation between methods increased as a result of the averaging procedure.



PAIRS OF SURVEYS

Figure 6. Histogram of correlation coefficients calculated within methods. Each bar represents the correlation coefficients obtained between two Brock surveys and between two Jones and Thompson surveys, all of which were conducted by one observer team on one line during a single day. The correlation coefficients for Brock surveys were consistently higher than those for Jones and Thompson surveys, indicating that the Brock surveys were more replicable.

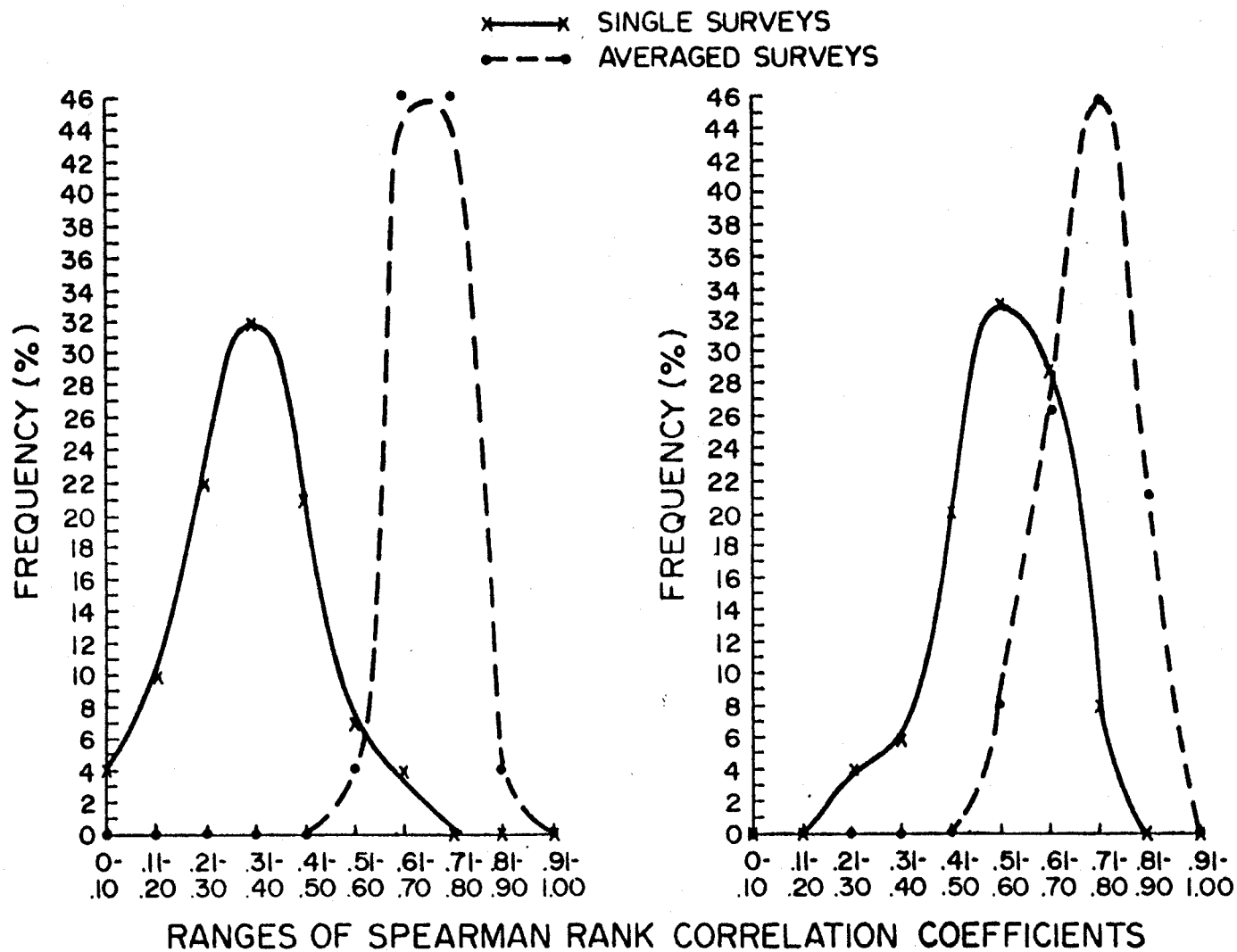


Figure 7. Frequency distributions for correlation coefficients calculated between Jones and Thompson surveys (left) and between Brock surveys (right). The frequency distributions for the averaged surveys plotted to the right of the distributions for the single surveys, indicating that the correlation within methods increased significantly as a result of the averaging procedure.

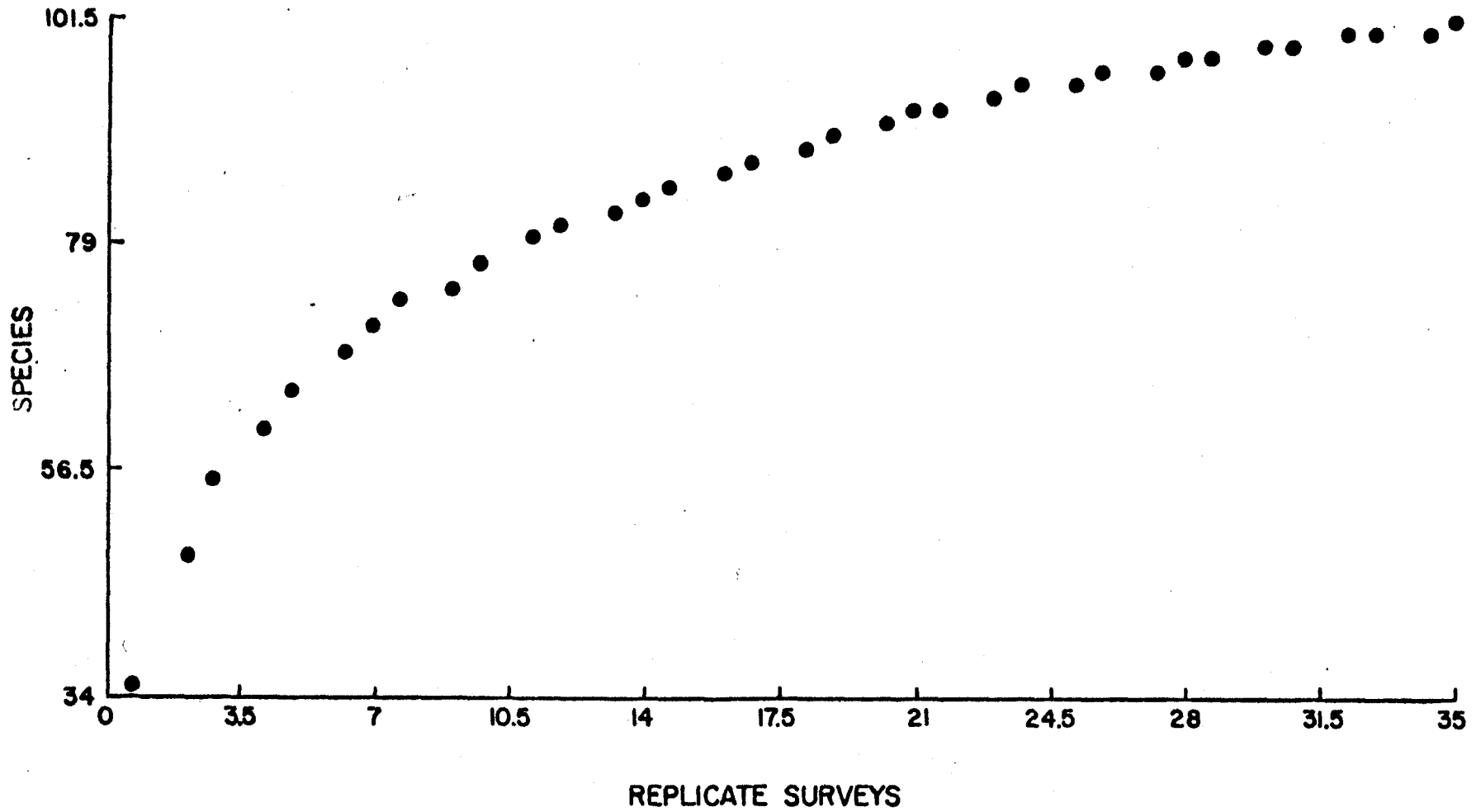


Figure 8. Sample of a cumulative species-replicate curve on which an increasing number of replicate surveys is plotted against the number of species observed. The data presented in this graph were obtained during 35 Jones and Thompson surveys conducted at Palaau, Molokai.

