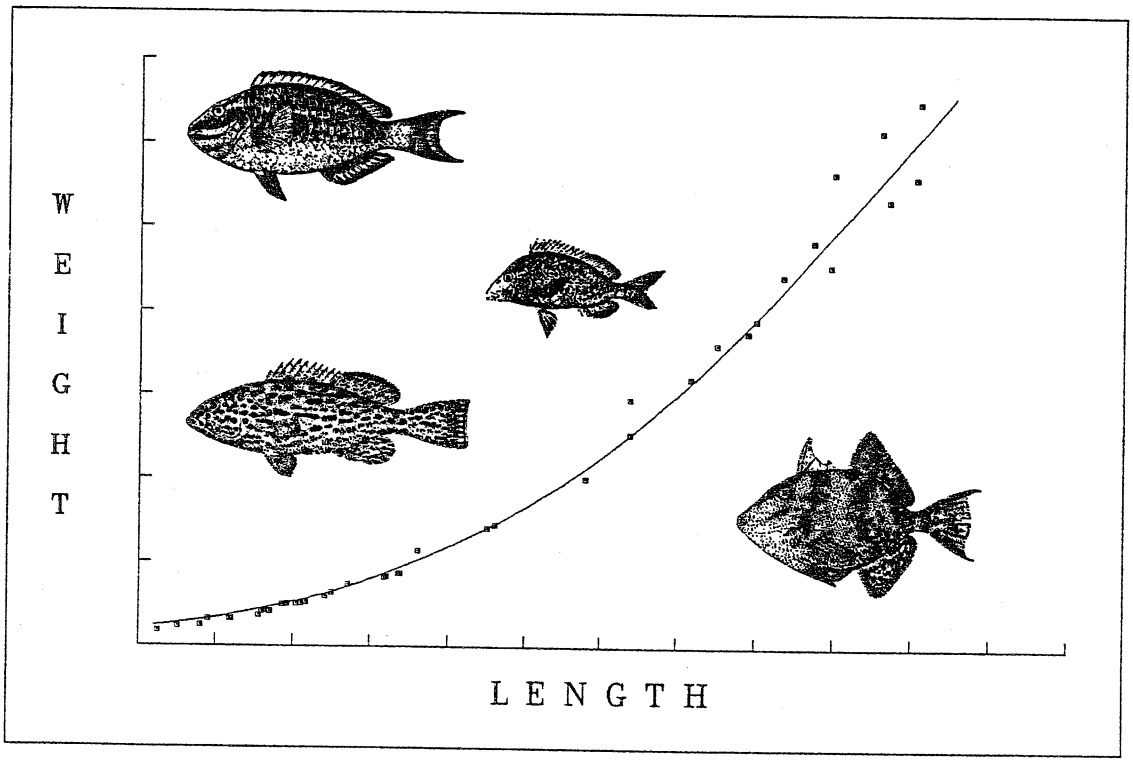
NOAA Technical Memorandum NMFS-SEFC-215

Length-Weight Relationships of Selected Marine Reef Fishes from the Southeastern United States and the Caribbean



DECEMBER 1988

James A. Bohnsack
Douglas E. Harper

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
Miami, Florida 33149

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BY
James A. Bohnsack and Douglas E. Harper

U. S. DEPARTMENT OF COMMERCE
C. William Verity, Jr., Secretary

National Oceanic and Atmospheric Administration
William E. Evans, Administrator

National Marine Fisheries Service
James W. Brennan, Assistant Administrator for Fisheries

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
Miami Laboratory
75 Virginia Beach Drive
Miami, Florida 33149

ABSTRACT

Formulae are provided for converting length estimates to wet weight biomass for 178 fish species from the southeast coast of the U.S., Gulf of Mexico, and the Caribbean. The formulae were empirically derived from measurements of 31,886 fishes. Species observed but lacking length-weight data are identified. Data contributions are solicited for future updates.

INTRODUCTION

A wide variety of visual censusing methods have been developed for non-destructive fishery-independent stock assessments. Most visual surveys of reef fishes have been limited to listing species or counting individuals (e.g., Brock, 1954; Jones and Thompson, 1978; Kimmel, 1985). A few visual census methods provide length estimates either for selected species (Bell, et al., 1985) or for general fish community structure (Bohnsack and Bannerot, 1986). Although fish length can be estimated underwater, use of these data have been limited because of a lack of information on relationships between length and weight for a majority of species. The mathematics of length-weight relationships has been reviewed by Weatherley and Gil (1987). Published data usually have been restricted to single or a few commercial species (e.g., Starck, 1970; Campbell, 1984).

Length-to-weight conversion formulae would be helpful in estimating reef fish biomass. Biomass data are important for studying and modeling ecosystem structure, trophic relationships, population dynamics, species importance, stock characteristics, and fisheries exploitation. Lengths converted to weights can be used to estimate catch-at-age for fisheries analysis. In addition, conversion formulae may help law enforcement personnel estimate total catch weights for legal purposes.

PURPOSE

Here we provide a preliminary list of empirically derived length-to-weight relationships based on data collected during fishery research in the Caribbean and off the southeastern United States. Our intent is to provide a convenient reference of length- weight formulae that can be used to convert size-frequency observations to biomass estimates for comprehensive fish community and stock comparisons.

METHODS

Scientists from the Miami Laboratory, SEFC, have opportunistically collected biological data on reef fishes from southern Florida from 1980 to the present. All fish were measured with a standard fish measuring board graduated in millimeters (mm). Fork lengths (FL) were recorded to the nearest mm by measuring from the tip of the snout with the mouth closed, to the end of the middle-most caudal ray. Total length (TL), measured to the longest caudal ray, was used for species with rounded or truncated caudal fins. Weights were measured to the nearest 0.1 g on a laboratory triple beam balance whenever the fish could be brought into the laboratory. Fish processed in the field were weighed on spring- tension cylindrical scales to the nearest 10 g.

In addition to southern Florida fishes, length and weight information for reef fish were obtained from the 1985 Caribbean Biostatistical Database. Bohnsack et. al. (1986) provides detailed analysis and information concerning this database. For the purposes of this paper, records for all reef fish species were extracted and used in the regression computations. Outliers, data outside of the general length-weight trend area, were manually omitted from the analysis.

Weight-length relationships were calculated by fitting a regression line to the equation:

$$\log W = \log a + b \log L$$

which is equivalent to the equation:

$$W = aL^b,$$

where W is weight in grams, and L is length in millimeters and a and b are constants. The regression constants, standard error of the constants, and coefficient of determination (R^2) were obtainted using the least squares data regression function of the LOTUS 1-2- 3 software.

Regressions for species with less than four actual measurements were derived by forcing the intercept through a point close to the origin by adding a "zero" data point.

RESULTS

Regression formulae are provided for 174 fish species representing a total of 7,503 individuals from the South Atlantic/ Gulf of Mexico (southern Florida) (Table 1) and 32 fish species representing a total of 24,383 individuals from the Caribbean (Table 2). Graphical representations of size-distribution and length-weight relationships for 50 southern Florida species with more than 30 measurements are presented in Appendix A so that users can assess the range and precision of the data. Formulae for species with fewer measurements should be used cautiously. Species observed in visual reef fish samples but lacking adequate length- to-weight data are identified in Table 3.

DISCUSSION

Data include most, but not all, species that have been observed during visual censuses of reef fish habitats by the staff at the Miami Laboratory. Many species are transients or visiting species and are not considered reef fish by traditional criteria (i.e., Starck, 1968). These species are included, however, because they potentially can be major influences on reef fish community structure.

Biomass is considered an important variable in ecological studies. Numbers of fishes used alone tend to give excessive importance to small species and juvenile fishes. Biomass may be more representative of community structure although it may give excessive importance to very large individuals. Numbers, biomass, and frequency-of-occurrence can be combined to provide an "importance value" for particular species in ecological studies (Brower and Zar, 1977).

We anticipate that the formulae and length-weight data will be useful, but will also indicate gaps in our knowledge. We anticipate publishing more comprehensive periodic updates. We encourage and solicit contributions of data for this effort, particularly for species with few data or lacking data. All contributions will be acknowledged. If sufficient interest exists, we may expand future editions to include other fishery parameters, various length-to-length relationships, regional length-to-weight relationships, and summaries of published length to weight relaionships. Suggestions are welcome.

ACKNOWLEDGMENTS

We thank the following people in alphabetical order for providing raw data: Christopher Holt, Ken Lindeman, and David McClellan. Organizations that contributed to this effort include the Newfound Harbor Marine Institute, Big Pine Key, Florida, the University of Miami, Miami, Florida, the Miami Seaquarium, Miami, Florida, and the Caribbean Biostatistical Sampling Program.

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Table 1. - Summary of southern Florida reef fish weight-regressions for 7,503 fish.
Regression formula: log WEIGHT(gms) = log a + b log LENGTH(mm).
Names of fishes are from Robins et. al. (1980).

* - Species with less than four actual fish measurements. The regression values presented can be only considered to represent very crude estimates. The regression lines were derived by forcing the intercept through a point at or close to the origin by adding a "zero" data point.

		SPECIES	COMMON NAME	NO.	TYPE	SIZE (mm) MIN.	SIZE (mm) MAX.	log a	b	R^2	STANDARD DEVIATION b	STANDARD DEVIATION log a
1		Abudefduf saxatilis	Sergeant major	35	FL	18	143	-4.7859	3.1420	0.98	0.0864	0.1359
2	*	Acanthemblemaria aspera	Roughhead blenny	1	TL	30	30	-5.0750	2.9625	1.00	0.0000	0.0000
3		Acanthurus bahianus	Ocean surgeon	29	FL	35	243	-4.6005	2.9752	0.99	0.0666	0.0771
4		Acanthurus chirurgus	Doctorfish	61	FL	39	304	-5.9255	3.5328	0.94	0.1154	0.1438
5		Acanthurus coeruleus	Blue tang	394	FL	35	304	-4.2165	2.8346	0.97	0.0261	0.0775
6		Aluterus schoepfi	Orange filefish	53	TL	277	548	-3.3770	2.3443	0.78	0.1732	0.0671
7		Aluterus scriptus	Scrawled filefish	71	TL	193	615	-1.8982	1.8136	0.89	0.0781	0.0908
8		Amblycirrhitus pinos	Redspotted hawkfish	25	FL	275	452	-6.0169	3.4266	0.87	0.2712	0.0610
9		Anisotremus surinamensis	Black margate	21	FL	247	488	-5.6212	3.3916	0.85	0.3223	0.0968
10		Anisotremus virginicus	Porkfish	187	FL	17	298	-4.9963	3.1674	0.99	0.0239	0.0816
11		Apogon maculatus	Flamefish	22	FL	16	65	-4.8752	3.0734	0.97	0.1110	0.0907
12		Apogon pseudomaculatus	Twospot cardinalfish	49	FL	18	68	-4.6413	2.9434	0.93	0.1156	0.1123
13	*	Archosargus probatocephalus	Sheepshead	1	FL	271	271	-4.8175	3.0912	1.00	0.0000	0.0000
14		Archosargus rhomboidalis	Sea bream	18	FL	42	254	-4.8471	3.1021	1.00	0.0518	0.0477
15	*	Astrapogon stellatus	Conchfish	1	TL	57	57	-4.8463	3.0769	1.00	0.0000	0.0000
16	*	Aulostomus maculatus	Trumpetfish	1	TL	209	209	-5.2686	2.8657	1.00	0.0000	0.0000
17		Balistes capriscus	Gray triggerfish	233	FL	158	536	-4.5359	2.9352	0.93	0.0549	0.0762
18		Balistes vetula	Queen triggerfish	22	FL	165	425	-4.5638	2.9903	0.96	0.1388	0.0550
19		Blennius cristata	Molly miller	16	TL	22	73	-3.9658	2.4144	0.92	0.1873	0.0938
20	*	Bodianus rufus	Spanish hogfish	2	FL	252	331	-4.8936	3.0532	1.00	0.0012	0.0045
21		Bothus lunatus	Peacock flounder	10	TL	81	469	-5.1974	3.1894	0.99	0.0978	0.0707
22		Calamus bajonado	Jolthead porgy	130	FL	192	481	-4.1758	2.8175	0.92	0.0730	0.0511
23		Calamus calamus	Saucereye porgy	207	FL	158	310	-4.1688	2.8009	0.84	0.0850	0.0640
24		Calamus penna	Sheepshead porgy	28	FL	165	369	-3.7826	2.6663	0.83	0.2401	0.1017
25		Calamus proridens	Littlehead porgy	47	FL	134	272	-3.5329	2.5299	0.75	0.2206	0.1140
26	*	Callionymus bairdi	Lancer dragonet	1	TL	16	16	-4.7580	3.1210	1.00	0.0000	0.0000
27		Cantherhines macrocerus	Whitespotted filefish	10	TL	233	395	-3.9037	2.6534	0.90	0.3109	0.0633
28		Cantherhines pullus	Orangespotted filefish	12	TL	151	200	-3.7282	2.5632	0.91	0.2508	0.0314
29		Canthidermis sufflamen	Ocean triggerfish	34	FL	363	555	-4.8095	3.0554	0.97	0.1023	0.0343
30		Caranx bartholomaei	Yellow jack	34	FL	202	705	-4.4953	2.9085	0.99	0.0536	0.0484
31		Caranx crysos	Blue runner	235	FL	160	458	-3.9699	2.6900	0.84	0.0782	0.1042
32		Caranx hippos	Crevalle jack	18	FL	260	647	-4.0201	2.7344	0.99	0.0706	0.0422
33		Caranx ruber	Bar jack	34	FL	32	377	-5.3687	3.2370	0.98	0.0754	0.0800
34		Centropristis ocyurus	Bank sea bass	10	TL	192	299	-3.6555	2.5990	0.96	0.1944	0.0422
35		Centropristis striata	Black sea bass	7	TL	215	328	-3.6557	2.4683	0.97	0.1903	0.0350
36		Chaetodiperus faber	Atlantic spadefish	43	FL	201	396	-3.7175	2.6836	0.91	0.1348	0.0495
37		Chaetodon capistratus	Foureye butterflyfish	6	TL	43	115	-4.8475	3.1897	1.00	0.0323	0.0122
38		Chaetodon ocellatus	Spotfin butterflyfish	80	TL	103	181	-4.4820	2.9838	0.96	0.0732	0.0296
39		Chaetodon sedentarius	Reef butterflyfish	34	TL	37	134	-4.6749	3.0760	0.88	0.1990	0.1031
40		Chaetodon striatus	Banded butterflyfish	13	TL	57	143	-4.7940	3.1395	0.99	0.1043	0.0599
41	*	Chilomycterus schoepfi	Stripped burrfish	1	FL	212	212	-4.7512	3.1244	1.00	0.0000	0.0000
42		Coryphopterus glaucofraenum	Bridled goby	18	TL	17	48	-4.8489	2.9674	0.93	0.2033	0.1188
43	*	Cryptotomus roseus	Bluelip parrotfish	3	TL	12	69	-4.4794	3.1816	0.99	0.2328	0.6985
44	*	Dasyatis americana	Southern stingray	2	TL	651	4150	-5.5182	2.6724	0.99	0.2951	1.2681
45		Diodon holocanthus	Balloonfish	162	TL	112	430	-3.1948	2.3979	0.73	0.1157	0.1126
46		Diodon hystrix	Porcupinefish	30	TL	103	345	-2.5498	2.2763	0.99	0.0384	0.0348
47		Diplectrum formosum	Sand perch	170	FL	39	728	-5.0229	3.0781	0.96	0.0463	0.1115
48		Echeneis naucrates	Sharksucker	5	TL	430	479	-3.0099	2.1128	0.98	0.1651	0.0060
49	*	Elops saurus	Ladyfish	2	FL	293	413	-5.0651	2.9680	1.00	0.0117	0.0434
50	*	Enneanectes pectoralis	Redeye triplefin	3	TL	23	34	-4.8980	3.0502	1.00	0.0158	0.0474

Table 1. (continued) - Summary of southern Florida reef fish weight-regressions for 7,503 fish.
Regression formula: log WEIGHT(gms) = log a + b log LENGTH(mm).
Names of fishes are from Robins et. al. (1980).

* - Species with less than four actual fish measurements. The regression values presented can be only considered to represent very crude estimates. The regression lines were derived by forcing the intercept through a point at or close to the origin by adding a "zero" data point.