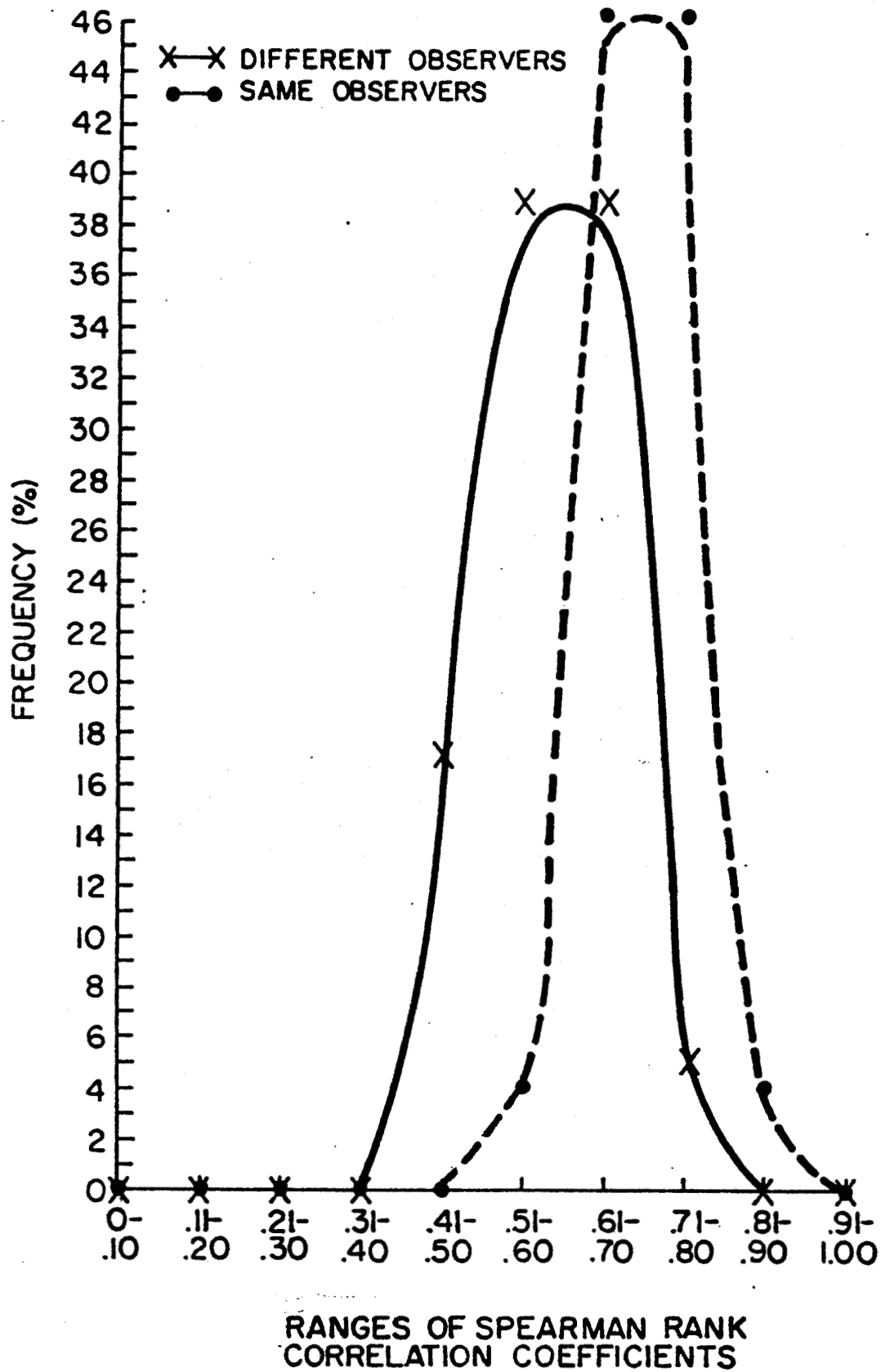


Figure 9. Frequency distributions for correlation coefficients calculated between Jones and Thompson surveys. The frequency distribution for same observers is significantly shifted to the right of the frequency distribution for different observers, indicating that there was a significant difference between data collected by different observers using the Jones and Thompson method.

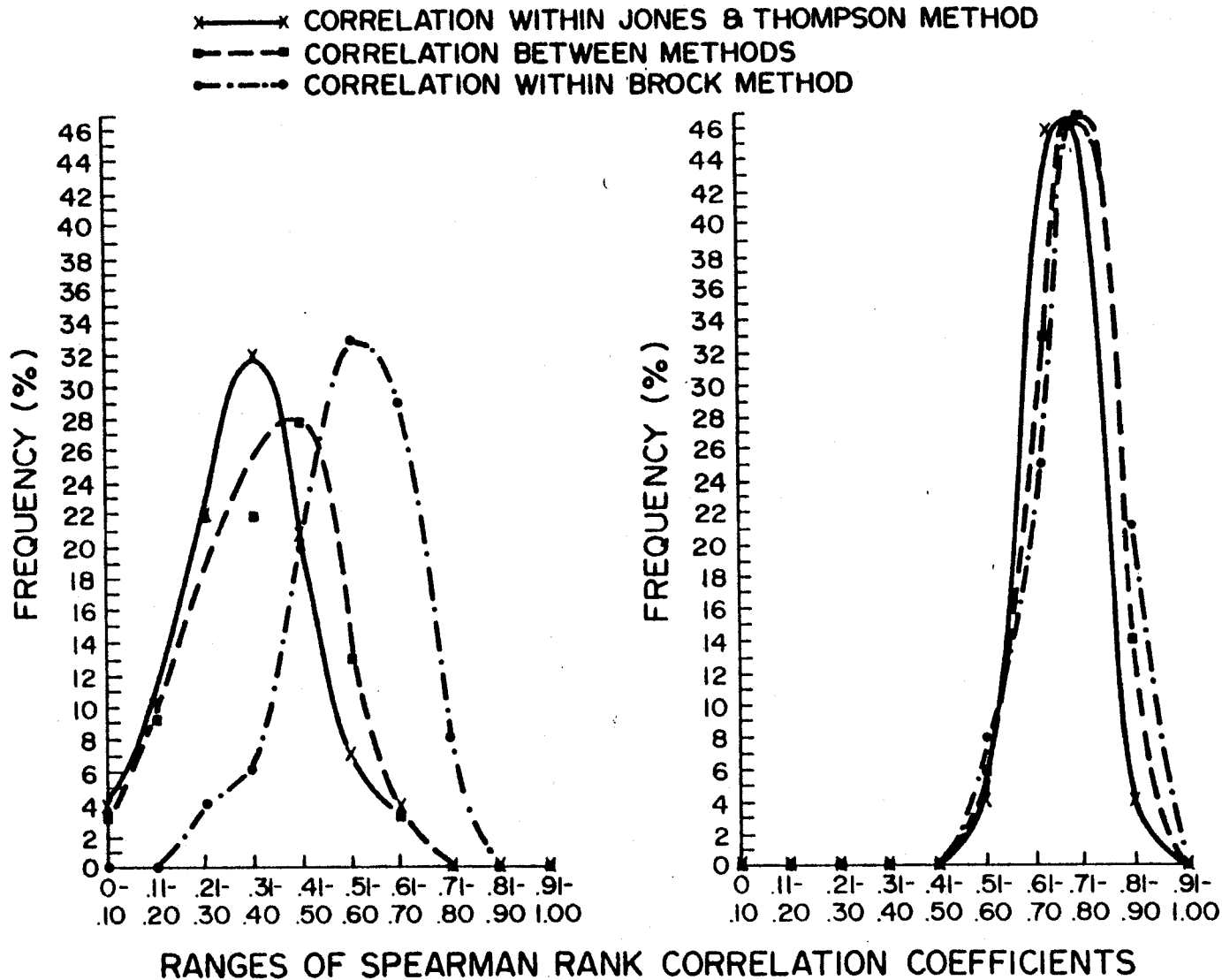


Figure 10. Frequency distributions for correlation coefficients calculated between single surveys (left) and between averaged surveys (right). When four surveys were averaged, an increase in the correlation within methods was reflected in an increase in the correlation between methods, suggesting that replicate surveys of each method approached accuracy.

ACKNOWLEDGEMENTS

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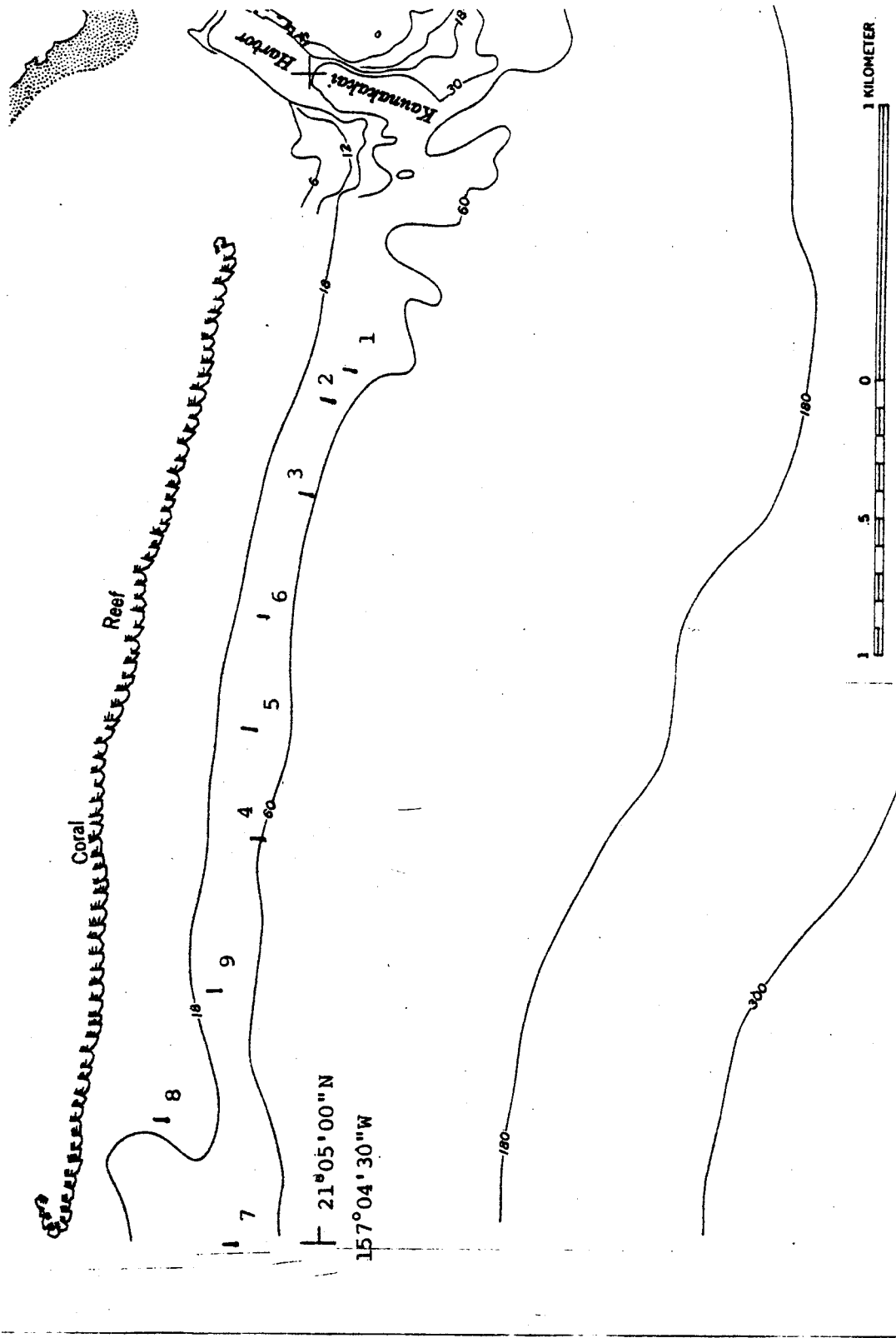
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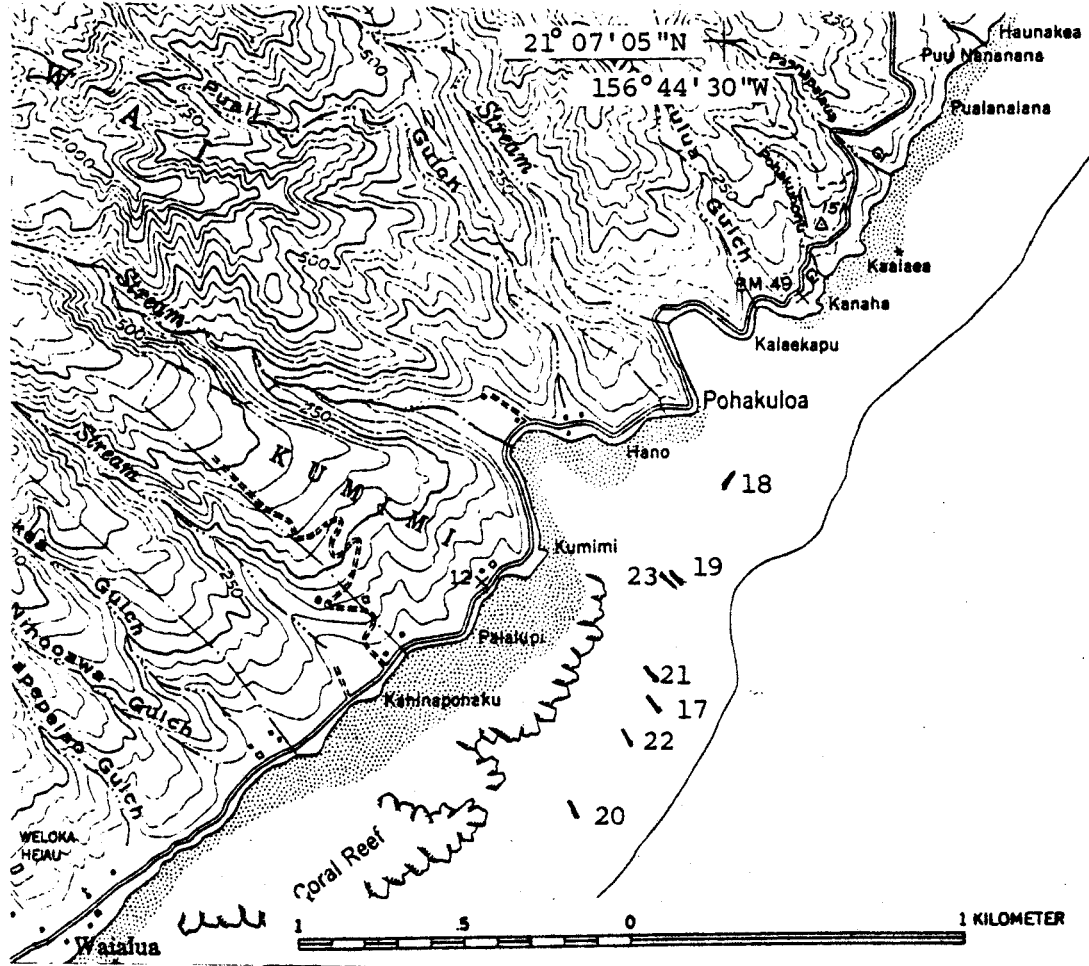
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APPENDIX A