	SPECIES	COMMON NAME	NO.	TYPE	SIZE (mm) MIN.	SIZE (mm) MAX.	log a	b	R^2	STANDARD DEVIATION b	STANDARD DEVIATION log a
51 *	Epinephelus cruentatus	Graysby	2	TL	219	246	-4.9123	3.0439	1.00	0.0030	0.0107
52	Epinephelus guttatus	Red hind	20	TL	139	255	-5.0680	3.1124	0.92	0.2174	0.0778
53	Epinephelus morio	Red grouper	47	TL	82	566	-4.9464	3.0350	0.99	0.0553	0.0585
54	Epinephelus striatus	Nassau grouper	9	TL	203	516	-5.4164	3.2292	0.98	0.1890	0.0810
55	Equetus acuminatus	High-hat	19	TL	28	199	-5.2620	3.2017	1.00	0.0492	0.0534
56	Equetus lanceolatus	Jacknife-fish	8	TL	93	223	-6.8068	3.8444	1.00	0.0851	0.0278
57 *	Eucinostomus havana	Bigeye mojarra	1	FL	116	116	-4.8940	3.0530	1.00	0.0000	0.0000
58	Gerres cinereus	Yellowfin mojarra	4	FL	52	257	-4.8195	3.0843	1.00	0.1145	0.0650
59	Ginglymostoma cirratum	Nurse shark	16	TL	229	1070	-4.8681	2.8918	0.93	0.2143	0.1516
60	Gnatholepis thompsoni	Goldspot goby	9	TL	15	52	-6.2207	3.7669	0.96	0.3071	0.1676
61 *	Gobiesox strumosus	Skilletfish	1	TL	42	42	-4.9281	3.0359	1.00	0.0000	0.0000
62	Gobiosoma oceanops	Neon goby	19	TL	23	45	-5.2341	3.1370	0.95	0.1823	0.0681
63	Gymnothorax funebris	Green moray	9	TL	597	2134	-5.2443	2.8560	0.94	0.2623	0.1475
64	Gymnothorax moringa	Spotted moray	22	TL	403	886	-6.1561	3.1577	0.90	0.2301	0.0931
65 *	Gymnothorax nigromarginatus	Blackedge moray	1	TL	486	486	-5.3194	2.8403	1.00	0.0000	0.0000
66 *	Gymnothorax vicinus	Purplemouth moray	1	TL	758	758	-5.2478	2.8761	1.00	0.0000	0.0000
67	Haemulon album	Margate	11	FL	162	595	-4.8186	3.0423	0.99	0.1154	0.0603
68	Haemulon aurolineatum	Tomtate	198	FL	12	260	-5.2081	3.2077	0.99	0.0186	0.0893
69 *	Haemulon carbonarium	Caesar grunt	3	FL	32	37	-4.8879	3.0559	1.00	0.0218	0.0668
70	Haemulon chrysargyreum	Smallmouth grunt	8	FL	140	200	-2.5578	2.1567	1.00	0.0466	0.0060
71	Haemulon flavolineatum	French grunt	61	FL	32	289	-5.0428	3.1581	0.99	0.0392	0.0606
72	Haemulon macrostomum	Spanish grunt	6	FL	174	203	-4.6419	3.0295	0.91	0.4687	0.0233
73	Haemulon melanurum	Cottonwick	70	FL	29	277	-4.5993	2.9527	0.98	0.0565	0.0519
74	Haemulon parrai	Sailor's choice	143	FL	41	300	-4.6947	2.9932	0.99	0.0237	0.0542
75	Haemulon plumieri	White grunt	362	FL	20	298	-5.0781	3.1612	0.99	0.0148	0.0924
76	Haemulon sciurus	Bluestriped grunt	136	FL	26	265	-4.7114	2.9996	0.99	0.0215	0.0705
77 *	Haemulon striatum	Striped grunt	3	FL	40	180	-4.8564	3.0988	1.00	0.0963	0.3398
78	Halichoeres bivittatus	Slippery dick	21	TL	36	152	-4.8117	2.9391	0.96	0.1441	0.1389
79	Halichoeres garnoti	Yellowhead wrasse	5	TL	26	105	-5.6591	3.3747	0.99	0.2205	0.1017
80	Halichoeres maculipinna	Clown wrasse	7	TL	15	97	-6.2524	3.6932	0.99	0.1994	0.1414
81 *	Halichoeres radiatus	Puddingwife	2	TL	24	36	-4.9221	3.0382	1.00	0.0145	0.0410
82	Hemiramphus brasiliensis	Ballyhoo	4	TL	275	380	-3.3362	2.3555	1.00	0.0717	0.0080
83	Holacanthus bermudensis	Blue angelfish	117	TL	69	427	-4.3950	2.8994	0.97	0.0513	0.0776
84	Holacanthus ciliaris	Queen anglefish	25	TL	29	350	-4.3731	2.9004	1.00	0.0369	0.0559
85	Holacanthus tricolor	Rock beauty	20	TL	42	213	-4.2262	2.8577	0.98	0.0989	0.0925
86	Holocentrus ascensionis	Squirrelfish	108	FL	190	382	-3.6218	2.5596	0.76	0.1403	0.0704
87 *	Holocentrus coruscus	Reef squirrelfish	1	FL	51	51	-4.8611	3.0695	1.00	0.0000	0.0000
88 *	Holocentrus rufus	Longspine squirrelfish	3	FL	90	175	-4.8825	3.0594	1.00	0.0716	0.2552
89	Hypleurochilus bermudensis	Barred blenny	6	TL	24	47	-4.9426	3.0332	0.95	0.3295	0.0733
90 *	Hypoplectrus unicolor	Butter hamlet	4	FL	109	170	-5.1419	3.1818	0.99	0.0346	0.2216
91 *	Kyphosus sectatrix	Bermuda chub	2	FL	190	206	-4.8397	3.0801	1.00	0.0034	0.0120
92	Lachnolaimus maximus	Hogfish	228	FL	68	600	-4.6801	2.9880	0.98	0.0318	0.0518
93	Lactophrys bicaudalis	Spotted trunkfish	5	TL	136	271	-2.4461	2.0976	0.95	0.2775	0.0644
94	Lactophrys polygonia	Honeycomb cowfish	6	TL	200	301	-5.6339	3.3462	0.94	0.4084	0.0553
95	Lactophrys quadricornis	Scrawled cowfish	177	TL	88	550	-3.0194	2.2629	0.87	0.0667	0.0785
96 *	Lactophrys trigonius	Trunkfish	3	TL	292	395	-4.8334	3.0829	1.00	0.0207	0.0814

Table 1. (continued) - Summary of southern Florida reef fish weight-regressions for 7,503 fish.
Regression formula: log WEIGHT(gms) = log a + b log LENGTH(mm).
Names of fishes are from Robins et. al. (1980).

* - Species with less than four actual fish measurements. The regression values presented can be only considered to represent very crude estimates. The regression lines were derived by forcing the intercept through a point at or close to the origin by adding a "zero" data point.

	SPECIES	COMMON NAME	NO.	TYPE	SIZE (mm) MIN.	SIZE (mm) MAX.	log a	b	R^2	STANDARD DEVATION b	STANDARD DEVATION log a
97	Lactophrys triqueter	Smooth trunkfish	117	TL	124	276	-2.7388	2.2302	0.80	0.1042	0.0744
98	Lagodon rhomboides	Pinfish	12	FL	130	212	-5.2350	3.2504	0.97	0.1652	0.0318
99	Lutjanus analis	Mutton snapper	365	FL	116	722	-4.8030	3.0112	0.97	0.0278	0.0579
100	Lutjanus apodus	Schoolmaster	51	FL	38	791	-4.6909	2.9779	0.99	0.0428	0.0516
101 *	Lutjanus buccanella	Blackfin snapper	3	FL	30	104	-5.1309	2.9735	0.99	0.2120	0.6800
102 *	Lutjanus cyanopterus	Cubera snapper	1	FL	693	693	-4.8799	3.0601	1.00	0.0000	0.0000
103	Lutjanus griseus	Gray snapper	245	FL	53	513	-4.5159	2.8809	0.97	0.0316	0.0537
104	Lutjanus jocu	Dog snapper	5	FL	265	774	-4.3683	2.8574	0.99	0.1567	0.0616
105	Lutjanus mahogoni	Mahogonay snapper	13	FL	220	357	-4.0870	2.7190	0.84	0.3624	0.0761
106	Lutjanus synagris	Lane snapper	254	FL	25	389	-4.3452	2.8146	0.96	0.0351	0.0709
107	Lythrypnus spilus	Bluegold goby	11	TL	16	40	-4.6635	2.7441	0.94	0.2261	0.0808
108	Malacanthus plumieri	Sand tilefish	5	FL	366	427	-4.1981	2.6290	0.93	0.4208	0.0215
109	Malacoctenus macrops	Rosy blenny	5	TL	25	37	-3.8333	2.2229	0.83	0.5814	0.0937
110	Malacoctenus triangulatus	Saddled blenny	4	TL	41	53	-5.3645	3.1883	0.86	0.8935	0.0750
111	Microspathodon chrysurus	Yellowtail damselfish	8	FL	16	58	-4.7033	3.0825	1.00	0.0652	0.0318
112 *	Monacanthus ciliatus	Fringed filefish	1	TL	126	126	-4.8264	3.0868	1.00	0.0000	0.0000
113	Monacanthus hispidus	Planehead filefish	115	TL	74	316	-3.9200	2.6178	0.86	0.0991	0.0934
114	Mulloidichthys martinicus	Yellow goatfish	13	FL	223	293	-6.3369	3.6627	0.96	0.2264	0.0310
115	Muraena miliaris	Goldentail moray	6	TL	249	742	-4.5351	2.5736	0.99	0.0916	0.0366
116	Mycteroperca bonaci	Black grouper	21	FL	201	824	-5.3696	3.2051	1.00	0.0390	0.0351
117	Mycteroperca microlepis	Gag	30	FL	419	851	-4.9169	3.0305	0.98	0.0888	0.0382
118	Ocyurus chrysurus	Yellowtail snapper	257	FL	15	363	-4.1108	2.7180	0.96	0.0363	0.0811
119 *	Odontoscion dentex	Reef crocker	1	TL	58	58	-4.9854	3.0073	1.00	0.0000	0.0000
120 *	Ogcocephalus radiatus	Polka-dot batfish	3	FL	204	255	-4.8749	3.0626	1.00	0.0018	0.0084
121	Ophioblennius atlanticus	Redlip blenny	9	TL	44	82	-3.8680	2.3791	0.87	0.3500	0.0936
122 *	Opistognathus whitehursti	Dusky jawfish	1	TL	144	144	-5.0210	2.9895	1.00	0.0000	0.0000
123	Orthopristis chrysoptera	Pigfish	49	FL	156	234	-5.0130	3.1893	0.95	0.1039	0.0237
124	Pagrus pagrus	Red porgy	113	FL	190	393	-4.6955	3.0027	0.95	0.0663	0.0462
125 *	Paranthias furcifer	Creole-fish	3	FL	235	295	-4.9130	3.0430	1.00	0.0124	0.0476
126 *	Pempheris schomburgki	Glassy sweeper	1	FL	42	42	-4.8557	3.0721	1.00	0.0000	0.0000
127	Phaeoptyx pigmentaria	Dusky cardinalfish	8	FL	25	49	-5.2814	3.2553	0.99	0.0968	0.0274
128	Pomacanthus arcuatus	Gray angelfish	121	TL	16	438	-4.4311	2.9680	0.96	0.0569	0.1309
129	Pomacanthus paru	French angelfish	63	TL	21	413	-4.8182	3.1264	0.99	0.0326	0.0665
130	Pomacentrus fuscus	Dusky damselfish	12	FL	28	79	-4.3479	2.8956	0.89	0.3139	0.1869
131	Pomacentrus leucostictus	Beaugregory	11	FL	30	89	-4.4057	2.8868	0.97	0.1616	0.0742
132	Pomacentrus partitus	Bicolor damselfish	33	FL	14	69	-4.8921	3.1519	0.88	0.2076	0.2271
133	Pomacentrus planifrons	Three spot damselfish	11	FL	14	105	-4.2782	2.8569	0.99	0.1030	0.1075
134	Pomacentrus variabilis	Cocoa damselfish	25	FL	12	74	-4.3258	2.8365	0.96	0.1259	0.1276
135	Priacanthus arenatus	Bigeye	171	FL	199	726	-4.9233	3.0387	0.91	0.0733	0.0665
136	Priacanthus cruentatus	Glasseye snapper	10	FL	222	345	-1.6587	1.7495	0.72	0.3880	0.0809
137 *	Prionotus roseus	Bluespotted searobin	1	TL	142	142	-4.9430	3.0285	1.00	0.0000	0.0000
138	Pseudupeneus maculatus	Spotted goatfish	32	FL	149	290	-4.8231	3.0257	0.91	0.1743	0.0561
139 *	Quisquilius hipoliti	Rusty goby	2	TL	36	46	-4.9180	3.0407	1.00	0.0117	0.0344
140 *	Rachycentron canadum	Cobia	1	FL	1085	1085	-5.3753	2.8123	1.00	0.0000	0.0000
141	Rhomboplites aurorubens	Vermilion snapper	8	FL	138	245	-4.5217	3.0436	0.93	0.3388	0.0780
142 *	Scarus coelestinus	Midnight parrotfish	1	TL	540	540	-4.8764	3.0618	1.00	0.0000	0.0000
143	Scarus coeruleus	Blue parrotfish	15	TL	103	610	-5.0162	3.1109	0.99	0.0838	0.0558
144	Scarus croicensis	Striped parrotfish	7	TL	24	96	-4.8887	3.0548	1.00	0.0628	0.0341

Table 1. (continued) - Summary of southern Florida reef fish weight-regressions for 7,503 fish.
Regression formula: log WEIGHT(gms) = log a + b log LENGTH(mm).
Names of fishes are from Robins et. al. (1980).

* - Species with less than four actual fish measurements. The regression values presented can be only considered to represent very crude estimates. The regression lines were derived by forcing the intercept through a point at or close to the origin by adding a "zero" data point.

	SPECIES	COMMON NAME	NO.	SIZE (mm) TYPE	MIN.	MAX.	log a	b	R^2	STANDARD DEVATION b	STANDARD DEVATION log a
145	Scarus guacamaia	Rainbow parrotfish	11	TL	128	484	-4.8714	3.0626	0.99	0.1026	0.0553
146	Scarus taeniopterus	Princess parrotfish	4	TL	176	280	-4.1836	2.7086	0.85	0.8116	0.1289
147 *	Scomberomorus cavalla	King mackerel	1	FL	510	510	-5.0538	2.9731	1.00	0.0000	0.0000
148 *	Scomberomorus maculatus	Spanish mackerel	1	FL	472	472	-5.0356	2.9822	1.00	0.0000	0.0000
149	Scorpaena plumieri	Scorpion fish	122	TL	13	340	-4.5626	2.9486	0.99	0.0323	0.0582
150	Selene vomer	Lookdown	31	FL	127	295	-4.7842	3.0758	0.97	0.1039	0.0409
151	Seriola dumerili	Greater amberjack	30	FL	220	728	-4.2985	2.8091	0.98	0.0693	0.0389
152 *	Seriola rivoliana	Almaco jack	2	FL	258	307	-4.8908	3.0548	1.00	0.0100	0.0364
153 *	Serranus baldwini	Lanternfish	1	FL	51	51	-4.9285	3.0358	1.00	0.0000	0.0000
154	Serranus tigrinus	Harlequin bass	7	FL	30	288	-4.8862	3.0475	1.00	0.0529	0.0475
155 *	Sparisoma atomarium	Greenblotch parrotfish	2	TL	62	86	-4.9446	3.0275	1.00	0.0041	0.0131
156	Sparisoma aurofrenatum	Redband parrotfish	17	FL	129	235	-5.7587	3.4291	0.88	0.3336	0.0948
157	Sparisoma chrysopterum	Redtail parrotfish	228	FL	27	395	-5.1754	3.1708	0.98	0.0321	0.0704
158 *	Sparisoma rubripinne	Yellowtail parrotfish	2	FL	240	315	-4.8701	3.0641	1.00	0.0241	0.0872
159	Sparisoma viride	Stoplight parrotfish	67	FL	129	382	-4.5223	2.9214	0.96	0.0707	0.0370
160	Sphoeroides nephelus	Southern puffer	23	TL	155	255	-4.0772	2.6973	0.72	0.3711	0.1228
161	Sphoeroides spengleri	Bandtail puffer	40	TL	27	303	-5.2360	3.2671	0.96	0.1065	0.1598
162 *	Sphoeroides testudineus	Checkered puffer	3	TL	170	205	-4.8561	3.0717	1.00	0.0083	0.0305
163	Sphyraena barracuda	Barracuda	10	FL	58	1020	-5.3865	3.0825	0.99	0.0850	0.1051
164 *	Sphyraena picudilla	Southern sennet	1	FL	430	430	-5.1165	2.9417	1.00	0.0000	0.0000
165	Starksia ocellata	Checkered blenny	19	TL	10	45	-4.7368	2.8771	0.69	0.4653	0.3248
166 *	Synodus foetens	Inshore lizardfish	1	FL	305	305	-5.0425	2.9787	1.00	0.0000	0.0000
167 *	Synodus intermedius	Sand diver	3	FL	299	386	-5.0020	2.9988	1.00	0.0042	0.0165
168	Thalassoma bifasciatum	Bluehead	39	TL	15	118	-4.8865	2.9162	0.90	0.1588	0.2709
169 *	Umbrina coroides	Sand drum	1	TL	192	192	-4.9506	3.0247	1.00	0.0000	0.0000
170	Urolophus jamaicensis	Yellow stingray	6	TL	273	416	-5.2244	3.0826	0.99	0.1563	0.0227
171 *	Vomer setapinnis	Atlantic moonfish	2	FL	187	224	-4.8312	3.0856	1.00	0.0245	0.0852
172 *	Xyrichthys martinicensis	Rosy razorfish	3	TL	25	62	-4.8221	3.0780	1.00	0.0593	0.1879
173	Xyrichthys novacula	Pearly razorfish	5	TL	35	100	-3.5613	2.2430	0.97	0.2352	0.0792
174 *	Xyrichthys splendens	Green razorfish	3	TL	97	104	-5.0012	2.9995	1.00	0.0121	0.0420

Table 2. - Summary of Caribbean (Puerto Rico, St. Thomas/St. John, and St.Croix) reef fish weight-length regressions for 24,383 fish. Regression formula: log W(gms) = log a + b log L(mm).

SPECIES Common Name	AREA	NO.	TYPE	SIZE (mm) MIN.	MAX.	log a	b	R^2
1 *Acanthurus chirurgus*	St. Thomas/St. John	139	FL	160	320	-4.0350	2.7443	0.89
Doctorfish	St. Croix	227	FL	175	337	-2.4262	2.0768	0.75
2 *Acanthurus coeruleus*	St. Thomas/St. John	410	FL	135	285	-3.1415	2.3964	0.80
Blue tang	St. Croix	2767	FL	100	295	-2.8242	2.2638	0.61
3 *Balistes vetula*	Puerto Rico	339	FL	175	546	-4.1822	2.8293	0.91
Queen triggerfish	St. Thomas/St. John	509	FL	170	435	-4.0637	2.7837	0.94
4 *Calamus bajonado*	Puerto Rico	114	FL	170	298	-4.1724	2.8216	0.94
Jolthead porgy								
5 *Calamus penna*	Puerto Rico	596	FL	134	535	-3.5518	2.5420	0.85
Sheepshead porgy								
6 *Canthidermis sufflamen*	St. Thomas/St. John	3	FL	330	350	-9.0383	4.7279	0.74
Ocean triggerfish								
7 *Caranx ruber*	St. Thomas/St. John	32	FL	200	730	-4.6704	2.9545	0.98
Bar jack	St. Croix	98	FL	175	380	-4.1896	2.7480	0.90
8 *Epinephelus fulvus*	Puerto Rico	583	FL	157	639	-4.6508	2.9330	0.83
Coney	St. Thomas/St. John	189	FL	190	370	-3.3353	2.4000	0.54
	St. Croix	1644	FL	105	315	-3.6232	2.5105	0.70
9 *Epinephelus guttatus*	Puerto Rico	723	FL	156	474	-4.4431	2.8386	0.88
Red hind	St. Thomas/St. John	448	FL	205	545	-5.0756	3.1001	0.91
	St. Croix	567	FL	208	500	-5.3835	3.2304	0.92
10 *Epinephelus striatus*	Puerto Rico	60	FL	210	645	-4.8980	3.0386	0.90
Nassau grouper	St. Thomas/St. John	73	FL	330	770	-5.8455	3.3804	0.60
	St. Croix	4	FL	320	470	-5.5063	3.2832	0.96
11 *Etelis oculatus*	St. Thomas/St. John	21	FL	360	890	-3.6326	2.5498	0.85
Queen snapper	St. Croix	48	FL	200	702	-3.7621	2.5775	0.95
12 *Haemulon flavolineatum*	Puerto Rico	200	FL	137	296	-3.8605	2.6509	0.76
French grunt	St. Thomas/St. John	12	FL	170	210	-3.4610	2.4850	0.72
	St. Croix	232	FL	170	280	-3.5676	2.5255	0.54
13 *Haemulon plumieri*	Puerto Rico	1071	FL	135	444	-4.2654	2.8186	0.89
White grunt	St. Thomas/St. John	39	FL	190	700	-4.7822	3.0336	0.97
	St. Croix	1588	FL	50	325	-2.2775	1.9849	0.57
14 *Haemulon sciurus*	St. Thomas/St. John	23	FL	205	310	-4.6001	2.9630	0.91
Bluestriped grunt	St. Croix	138	FL	193	285	-3.9303	2.6930	0.68
15 *Holocentrus ascensionis*	St. Thomas/St. John	98	FL	180	270	-3.3204	2.4280	0.66
Squirrelfish	St. Croix	187	FL	160	250	-2.6159	2.1061	0.38
16 *Lachnolaimus maximus*	Puerto Rico	53	FL	230	595	-3.9814	2.7055	0.81
Hogfish	St. Thomas/St. John	27	FL	245	704	-4.3997	2.8828	0.99
	St. Croix	3	FL	308	363	-5.3159	3.2641	1.00
17 *Lactophrys polygonia*	Puerto Rico	203	FL	132	417	-3.9652	2.6794	0.91
Honeycomb cowfish	St. Croix	199	FL	135	385	-3.4940	2.4922	0.86
	Puerto Rico	219	FL	120	360	-2.9762	2.2372	0.81
18 *Lactophrys quadricornis*	St. Croix	9	FL	244	330	-5.8621	3.4177	0.91
Scrawled cowfish								