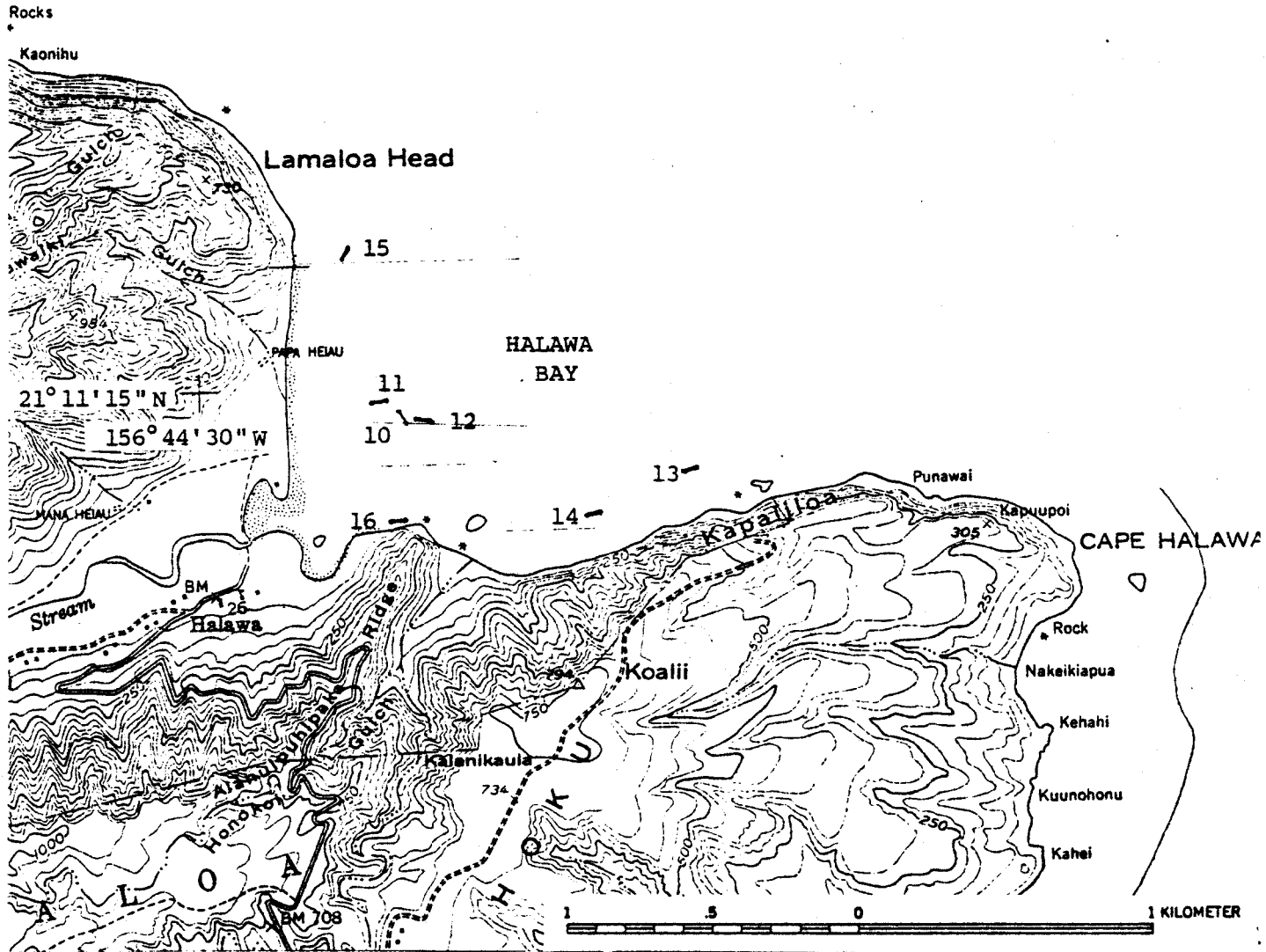
U.S. Dept. of the Interior Geological Survey, 1952

Figure A. Survey sites at Palau.



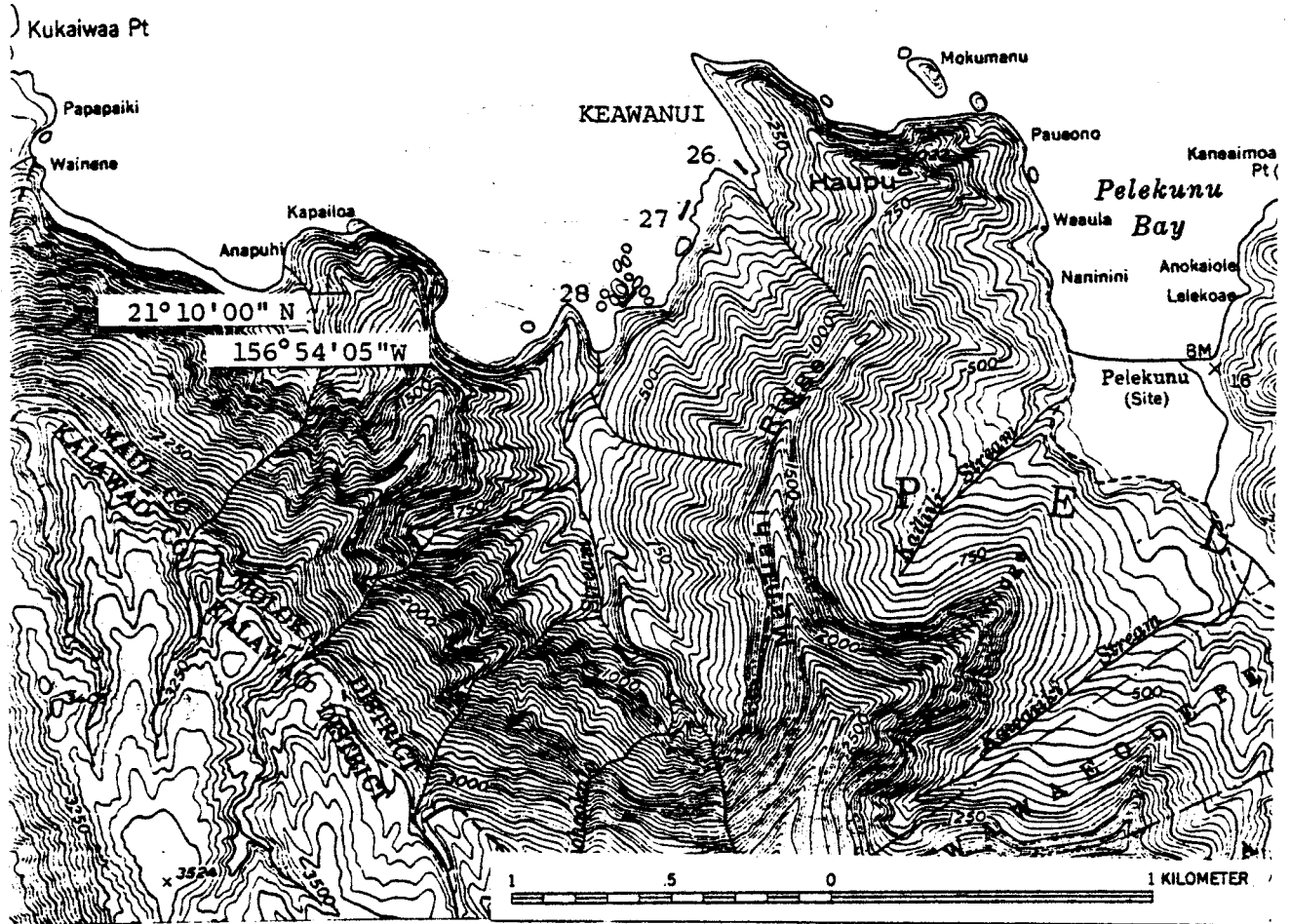
U.S. Dept. of the Interior Geological Survey, 1952

Figure B. Survey sites at Moanui.