Table 2. (continued) - Summary of Caribbean (Puerto Rico, St. Thomas/St. John, and St.Croix) reef fish weight-length regressions for 24,383 fish. Regression formula: log W(gms) = log a + b log L(mm).

SPECIES Common Name	AREA	NO.	TYPE	SIZE (mm) MIN.	MAX.	log a	b	R^2
19 Lutjanus analis	Puerto Rico	53	FL	214	771	-4.6555	2.9502	0.94
Mutton snapper	St. Thomas/St. John	27	FL	230	610	-5.2541	3.1747	0.99
	St. Croix	17	FL	260	630	-4.8341	3.0345	0.96
20 Lutjanus apodus	Puerto Rico	72	FL	185	464	-5.1010	3.1541	0.98
Schoolmaster	St. Thomas/St. John	39	FL	255	450	-4.7653	3.0096	0.94
	St. Croix	101	FL	188	470	-4.2103	2.7965	0.81
21 Lutjanus buccanella	Puerto Rico	20	FL	173	360	-4.4161	2.8593	0.98
Blackfin snapper	St. Thomas/St. John	180	FL	190	450	-4.1265	2.7346	0.91
	St. Croix	65	FL	212	440	-4.6475	2.9636	0.95
22 Lutjanus synagris	Puerto Rico	396	FL	156	414	-4.4119	2.8437	0.85
Lane snapper	St. Thomas/St. John	99	FL	175	400	-4.7458	2.9809	0.94
	St. Croix	4	FL	185	238	-2.3588	1.9954	0.67
23 Lutjanus vivanus	Puerto Rico	181	FL	149	403	-5.3646	3.2368	0.93
Silk snapper	St. Thomas/St. John	36	FL	195	635	-4.6001	2.9132	0.97
	St. Croix	165	FL	222	650	-4.2096	2.7812	0.93
24 Mulloidichthys martinicus	Puerto Rico	90	FL	164	290	-4.9593	3.0918	0.93
Yellow goatfish	St. Thomas/St. John	22	FL	225	325	-2.6201	2.1091	0.64
	St. Croix	547	FL	125	270	-3.2528	2.3772	0.55
25 Mycteroperca venenosa	Puerto Rico	19	FL	225	550	-4.7033	2.9764	0.93
Yellowfin grouper	St. Thomas/St. John	103	FL	285	900	-5.1611	3.1402	0.96
	St. Croix	11	FL	254	645	-3.2945	2.3892	0.75
26 Ocyurus chrysurus	Puerto Rico	992	FL	29	562	-3.1552	2.3311	0.76
Yellowtail snapper	St. Thomas/St. John	456	FL	215	560	-4.1770	2.7588	0.92
	St. Croix	610	FL	194	562	-4.3379	2.8110	0.96
27 Pomacanthus arcuatus	St. Thomas/St. John	82	FL	25	490	0.8074	0.8716	0.26
Gray angelfish								
28 Pseudupeneus maculatus	Puerto Rico	1160	FL	127	297	-4.6397	2.9581	0.85
Spotted goatfish	St. Thomas/St. John	3	FL	195	270	-6.7109	3.8059	1.00
	St. Croix	125	FL	180	262	-3.7431	2.5866	0.74
29 Rhomboplites aurorubens	Puerto Rico	162	FL	152	303	-4.6686	2.9512	0.87
Vermilion snapper	St. Thomas/St. John	6	FL	150	245	-5.0857	3.1214	0.91
	St. Croix	14	FL	310	405	-3.5651	2.5201	0.95
30 Scarus taeniopterus	St. Thomas/St. John	29	FL	215	300	-3.2257	2.3852	0.87
Princess parrotfish	St. Croix	334	FL	200	350	-2.0098	1.8751	0.43
31 Sparisoma aurofrenatum	St. Thomas/St. John	25	FL	180	330	-3.1111	2.3363	0.84
Redband parrotfish	St. Croix	434	FL	190	280	-4.0781	2.7438	0.43
32 Sparisoma chrysopterum	St. Thomas/St. John	93	FL	220	425	-3.3969	2.4533	0.66
Redtail parrotfish	St. Croix	1970	FL	150	383	-3.0509	2.3192	0.58
32 Sparisoma viride	St. Thomas/St. John	53	FL	218	460	-5.0057	3.1207	0.93
Stoplight parrotfish	St. Croix	1693	FL	190	425	-4.4317	2.9051	0.84

Table 3. - List of species observed in visual censusing by Reef Team and for which length-weight data is needed (fewer than 30 measured individuals available).

SPECIES	COMMON NAME
Acanthemblemaria aspera	Roughhead blenny
Acanthemblemaria chaplini	Papillose blenny
Acanthurus bahianus	Ocean surgeon
Adioryx vexillarius	Dusky squirrelfish
Aetobatus narinari	Spotted eagle ray
Alectis crinitus	African pompano
Amblycirrhitus pinos	Redspotted hawkfish
Anchoa lyolepis	Dusky anchovy
Anisotremus surinamensis	Black margate
Apogon binotatus	Barred cardinalfish
Apogon maculatus	Flamefish
Apogon quadrisquamatus	Sawcheek cardinalfish
Archosargus probatocephalus	Sheepshead
Archosargus rhomboidalis	Sea bream
Astrapogon stellatus	Conchfish
Atherinomorus stipes	Hardhead silverside
Aulostomus maculatus	Trumpetfish
Blennius cristata	Molly miller
Bodianus puchellus	Spotfin hogfish
Bodianus rufus	Spanish hogfish
Bothus lunatus	Peacock flounder
Callionymus bairdi	Lancer dragonet
Cantherhines macrocerus	Whitespotted filefish
Cantherhines pullus	Orangespotted filefish
Canthigaster rostrata	Sharpnose puffer
Caranx hippos	Crevalle jack
Caranx latus	Horse-eye jack
Centropomus undecimalis	Snook
Centropristis ocyurus	Bank sea bass
Centropristis striata	Black sea bass
Chaetodon capistratus	Foureye butterflyfish
Chaetodon striatus	Banded butterflyfish
Chilomycterus schoepfi	Stripped burrfish
Chromis cyaneus	Blue chromis
Chromis insolatus	Sunshinefish
Chromis multilineatus	Brown chromis
Chromis scotti	Purple reeffish
Clepticus parrai	Creole wrasse
Coryphopterus dicrus	Colon goby
Coryphopterus glaucofraenum	Bridled goby
Coryphopterus personatus	Masked goby
Cryptotomus roseus	Bluelip parrotfish
Dactylopterus volitans	Flying gurnard
Dasyatis americana	Southern stingray
Decapterus macarellus	Mackerel scad
Decapterus punctatus	Round scad
Echeneis naucrates	Sharksucker

Table 3. (continued) - List of species observed in visual censusing by Reef Team and for which length-weight data is needed (fewer than 30 measured individuals available).

SPECIES	COMMON NAME
Elops saurus	Ladyfish
Emblemaria pandionis	Sailfin blenny
Enchelycore nigrans	Viper moray
Enneanectes boehlkei	Roughhead triplefin
Enneanectes pectoralis	Redeye triplefin
Epinephelus adscensionis	Rock hind
Epinephelus cruentatus	Graysby
Epinephelus itajara	Jewfish
Epinephelus niveatus	Snowy grouper
Epinephelus striatus	Nassau grouper
Equetus acuminatus	High-hat
Equetus lanceolatus	Jacknife-fish
Equetus punctatus	Spotted drum
Eucinostomus argenteus	Spotfin mojarra
Eucinostomus havana	Bigeye mojarra
Gerres cinereus	Yellowfin mojarra
Ginglymostoma cirratum	Nurse shark
Gnatholepis thompsoni	Goldspot goby
Gobiesox strumosus	Skilletfish
Gobiosoma evelynae	Sharpnose goby
Gobiosoma macrodon	Tiger goby
Gobiosoma oceanops	Neon goby
Gramma loreto	Fairy basslet
Gymnothorax funebris	Green moray
Gymnothorax moringa	Spotted moray
Gymnothorax nigromarginatus	Blackedge moray
Gymnothorax saxicola	Ocellated moray
Gymnothorax vicinus	Purplemouth moray
Haemulon album	Margate
Haemulon carbonarium	Caesar grunt
Haemulon chrysargyreum	Smallmouth grunt
Haemulon macrostomum	Spanish grunt
Haemulon striatum	Striped grunt
Halichoeres bivittatus	Slippery dick
Halichoeres garnoti	Yellowhead wrasse
Halichoeres maculipinna	Clown wrasse
Halichoeres pictus	Rainbow wrasse
Halichoeres poeyi	Blackear wrasse
Halichoeres radiatus	Puddingwife
Hemiemblemaria simulus	Wrasse blenny
Hemiramphus brasiliensis	Ballyhoo
Holacanthus tricolor	Rock beauty
Holocentrus coruscus	Reef squirrelfish

Table 3. (continued) - List of species observed in visual censusing by Reef Team and for which length-weight data is needed (fewer than 30 measured individuals available).

SPECIES	COMMON NAME
Holocentrus marianus	Longjaw squirrelfish
Holocentrus rufus	Longspine squirrelfish
Holocentrus vexillarius	Dusky squirrelfish
Hypleurochilus bermudensis	Barred blenny
Hypoplectrus unicolor	Butter hamlet
Inermia vittata	Boga
Ioglossus calliurus	Blue goby
Jenkinsia lamprotaenia	Dwarf herring
Kyphosus sectatrix	Bermuda chub
Lactophrys trigonius	Trunkfish
Lagodon rhomboides	Pinfish
Liopropoma rubre	Peppermint bass
Lutjanus cyanopterus	Cubera snapper
Lutjanus jocu	Dog snapper
Lutjanus mahogoni	Mahogonay snapper
Lythrypnus spilus	Bluegold goby
Malacanthus plumieri	Sand tilefish
Malacoctenus aurolineatus	Goldline blenny
Malacoctenus gilli	Dusky blenny
Malacoctenus macrops	Rosy blenny
Malacoctenus sp.	Unidentified blenny
Malacoctenus triangulatus	Saddled blenny
Malacoctenus versicolor	Barfin blenny
Manta birostris	Atlantic manta
Megalops atlanticus	Tarpon
Melichthys niger	Black durgon
Microgobius carri	Seminole goby
Microgobius microlepis	Banner goby
Microspathodon chrysurus	Yellowtail damselfish
Monacanthus ciliatus	Fringed filefish
Monacanthus tuckeri	Slender filefish
Mulloidichthys martinicus	Yellow goatfish
Muraena miliaris	Goldentail moray
Muraena retifera	Reticulate moray
Mycteroperca bonaci	Black grouper
Mycteroperca phenax	Scamp
Mycteroperca tigris	Tiger grouper
Mycteroperca venenosa	Yellowfin grouper
Myripristis jacobus	Blackbar soldierfish
Odontoscion dentex	Reef crocker
Ogcocephalus radiatus	Polka-dot batfish

Table 3. (continued) - List of species observed in visual censusing by Reef Team and for which length-weight data is needed (fewer than 30 measured individuals available).

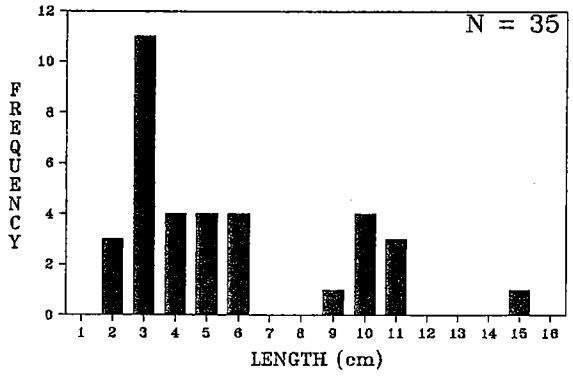
SPECIES	COMMON NAME
Ophioblennius atlanticus	Redlip blenny
Opistognathus aurifrons	Yellowhead jawfish
Opistognathus maxillosus	Mottled jawfish
Opistognathus whitehursti	Dusky jawfish
Paranthias furcifer	Creole-fish
Pempheris schomburgki	Glassy sweeper
Phaeoptyx pigmentaria	Dusky cardinalfish
Pomacentrus diencaeus	Longfin damselfish
Pomacentrus fuscus	Dusky damselfish
Pomacentrus leucostictus	Beaugregory
Pomacentrus planifrons	Three spot damselfish
Pomacentrus variabilis	Cocoa damselfish
Priacanthus cruentatus	Glasseye snapper
Prionotus roseus	Bluespotted searobin
Quisquilius hipoliti	Rusty goby
Rachycentron canadum	Cobia
Rypticus saponaceus	Greater soapfish
Scarus coelestinus	Midnight parrotfish
Scarus coeruleus	Blue parrotfish
Scarus croicensis	Striped parrotfish
Scarus guacamaia	Rainbow parrotfish
Scarus taeniopterus	Princess parrotfish
Scarus vetula	Queen parrotfish
Scomberomorus cavalla	King mackerel
Scomberomorus maculatus	Spanish mackerel
Scomberomorus regalis	Cero mackerel
Seriola rivoliana	Almaco jack
Serranus baldwini	Lanternfish
Serranus tabacarius	Tobaccofish
Serranus tigrinus	Harlequin bass
Serranus tortugarum	Chalk bass
Sparisoma atomarium	Greenblotch parrotfish
Sparisoma radians	Bucktooth parrotfish
Sparisoma rubripinne	Yellowtail parrotfish
Sphoeroides nephelus	Southern puffer
Sphoeroides testudineus	Checkered puffer
Sphyraena barracuda	Barracuda
Sphyraena picudilla	Southern sennet
Sphyrna mokarran	Great hammerhead
Starksia ocellata	Checkered blenny
Strongylura notata	Redfin needlefish
Strongylura timucu	Timucu
Synodus foetens	Inshore lizardfish
Synodus intermedius	Sand diver
Trachinotus falcatus	Permit

Table 3. (continued) - List of species observed in visual censusing by Reef Team and for which length-weight data is needed (fewer than 30 measured individuals available).

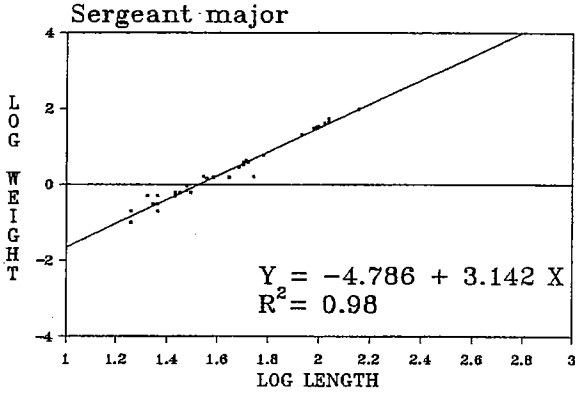
SPECIES	COMMON NAME
Tylosurus crocodilus	Houndfish
Umbrina coroides	Sand drum
Urolophus jamaicensis	Yellow stingray
Vomer setapinnis	Atlantic moonfish
Xyrichthys martinicensis	Rosy razorfish
Xyrichthys novacula	Pearly razorfish
Xyrichthys splendens	Green razorfish