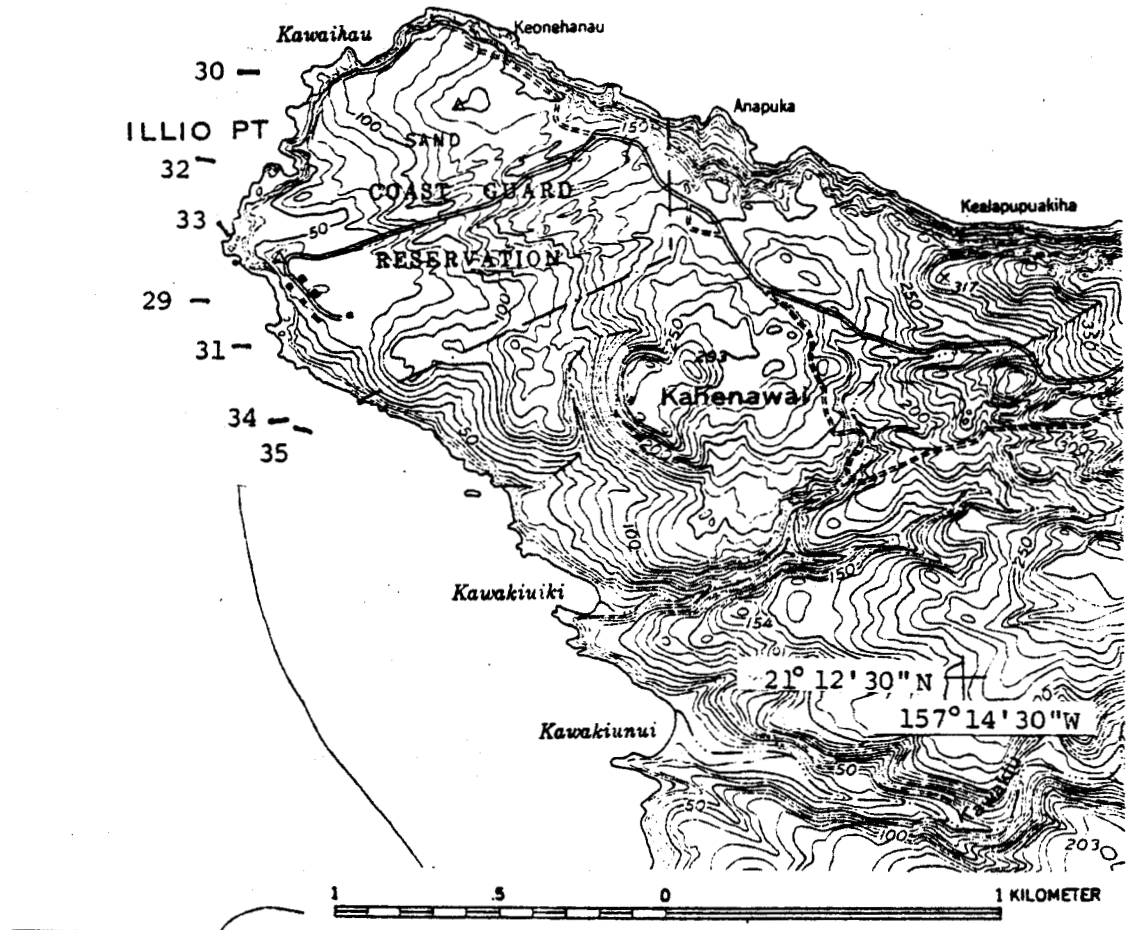
U.S. Dept. of the Interior Geological Survey, 1952

Figure C. Survey sites at Halawa Bay.



U.S. Dept. of the Interior Geological Survey, 1952

Figure D. Survey sites at Keawanui.



U.S. Dept. of the Interior Geological Survey, 1952

Figure E. Survey sites at Ilio Point.

Table A. COORDINATES AND DEPTHS FOR MOLOKAI SURVEY SITES

<u>SITE NUMBER</u>	<u>COORDINATES</u>	<u>DEPTH (feet)</u>
<u>Palaau</u>		
1	21 ^o 04.90'N 157 ^o 02.64'W	35-40
2	21 ^o 04.94'N 157 ^o 02.70'W	34-40
3	21 ^o 05.00'N 157 ^o 02.90'W	25-30
4	21 ^o 05.10'N 157 ^o 03.63'W	35-45
5	21 ^o 05.10'N 157 ^o 03.40'W	20-25
6	21 ^o 05.08'N 157 ^o 03.15'W	15-25
7	21 ^o 05.17'N 157 ^o 04.50'W	15
8	21 ^o 05.30'N 157 ^o 04.23'W	20-25
9	21 ^o 05.20'N 157 ^o 03.96'W	30-35
<u>Halawa Bay</u>		
10	21 ^o 09.96'N 156 ^o 44.11'W	35-45
11	21 ^o 09.98'N 156 ^o 44.13'W	30-40
12	21 ^o 09.94'N 156 ^o 44.07'W	30-40
13	21 ^o 09.84'N 156 ^o 43.51'W	35-45
14	21 ^o 09.75'N 156 ^o 43.71'W	25
15	21 ^o 10.28'N 156 ^o 44.21'W	25
16	21 ^o 09.75'N 156 ^o 44.09'W	20

Moanui

17	21 ^o 06.34'N 156 ^o 44.61'W	35-40
18	21 ^o 06.73'N 156 ^o 44.50'W	30-35
19	21 ^o 06.57'N 156 ^o 44.57'W	15-30
20	21 ^o 06.16'N 156 ^o 44.75'W	25-30
21	21 ^o 06.40'N 156 ^o 44.62'W	25-30
22	21 ^o 06.30'N 156 ^o 44.66'W	35-50
23	21 ^o 06.56'N 156 ^o 44.58'W	30-35

Keawanui

26	21 ^o 10.22'N 156 ^o 53.71'W	25-40
27	21 ^o 10.12'N 156 ^o 53.81'W	35-50
28	21 ^o 10.02'N 156 ^o 53.91'W	30-35

Ilio Point

29	21 ^o 13.14'N 157 ^o 15.86'W	40
30	21 ^o 13.53'N 157 ^o 15.74'W	25-35
31	21 ^o 13.08'N 157 ^o 15.80'W	15-30
32	21 ^o 13.39'N 157 ^o 15.85'W	30-45
33	21 ^o 13.28'N 157 ^o 15.82'W	20
34	21 ^o 12.94'N 157 ^o 15.74'W	20-25
35	21 ^o 12.93'N 157 ^o 15.70'W	15-20

APPENDIX B

CORAL DENDROGRAM

In the coral dendrogram (page 56), four distinct clusters can be identified. In general, these four clusters correspond to the five areas studied, with the sites at Halawa Bay and Keawanui clustered together (Table A, page 58).

Sites 1 through 9 were located at Palaau. These sites, excluding Site 7, comprised one cluster. The substratum at Sites 1 through 6, 8, and 9 was approximately 85% live coral, with *Porites compressa*, *Montipora verrucosa*, and *Porites lobata* the predominant species. Site 7 was unlike the other Palaau sites in that approximately 40% of the substratum consisted of consolidated limestone pavement.

The Halawa Bay and Keawanui sites, situated along the north coast, formed a second cluster. Sites 10 through 16 were located at Halawa Bay, where the substratum was composed mainly of boulders and basalt pavement. Similarly, the substratum at the Keawanui sites numbered 26 through 28 was composed of boulders.

Sites 17 through 23 at Moanui comprised a third cluster. The substratum was dominated by limestone pavement interspersed with coral rubble and dead *Pocillopora meandrina*. Live *Porites lobata* and *Pocillopora meandrina* were also present.

Sites 24 and 25 were located in Pelekunu Bay on the north coast. The substratum in the center of the bay was chiefly sand. Steep cliffs on the sides of the bay dropped to sand at a depth of 60 feet. Due to the difficulty involved in quantitatively surveying such an area, qualitative surveys were conducted and the data were not included in this study.

Ilio Point was the area for Sites 29 through 35. With the exception of Site 32, the Ilio sites formed a fourth cluster. Basalt pavement, with

scattered heads of *Pocillopora meandrina* and *Porites lobata*, dominated the substratum. Site 32 differed from the other Ilio sites in that boulders accounted for 37% of the substratum.