Appendix A.- Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

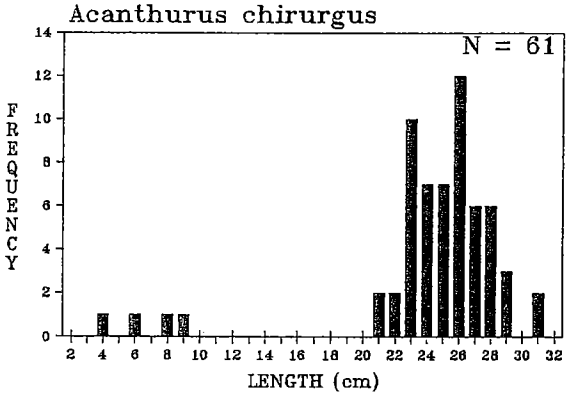
Abudefduf saxatilis



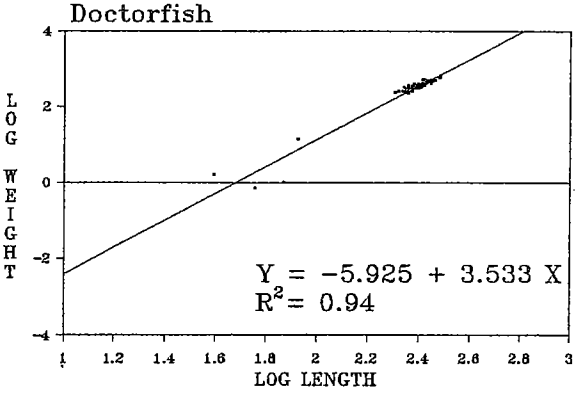
Sergeant major



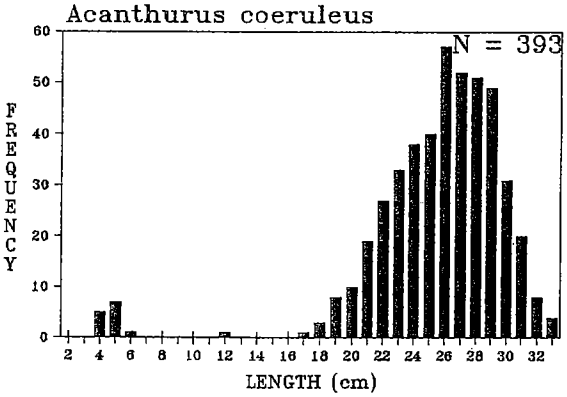
Acanthurus chirurgus



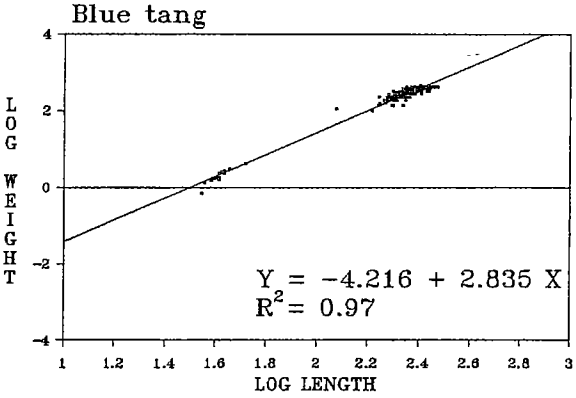
Doctorfish



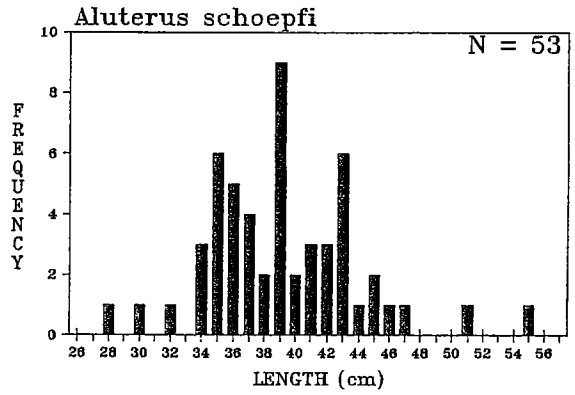
Acanthurus coeruleus

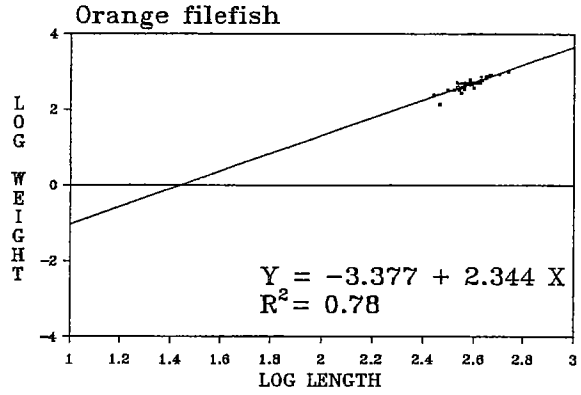


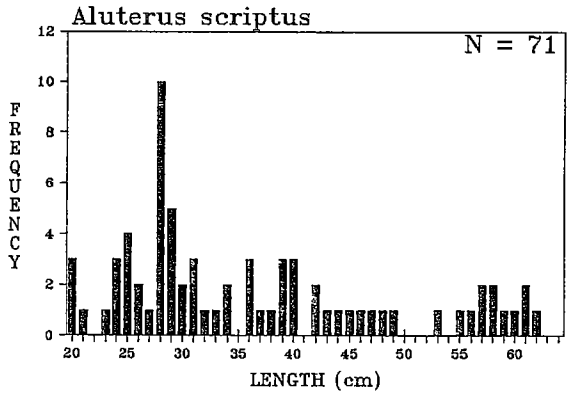
Blue tang

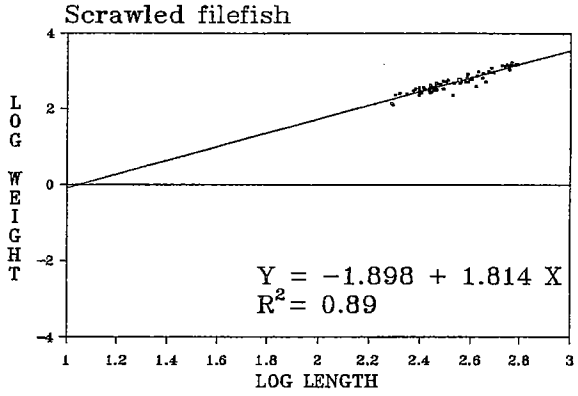


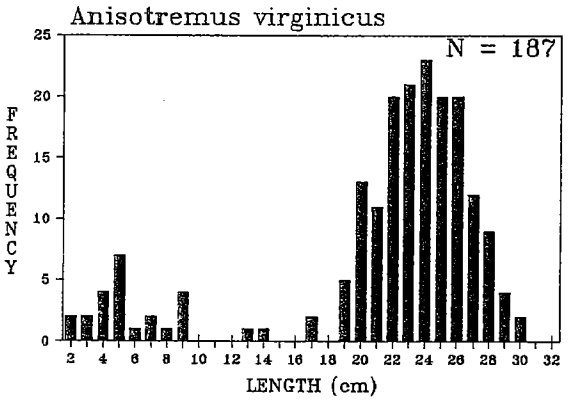
Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