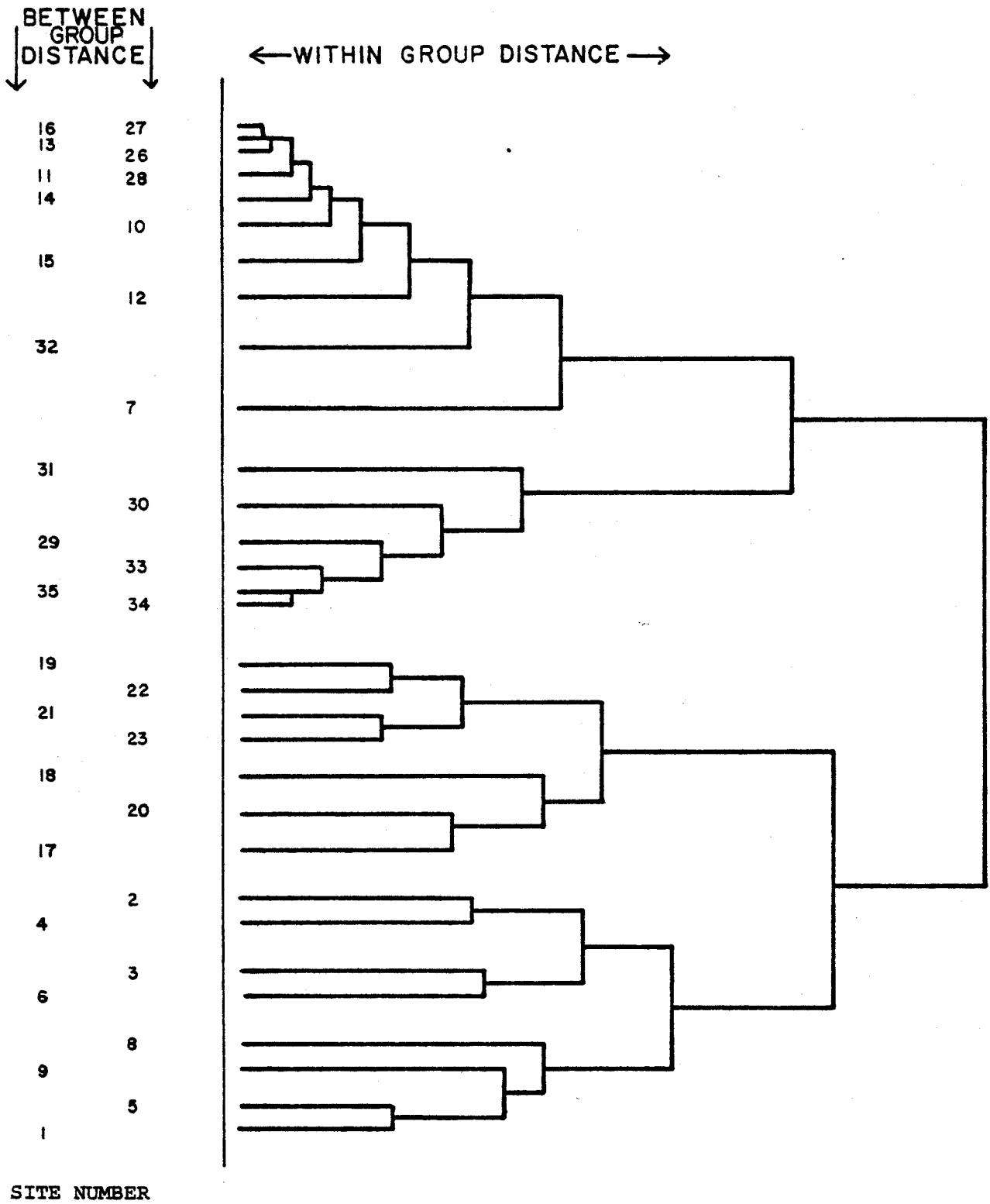


Figure A. Dendrogram of coral surveys. In general, the four distinct clusters correspond to the five areas studied, with the sites at Halawa Bay and Keawanui clustered together.

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SORENSEN'S SIMILARITY COEFFICIENTS

site #	1	2	3	4	5	6	7	8	9	10	11	12
1 1	1.0000											
2 2	0.2889	1.0000										
3 3	0.6667	0.4667	1.0000									
4 4	0.5000	0.7667	0.6667	1.0000								
5 5	0.8444	0.3111	0.7111	0.5222	1.0000							
6 6	0.5556	0.5556	0.7556	0.7333	0.5778	1.0000						
7 7	0.4556	0.2222	0.4222	0.3222	0.4000	0.3778	1.0000					
8 8	0.7000	0.1111	0.6333	0.3111	0.6333	0.4444	0.4778	1.0000				
9 9	0.6667	0.2667	0.5778	0.4800	0.6778	0.5889	0.6333	0.6000	1.0000			
10 10	0.1778	0.0333	0.1444	0.0667	0.1667	0.1333	0.1333	0.2000	0.1444	1.0000		
11 11	0.2778	0.0	0.1000	0.0222	0.1000	0.0222	0.0333	0.1222	0.0778	0.6333	1.0000	
12 12	0.0889	0.0111	0.1000	0.0444	0.1000	0.0556	0.0556	0.1222	0.0889	0.5111	0.5667	1.0000

NSF/SOS SUMMER 79 CORAL TRANSECTS PART 2 OF 6

SORENSEN'S SIMILARITY COEFFICIENTS

site #	13	14	15	16	17	18	19	20	21	22	23	24	
13 13	1.0000												
14 14	0.0444	1.0000											
15 15	0.0556	0.0	1.0000										
16 16	0.0333	0.0111	0.0778	1.0000									
17 17	0.3200	0.0444	0.2556	0.1111	1.0000								
18 18	0.4333	0.0778	0.2556	0.1222	0.3889	1.0000							
19 19	0.2667	0.0333	0.2111	0.0667	0.2444	0.2222	1.0000						
20 20	0.4111	0.0556	0.2667	0.1111	0.2667	0.2556	0.6333	1.0000					
21 21	0.1556	0.0333	0.2333	0.0778	0.1889	0.1444	0.1667	0.3111	1.0000				
22 22	0.3444	0.0444	0.2333	0.1000	0.2778	0.2556	0.5556	0.4111	0.4667	1.0000			
23 23	0.1222	0.0333	0.1778	0.0778	0.1222	0.1778	0.4333	0.2556	0.4000	0.1000	1.0000		
24 24	0.0667	0.0111	0.0667	0.0444	0.0667	0.0444	0.0444	0.0889	0.0667	0.8444	0.9444	1.0000	

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SORENSEN'S SIMILARITY COEFFICIENTS

site #	13	14	15	16	17	18	19	20	21	22	23	24	
13 13	1.0000												
14 14	0.8778	1.0000											
15 15	0.7778	0.7667	1.0000										
16 16	0.9667	0.8556	0.7889	1.0000									
17 17	0.0556	0.0667	0.1778	0.0667	1.0000								
18 18	0.0333	0.0333	0.1111	0.0556	0.6222	1.0000							
19 19	0.0444	0.0556	0.1222	0.0556	0.6889	0.5111	1.0000						
20 20	0.0444	0.0556	0.1667	0.0556	0.7889	0.6667	0.6667	1.0000					
21 21	0.0444	0.0333	0.2889	0.0444	0.5333	0.3111	0.7778	0.5556	1.0000				
22 22	0.0333	0.0333	0.1111	0.0556	0.6778	0.6222	0.8444	0.7333	0.6667	1.0000			
23 23	0.0333	0.0111	0.0667	0.0333	0.5111	0.3444	0.7778	0.5222	0.8556	0.6889	1.0000		
24 24	0.9556	0.8556	0.7556	0.6667	0.9556	0.8222	0.8222	0.8556	0.8667	0.8444	0.8333	1.0000	

NSF/SOS SUMMER 79 CORAL TRANSECTS PART 4 OF 6

SORENSEN'S SIMILARITY COEFFICIENTS

site #	1	2	3	4	5	6	7	8	9	10	11	12
25 27	0.0333	0.0111	0.0333	0.0333	0.0333	0.0333	0.0444	0.0556	0.0333	0.0556	0.9000	0.5111
26 28	0.0667	0.0	0.1000	0.0222	0.0889	0.0222	0.0222	0.1222	0.0667	0.4212	0.9778	0.5667
27 29	0.2667	0.0667	0.2333	0.1333	0.2667	0.2111	0.1556	0.2667	0.2444	0.1667	0.0444	0.5556
28 31	0.0444	0.0333	0.0778	0.0444	0.1000	0.0556	0.1444	0.1000	0.1111	0.1222	0.1000	0.8333
29 31	0.2556	0.0333	0.1778	0.0778	0.3000	0.1667	0.2000	0.2333	0.2111	0.3000	0.1778	0.5667
30 32	0.0778	0.0111	0.0667	0.0444	0.0889	0.0556	0.1222	0.0889	0.1000	0.4222	0.1778	0.4000
31 33	0.0222	0.0	0.0222	0.0	0.0222	0.0	0.0222	0.0222	0.0222	0.0111	0.0111	0.3000
32 34	0.1111	0.0111	0.1000	0.0444	0.1222	0.0778	0.0778	0.1111	0.1222	0.1000	0.0222	0.3333
33 35	0.0667	0.0111	0.0556	0.0333	0.0778	0.0333	0.0889	0.0956	0.0333	0.0444	0.0111	0.2222

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SORENSEN'S SIMILARITY COEFFICIENTS

site #	13	14	15	16	17	18	19	20	21	22	23	24
25 27	0.9778	0.8556	0.7667	0.9778	0.8444	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333	0.8556
26 28	0.8999	0.8556	0.7333	0.8889	0.0444	0.0	0.0	0.0333	0.1000	0.0222	0.0111	0.9333
27 29	0.0444	0.0444	0.1889	0.0444	0.2556	0.2111	0.2000	0.2333	0.1222	0.1849	0.1222	0.5556
28 31	0.1000	0.1222	0.2556	0.0889	0.2222	0.0556	0.0778	0.1667	0.0889	0.0444	0.0444	0.0889
29 31	0.2000	0.2111	0.4111	0.2111	0.4700	0.2889	0.2667	0.3111	0.1222	0.2556	0.1222	0.1889
30 32	0.4111	0.4111	0.6000	0.4222	0.1556	0.0778	0.1111	0.1444	0.1000	0.0778	0.0556	0.3889
31 33	0.0222	0.0222	0.1333	0.0111	0.0333	0.0333	0.0444	0.0444	0.0444	0.0222	0.0111	0.0
32 34	0.0556	0.0444	0.2111	0.0444	0.1333	0.0889	0.1111	0.1222	0.0778	0.0889	0.0889	0.3333
33 35	0.0444	0.0333	0.2000	0.0333	0.1000	0.0444	0.0667	0.1000	0.0778	0.0444	0.0444	0.2222

NSF/SOS SUMMER 79 CORAL TRANSECTS PART 6 OF 6

SORENSEN'S SIMILARITY COEFFICIENTS

site #	27	28	29	30	31	32	33	34	35			
25 27	1.0000											
26 28	0.8889	1.0000										
27 29	0.0333	0.2333	1.0000									
28 30	0.0778	0.1000	0.7222	1.0000								
29 31	0.1889	0.1667	0.5889	0.6556	1.0000							
30 32	0.4000	0.3667	0.5444	0.6111	0.6778	1.0000						
31 33	0.0	0.0	0.7444	0.6778	0.4222	0.5000	1.0000					
32 34	0.0444	0.0111	0.8111	0.6889	0.5111	0.5556	0.8889	1.0000				
33 35	0.0333	0.0	0.7667	0.7000	0.4778	0.5556	0.9111	0.9444	1.0000			

Figure B. Similarity matrix for coral surveys.

Table A. PERCENT COVER OF PREDOMINANT CORAL SPECIES AND SUBSTRATA
AT MOLOKAI SITES

PALAAU		MOANUI	
<u>Sites 1-9, excluding 7</u>		<u>Sites 17-23</u>	
<i>Porites compressa</i>	36%	Limestone pavement	56%
<i>Montipora verrucosa</i>	23%	<i>Porites lobata</i>	13%
<i>Porites lobata</i>	11%	Coral rubble	9%
Sand	8%	Dead <i>Pocillopora meandrina</i>	7%
Limestone pavement	7%	<i>Pocillopora meandrina</i>	5%
<i>Montipora patula</i>	6%		
Coral rubble	6%		
		KEAWANUI	
		<u>Sites 26-28</u>	
Limestone pavement	38%	Boulder	93%
<i>Porites compressa</i>	11%	Sand	5%
<i>Montipora verrucosa</i>	11%		
Coral rubble	11%		
<i>Montipora patula</i>	9%		
<i>Pocillopora meandrina</i>	8%		
<i>Pavona varians</i>	6%		
		ILIO POINT	
		<u>Sites 29-35, excluding 32</u>	
		Basalt pavement	73%
		<i>Pocillopora meandrina</i>	8%
		<i>Porites lobata</i>	7%
		Boulder	4%
		HALAWA BAY	
		<u>Sites 10-16</u>	
Boulder	81%	<u>Site 32</u>	
Basalt pavement	7%	Basalt pavement	46%
<i>Porites lobata</i>	3%	Boulder	37%
		<i>Pocillopora meandrina</i>	7%
		<i>Porites lobata</i>	4%

ALGAE DENDROGRAM

Three distinct clusters can be noted in the algae dendrogram (page 60). Unlike the coral dendrogram, the 33 sites were not consistently clustered by area, indicating that the five areas cannot be readily distinguished on the basis of algal assemblages (Table B, page 62). Environmental parameters may complicate the comparison of algal assemblages. Santelices (1977) reported that seasonal algal growth may be related to light intensity, temperature, water movement, and salinity. Therefore, the clustering of sites on the basis of algal assemblages may vary according to the season during which the baseline data are collected.

The Palaau sites (1 through 9) formed a cluster with four Moanui sites (20 through 23). The Palaau sites were characterized by patches of *Porolithon* sp., *Bryopsis* sp., and *Ralfsia pangoensis* scattered over a substratum which was approximately 66% live coral. At Sites 20 through 23, an unidentified alga belonging to the phylum Rhodophyta or the phylum Phaeophyta covered an average of 22% of the substratum. The broad, flat blades of this alga, approximately 2.0 cm in height, were fragile and could not be successfully preserved or pressed.

A second cluster was composed of the Halawa sites (10 through 16), two Moanui sites (17 and 19), two Keawanui sites (27 and 28), and five Ilio sites (29, 31, and 33 through 35). These sites shared an unidentified filamentous alga belonging to the phylum Phaeophyta. This alga, which was 0.5 to 1.0 cm in height, was found to be growing over an average of 34% of the substratum.

Moanui Site 18, Keawanui Site 26, and Ilio Sites 30 and 32 formed a third cluster. *Dictyota stolonifera*, *Sargassum obtusifolium*, *Padina crassa*, and *Porolithon* sp. were the predominant algae at these sites.

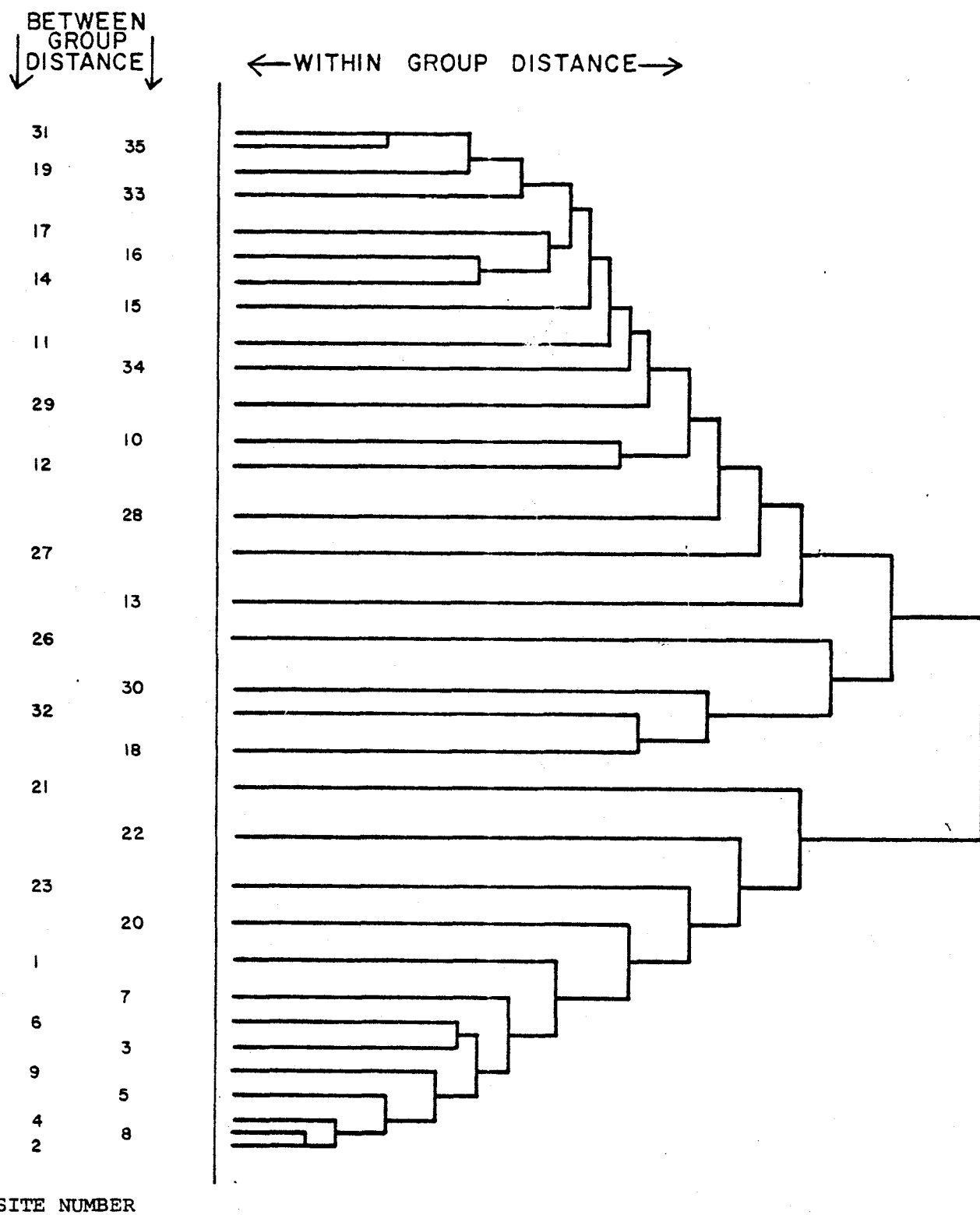


Figure C. Dendrogram of algae surveys. The 33 sites were not consistently clustered by area, indicating that the five areas cannot be readily distinguished on the basis of algal assemblages.

NSFOS SUMMER 79 ALGAE TRANSECTS												PART 1 OF 6		
site #	SORENSEN'S SIMILARITY COEFFICIENTS													
	1	2	3	4	5	6	7	8	9	10	11	12		
1 1	1.0000													
2 2	0.3400	1.0000												
3 3	0.5400	0.4700	1.0000											
4 4	0.5100	0.8500	0.7000	1.0000										
5 5	0.5100	0.7500	0.7800	0.3300	1.0000									
6 6	0.6300	0.6300	0.7900	0.7800	0.7400	1.0000								
7 7	0.5900	0.5300	0.5500	0.6200	0.7300	0.6700	1.0000							
8 8	0.4200	0.9300	0.7000	0.9100	0.7900	0.7000	0.5700	1.0000						
9 9	0.5700	0.5600	0.7100	0.7400	0.8200	0.7600	0.6400	0.7200	1.0000					
10 10	0.1900	0.1200	0.1200	0.1500	0.1600	0.1600	0.1500	0.1700	0.1700	1.0000				
11 11	0.2700	0.0700	0.1600	0.1800	0.1500	0.2300	0.1200	0.1100	0.1800	0.5500	1.0000			
12 12	0.1400	0.0600	0.0600	0.0900	0.1000	0.1000	0.0500	0.0700	0.1000	0.6400	0.6100	1.0000		

NSFOS SUMMER 79 ALGAE TRANSECTS												PART 2 OF 6		
site #	SORENSEN'S SIMILARITY COEFFICIENTS													
	1	2	3	4	5	6	7	8	9	10	11	12		
13 13	0.1000	0.0300	0.0400	0.0500	0.0800	0.0600	0.0500	0.0400	0.0300	0.1300	0.0300	0.0400	0.5400	
14 14	0.2900	0.0900	0.0800	0.1600	0.1700	0.2200	0.2300	0.1100	0.1700	0.5200	0.6300	0.5000		
15 15	0.2000	0.1300	0.1200	0.1500	0.1700	0.1600	0.1500	0.1300	0.1700	0.5400	0.5200	0.6200		
16 16	0.3100	0.1600	0.1500	0.2300	0.2500	0.2900	0.3100	0.1800	0.2400	0.5800	0.6500	0.4600		
17 17	0.4900	0.2700	0.2900	0.3900	0.4200	0.4300	0.4300	0.3400	0.4100	0.5100	0.5200	0.4400		
18 18	0.3500	0.3000	0.2600	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500	0.2400	0.2400	0.1700	0.4500	
19 19	0.1100	0.2200	0.2100	0.2600	0.3000	0.2900	0.2600	0.2500	0.2400	0.5000	0.4100	0.2700	0.2200	
20 20	0.3900	0.3000	0.2900	0.3700	0.3800	0.3900	0.3700	0.3200	0.3800	0.2800	0.2700	0.2700	0.3500	
21 21	0.2400	0.3700	0.1700	0.1600	0.1500	0.1700	0.1700	0.1100	0.1600	0.1000	0.1000	0.1000	0.3500	
22 22	0.3200	0.0900	0.2300	0.1200	0.1500	0.2400	0.1500	0.1300	0.2100	0.1200	0.1700	0.0700		
23 23	0.3400	0.1700	0.2500	0.2600	0.2300	0.3300	0.2200	0.2200	0.3100	0.1400	0.2200	0.1100		
24 24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3800	0.1100	0.1200		

NSFOS SUMMER 79 ALGAE TRANSECTS												PART 3 OF 6		
site #	SORENSEN'S SIMILARITY COEFFICIENTS													
	13	14	15	16	17	18	19	20	21	22	23	24		
13 13	1.0000													
14 14	0.1400	1.0000												
15 15	0.3300	0.6300	1.0000											
16 16	0.1400	0.7700	0.6100	1.0000										
17 17	0.1200	0.7100	0.6500	0.6200	1.0000									
18 18	0.0700	0.3200	0.3900	0.3400	0.5100	1.0000								
19 19	0.1700	0.6000	0.5200	0.6500	0.6400	0.7000	1.0000							
20 20	0.0400	0.3900	0.3700	0.4000	0.6000	0.5100	0.3700	1.0000						
21 21	0.0900	0.0700	0.0900	0.0900	0.1400	0.0800	0.1600	0.1000	1.0000					
22 22	0.2200	0.1600	0.1800	0.1300	0.2200	0.1800	0.1600	0.1600	0.2500	1.0000				
23 23	0.2100	0.1700	0.1700	0.2000	0.2600	0.2300	0.2900	0.3100	0.4100	0.5700	1.0000			
24 24	0.0700	0.1700	0.2700	0.1000	0.1800	0.2700	0.0900	0.1700	0.0	0.0800	0.0400	1.0000		

NSFOS SUMMER 79 ALGAE TRANSECTS												PART 4 OF 6		
site #	SORENSEN'S SIMILARITY COEFFICIENTS													
	1	2	3	4	5	6	7	8	9	10	11	12		
25 27	0.2700	0.2700	0.2200	0.2200	0.2400	0.2300	0.2200	0.2000	0.2400	0.1900	0.1900	0.1700		
26 28	0.1900	0.0500	0.0400	0.1100	0.1200	0.1500	0.1900	0.2700	0.1000	0.2400	0.3500	0.3200		
27 29	0.2000	0.0500	0.1000	0.1500	0.1200	0.1600	0.3900	0.2900	0.1300	0.4400	0.5600	0.4400		
28 30	0.2400	0.2100	0.1700	0.2400	0.2400	0.2400	0.2400	0.2300	0.2400	0.1600	0.1400	0.3500		
29 31	0.3700	0.2500	0.2400	0.3200	0.3400	0.3300	0.3200	0.2700	0.3200	0.2700	0.6300	0.4100		
30 32	0.2400	0.1400	0.1200	0.2100	0.2200	0.2400	0.2400	0.1600	0.2200	0.1800	0.1600	0.1100		
31 33	0.1400	0.1100	0.0700	0.1400	0.1400	0.1400	0.1400	0.1700	0.1500	0.4700	0.5400	0.5400		
32 34	0.1100	0.1000	0.0800	0.1100	0.1100	0.1100	0.1100	0.1000	0.1100	0.4500	0.4800	0.3400		
33 35	0.3000	0.1600	0.1500	0.2300	0.2500	0.2600	0.2600	0.1900	0.2300	0.5100	0.5200	0.6700		

NSFOS SUMMER 79 ALGAE TRANSECTS												PART 5 OF 6		
site #	SORENSEN'S SIMILARITY COEFFICIENTS													
	13	14	15	16	17	18	19	20	21	22	23	24		
25 27	0.2000	0.1900	0.2100	0.2100	0.3100	0.2500	0.3400	0.2800	0.0400	0.2100	0.3100	0.5000		
26 28	0.1400	0.4600	0.3000	0.4300	0.3500	0.1700	0.3400	0.2400	0.0300	0.2600	0.3400	0.1200		
27 29	0.1700	0.5500	0.5100	0.4700	0.5200	0.1400	0.5400	0.2600	0.1300	0.2200	0.2600	0.3400		
28 30	0.0700	0.2100	0.2900	0.2300	0.1600	0.5500	0.2500	0.3600	0.0800	0.1800	0.2200	0.3400		
29 31	0.1100	0.6600	0.5300	0.7000	0.7100	0.3300	0.7500	0.4400	0.0900	0.1400	0.2100	0.1100		
30 32	0.0900	0.2800	0.3300	0.2400	0.1600	0.4200	0.1900	0.3400	0.0900	0.1700	0.1700	0.2200		
31 33	0.2700	0.6800	0.6900	0.6500	0.5500	0.1300	0.6200	0.3500	0.1100	0.2100	0.2000	0.2100		
32 34	0.2700	0.5500	0.4500	0.5700	0.4600	0.4200	0.5900	0.2600	0.0400	0.1800	0.2300	0.1100		
33 35	0.1800	0.6800	0.5600	0.7100	0.6100	0.2400	0.7100	0.3700	0.0900	0.1100	0.1800	0.1200		

NSFOS SUMMER 79 ALGAE TRANSECTS												PART 6 OF 6		
site #	SORENSEN'S SIMILARITY COEFFICIENTS													
	27	28	29	30	31	32	33	34	35					
25 27	1.0000													
26 28	0.1500	1.0000												
27 29	0.0900	0.3700	1.0000											
28 30	0.3300	0.1500	0.3000	1.0000										
29 31	0.3300	0.3400	0.5100	0.2900	1.0000									
30 32	0.1600	0.1500	0.1400	0.4800	0.2600	1.0000								
31 33	0.1500	0.3400	0.4900	0.2500	0.6800	0.2500	1.0000							
32 34	0.1700	0.2700	0.5200	0.3200	0.6000	0.3900	0.6100	1.0000						
33 35	0.2500	0.3800	0.5100	0.2100	0.8500	0.2600	0.7200	0.6400	1.0000					

Figure D. Similarity matrix for algae surveys.

Table B. PERCENT COVER OF PREDOMINANT ALGAE SPECIES AND SUBSTRATA
AT MOLOKAI SITES

PALAAU <u>Sites 1-9</u>		MOANUI (in part), KEAWANUI (in part), ILIO POINT (in part) <u>Sites 18, 26, 30, 32</u>	
Coral	66%		
<i>Porolithon</i> sp.	10%	<i>Dictyota stolonifera</i>	22%
Sand	9%	Basalt pavement	22%
Coral rubble	4%	<i>Sargassum obtusifolium</i>	17%
<i>Bryopsis</i> sp.	3%	Coral	13%
<i>Ralfsia pangoensis</i>	3%	<i>Padina crassa</i>	9%
		<i>Porolithon</i> sp.	7%
		Unidentified Phaeophyta	5%
HALAWA BAY, MOANUI (in part), KEAWANUI (in part), ILIO POINT (in part) <u>Sites 10-17, 19, 27-29, 31, 33-35</u>		MOANUI (in part) <u>Sites 20-23</u>	
Unidentified Phaeophyta	36%	Unidentified Rhodophyta or Phaeophyta	22%
<i>Porolithon</i> sp.	10%	Coral	12%
Coral	9%	Limestone pavement	11%
<i>Ralfsia pangoensis</i>	7%	Unidentified Chlorophyta	9%
Boulder	5%	Sand	9%
<i>Dictyota stolonifera</i>	3%	Coral rubble	5%
		<i>Spyridia</i> sp.	5%
		<i>Dictyota stolonifera</i>	5%
		<i>Porolithon</i> sp.	5%
		Unidentified Phaeophyta	3%
		<i>Microdictyon</i> sp.	3%

FISH DENDROGRAM

In the fish dendrogram (page 65), the sites grouped into four distinct clusters which generally correspond to the areas studied (Table C, page 67). The Palaau sites (1 through 9) clustered with two Moanui sites (17 and 22). In terms of percent of total number of individual fish recorded at these sites, *Ctenochaetus strigosus* (kole) was the dominant species. Prominent species included other members of the family Acanthuridae (surgeon fish) such as *Zebrasoma flavescens* (lau'ipala) and *Acanthurus nigrofuscus*; members of the family Pomacentridae (damsel fish) such as *Stegastes fasciolatus*, *Chromis hanui*, and *Plectroglyphidodon johnstonianus*; and *Thalassoma duperrey* (hinalea lau wili), a member of the family Labridae (wrasses).

A second cluster was formed by five Halawa sites (10, 11, 14, 15, and 16) where an abundance of *Chromis vanderbilti* (family Pomacentridae) and *Thalassoma duperrey* was noted. Other species commonly seen included *Stegastes fasciolatus* and *Chromis ovalis*, members of the family Pomacentridae; *Lutjanus kasmira* (taape), a member of the family Lutjanidae (snappers); and *Parupeneus pleurostigma*, a member of the family Mullidae (goat fish).

Five Moanui sites (18, 19, 20, 21, and 23) composed a third cluster. *Thalassoma duperrey* was found to be the dominant species. *Paracirrhites arcatus* (piliko'a), a member of the family Cirrhitidae (hawk fish); *Coris venusta*, a member of the family Labridae; unidentified juveniles of the family Scaridae (parrot fish); and *Acanthurus nigrofuscus* were also frequently recorded.

Two Halawa sites (12 and 13) and the three Keawanui sites (26 through 28) grouped with the Ilio sites (29 through 35) in a fourth cluster.

Chromis vanderbilti accounted for a large percentage of the total number of fish at these sites. Other abundant species included *Chromis ovalis*, *Thalassoma duperrey*, and *Acanthurus nigrofuscus*.

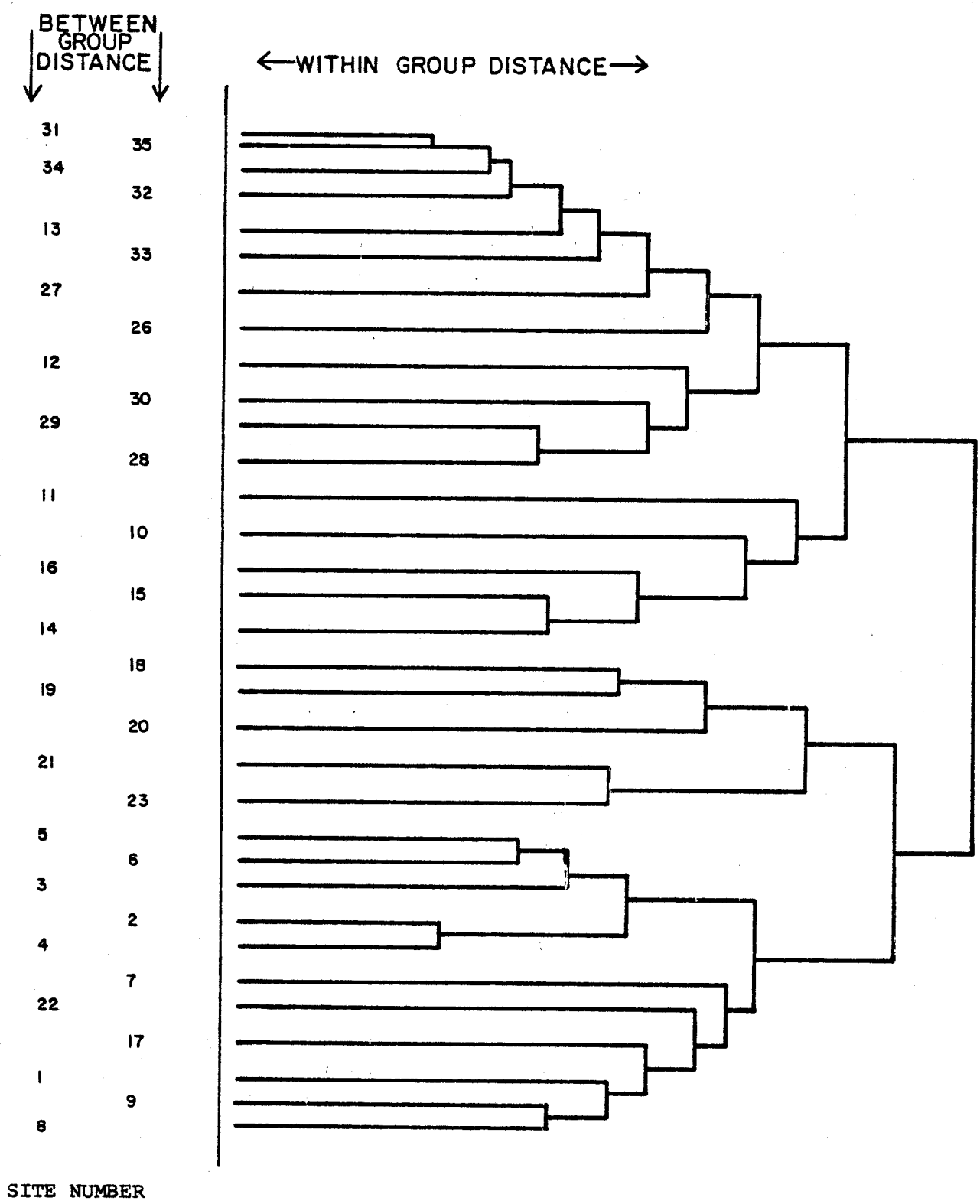


Figure E. Dendrogram of fish surveys. The sites grouped into four distinct clusters which generally correspond to the areas studied.

NSFOS SUMMER 79 AVERAGED FISH TRANSECTS												PART 1 OF 6		
SORENSEN'S SIMILARITY COEFFICIENTS														
site #	1	2	3	4	5	6	7	8	9	10	11	12		
1	1.0000													
2	0.5552	1.0000												
3	0.6750	0.5015	1.0000											
4	0.4522	0.6219	0.5351	1.0000										
5	0.5145	0.5598	0.6741	0.6114	1.0000									
6	0.5348	0.6030	0.6413	0.6594	0.7502	1.0000								
7	0.4449	0.5270	0.4295	0.2948	0.4553	0.4401	1.0000							
8	0.6412	0.4696	0.6006	0.5411	0.5691	0.5348	0.5393	1.0000						
9	0.6445	0.5666	0.6739	0.6159	0.6313	0.6764	0.5296	0.5296	1.0000					
10	0.2336	0.0992	0.2054	0.1153	0.1527	0.1671	0.2018	0.2078	0.1573	1.0000				
11	0.2241	0.1364	0.2412	0.1671	0.1642	0.1901	0.1830	0.2088	0.2249	0.5099	1.0000			
12	0.3231	0.1745	0.2698	0.1726	0.1975	0.2271	0.2605	0.2795	0.2637	0.4695	0.5902	1.0000		

NSFOS SUMMER 79 AVERAGED FISH TRANSECTS												PART 2 OF 6		
SORENSEN'S SIMILARITY COEFFICIENTS														
site #	13	14	15	16	17	18	19	20	21	22	23	24		
13	1.0000													
14	0.1639	1.0000												
15	0.3105	0.1125	1.0000											
16	0.2013	0.0678	0.2014	1.0000										
17	0.5162	0.3428	0.5272	0.3650	1.0000									
18	0.2741	0.1118	0.3440	0.1564	0.3143	1.0000								
19	0.2668	0.1404	0.2547	0.1558	0.2061	0.2121	1.0000							
20	0.3172	0.1522	0.3015	0.1446	0.3052	0.2247	0.3597	1.0000						
21	0.2441	0.0969	0.2000	0.1026	0.1461	0.1586	0.2521	0.3144	1.0000					
22	0.4743	0.2222	0.4189	0.2277	0.3056	0.3515	0.4417	0.6148	0.4754	1.0000				
23	0.2427	0.1064	0.1470	0.0949	0.1498	0.1648	0.2989	0.3276	0.2673	0.1943	1.0000			
24	0.1779	0.1088	0.3004	0.1417	0.2911	0.2865	0.2221	0.2514	0.2691	0.3886	0.4370	1.0000		

NSFOS SUMMER 79 AVERAGED FISH TRANSECTS												PART 3 OF 6		
SORENSEN'S SIMILARITY COEFFICIENTS														
site #	13	14	15	16	17	18	19	20	21	22	23	24		
13	1.0000													
14	0.2433	1.0000												
15	0.3539	0.7241	1.0000											
16	0.3617	0.0219	0.6013	1.0000										
17	0.2455	0.3238	0.4020	0.3273	1.0000									
18	0.3352	0.1921	0.6312	0.4377	0.4485	1.0000								
19	0.3716	0.4746	0.5242	0.4289	0.3590	0.6619	1.0000							
20	0.2474	0.2903	0.4323	0.3385	0.4894	0.5795	0.5014	1.0000						
21	0.1849	0.3768	0.4271	0.4133	0.3017	0.4192	0.4281	0.3245	1.0000					
22	0.2535	0.3955	0.5271	0.3867	0.6051	0.4696	0.4471	0.5195	0.4788	1.0000				
23	0.2032	0.1370	0.4204	0.4278	0.3013	0.4713	0.4732	0.4242	0.5769	0.5521	1.0000			
24	0.3900	0.3904	0.4298	0.4645	0.3035	0.3944	0.3942	0.2558	0.2298	0.3523	0.2529	1.0000		

NSFOS SUMMER 79 AVERAGED FISH TRANSECTS												PART 4 OF 6		
SORENSEN'S SIMILARITY COEFFICIENTS														
site #	25	26	27	28	29	30	31	32	33	34	35			
25	1.0000													
26	0.1091	1.0000												
27	0.1337	0.0603	1.0000											
28	0.2625	0.1067	0.2422	1.0000										
29	0.2781	0.0745	0.2504	0.0953	1.0000									
30	0.1759	0.0761	0.1708	0.0455	0.3080	1.0000								
31	0.2233	0.0936	0.1984	0.1067	0.1944	0.1742	1.0000							
32	0.1526	0.0787	0.1852	0.0897	0.2375	0.2120	0.3406	1.0000						
33	0.2154	0.1075	0.2115	0.1228	0.2666	0.2379	0.3702	0.3718	1.0000					
34	0.1790	0.0798	0.1746	0.0985	0.2250	0.1974	0.3259	0.3209	0.2492	1.0000				

NSFOS SUMMER 79 AVERAGED FISH TRANSECTS												PART 5 OF 6		
SORENSEN'S SIMILARITY COEFFICIENTS														
site #	25	26	27	28	29	30	31	32	33	34	35			
25	1.0000													
26	0.5705	1.0000												
27	0.5174	0.3465	1.0000											
28	0.5528	0.3628	0.4435	1.0000										
29	0.3451	0.4396	0.5316	0.4075	1.0000									
30	0.7442	0.2899	0.3792	0.2564	0.3568	1.0000								
31	0.6429	0.3466	0.4297	0.3505	0.3665	0.4404	1.0000							
32	0.4648	0.4018	0.5024	0.3503	0.3849	0.4255	0.4051	1.0000						
33	0.5389	0.3511	0.4313	0.3713	0.4530	0.5538	0.4613	0.4334	1.0000					
34	0.4657	0.3045	0.3910	0.3301	0.4120	0.4625	0.4042	0.3494	0.2314	1.0000				

NSFOS SUMMER 79 AVERAGED FISH TRANSECTS												PART 6 OF 6		
SORENSEN'S SIMILARITY COEFFICIENTS														
site #	25	26	27	28	29	30	31	32	33	34	35			
25	1.0000													
26	0.5335	1.0000												
27	0.5178	0.7299	1.0000											
28	0.3462	0.5664	0.6164	1.0000										
29	0.5243	0.4386	0.5404	0.4445	1.0000									
30	0.5648	0.5562	0.7255	0.5642	0.7237	1.0000								
31	0.4676	0.5677	0.6174	0.5688	0.6049	0.6288	1.0000							
32	0.5365	0.5643	0.6894	0.5365	0.6498	0.7194	0.6473	1.0000						
33	0.5546	0.5062	0.5496	0.4756	0.6304	0.7694	0.6169	0.8061	1.0000					

Figure F. Similarity matrix for fish surveys.

Table C. PREDOMINANT FISH SPECIES AT MOLOKAI SITES
BY PERCENT OF TOTAL NUMBER OF INDIVIDUAL FISH

PALAAU, MOANUI (in part)		MOANUI (in part)	
<u>Sites 1-9, 17, 22</u>		<u>Sites 18, 19, 20, 21, 23</u>	
<i>Ctenochaetus strigosus</i>	20%	<i>Thalassoma duperrey</i>	33%
<i>Acanthurus nigroris</i>	10%	<i>Paracirrhites arcatus</i>	8%
<i>Thalassoma duperrey</i>	8%	<i>Chromis vanderbilti</i>	7%
<i>Stegastes fasciolatus</i>	7%	<i>Coris venusta</i>	5%
<i>Zebrasoma flavescens</i>	7%	<i>Acanthurus nigrofuscus</i>	4%
<i>Chromis hanui</i>	7%	Unidentified Scaridae juveniles	4%
<i>Plectroglyphidodon johnstonianus</i>	7%		
		KEAWANUI, ILIO POINT, HALAWA BAY (in part)	
<u>Sites 10, 11, 14, 15, 16</u>		<u>Sites 12, 13, 26-28, 29-35</u>	
<i>Chromis vanderbilti</i>	16%	<i>Chromis vanderbilti</i>	40%
<i>Thalassoma duperrey</i>	15%	<i>Chromis ovalis</i>	9%
<i>Chromis ovalis</i>	6%	<i>Thalassoma duperrey</i>	8%
<i>Stegastes fasciolatus</i>	6%	<i>Acanthurus nigrofuscus</i>	5%
<i>Lutjanus kasmira</i>	5%		
<i>Parupeneus pleurostigma</i>	4%		