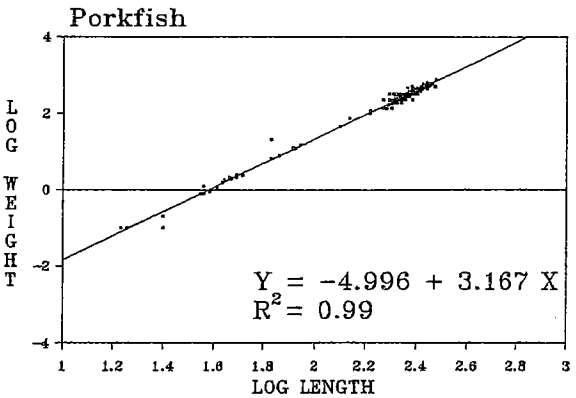






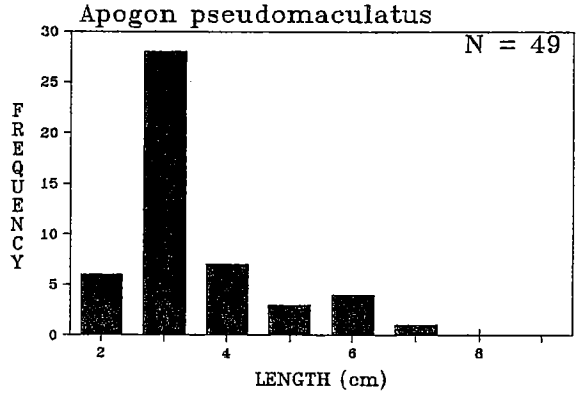




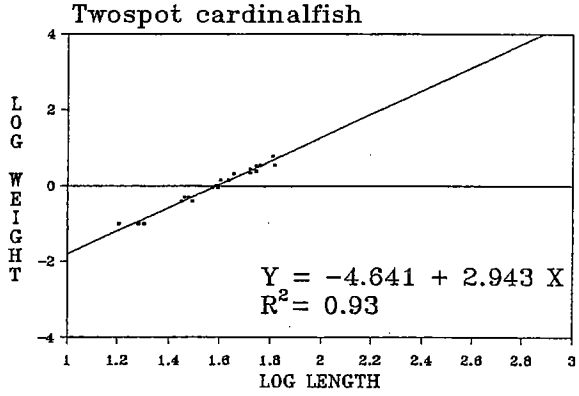


Appendix A.- (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

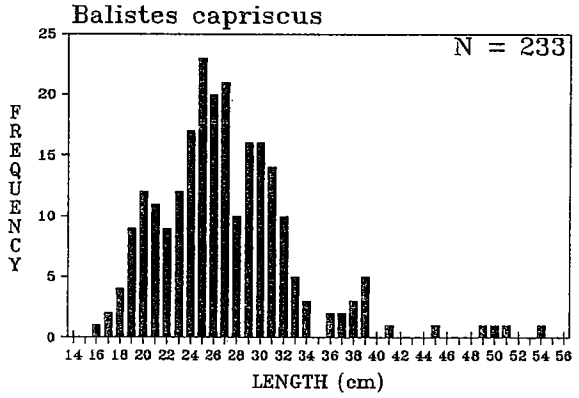
Apogon pseudomaculatus



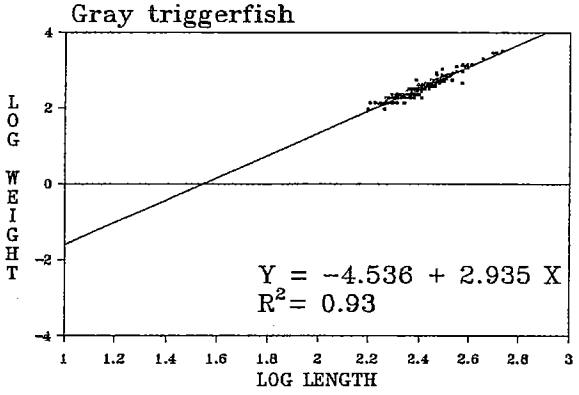
Twospot cardinalfish



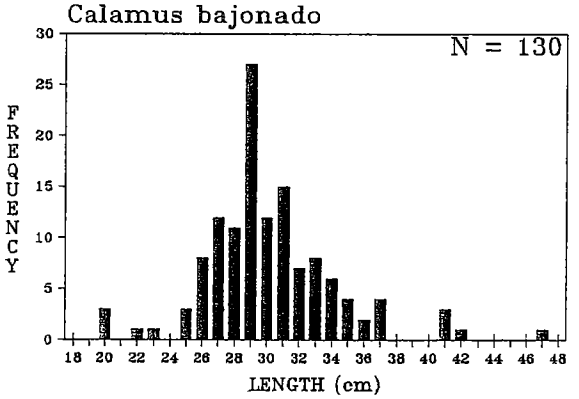
Balistes capriscus



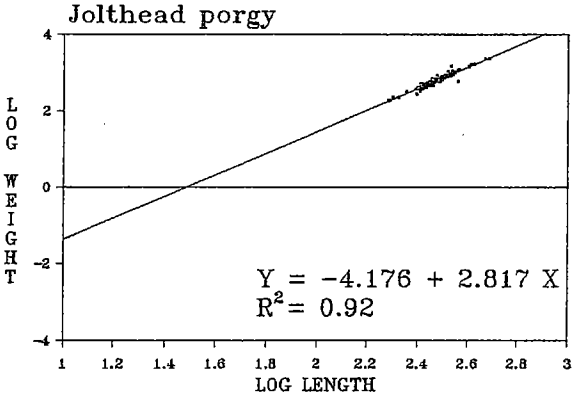
Gray triggerfish



Calamus bajonado

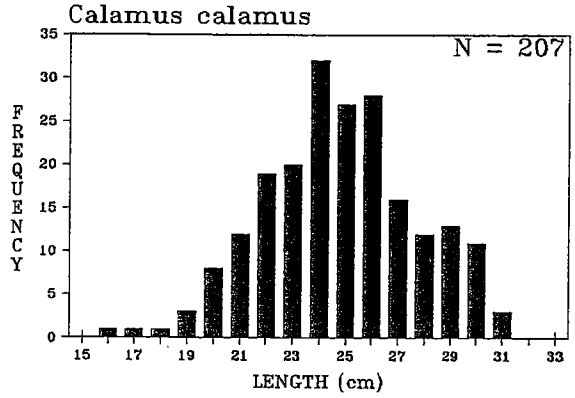


Jolthead porgy

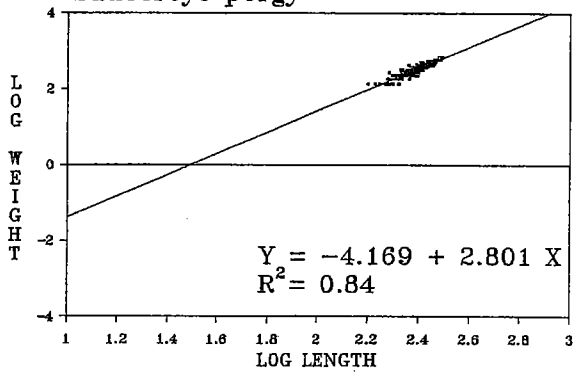


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

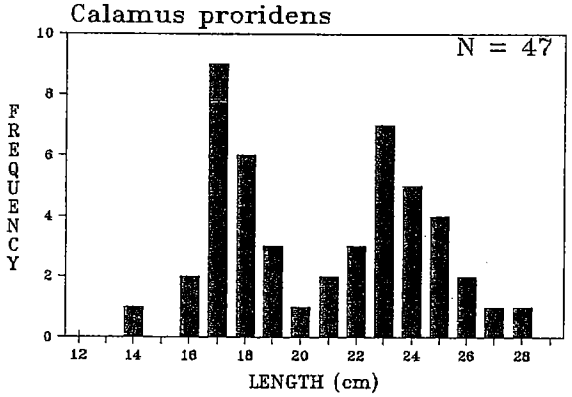
Calamus calamus



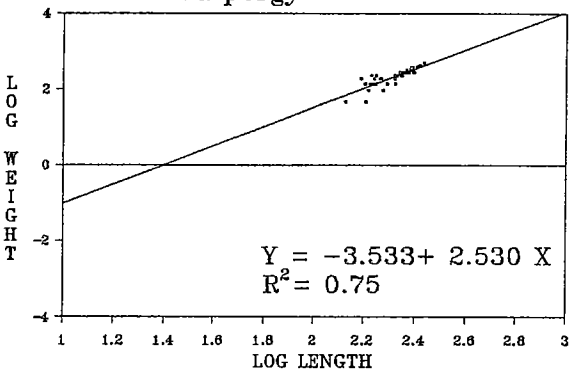
Saucereye porgy



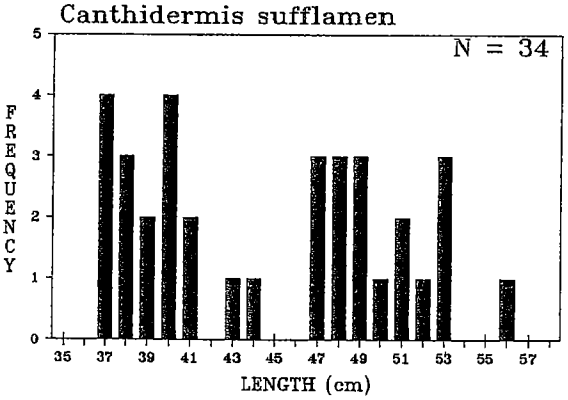
Calamus proridens



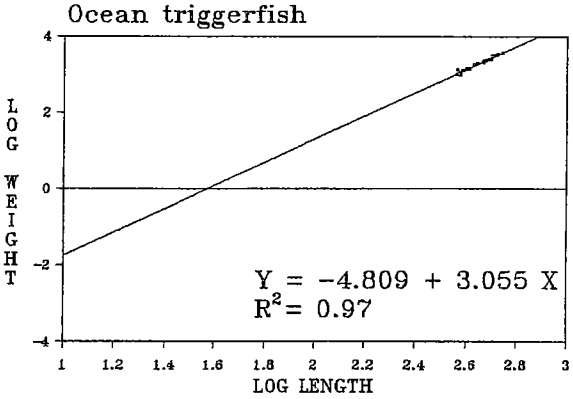
Littlehead porgy



Canthidermis sufflamen

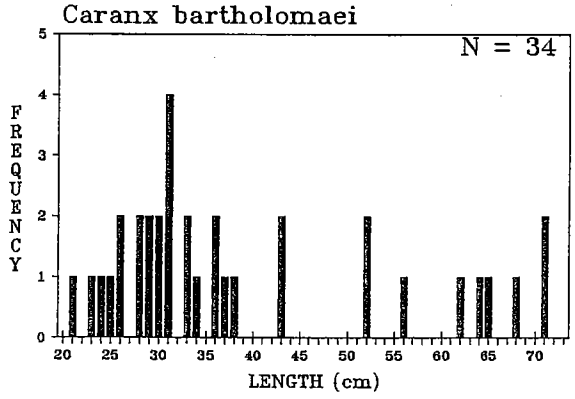


Ocean triggerfish

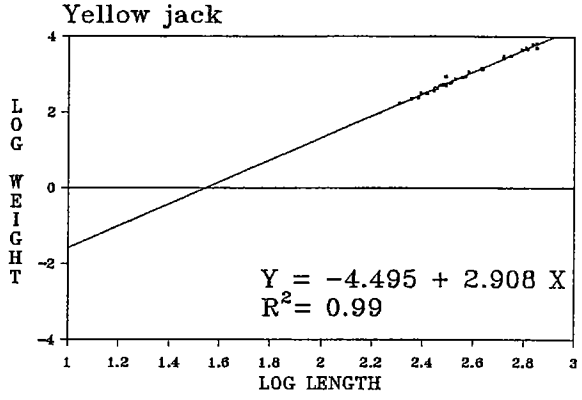


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

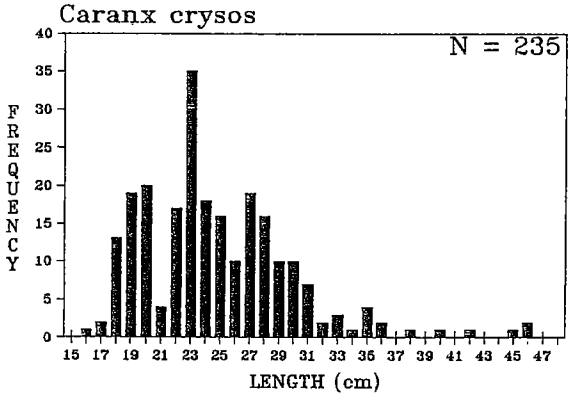
Caranx bartholomaei



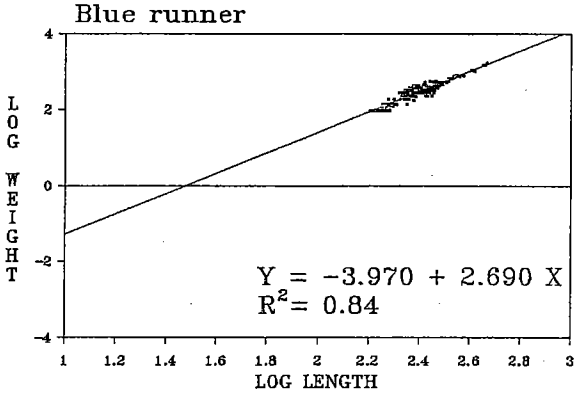
Yellow jack



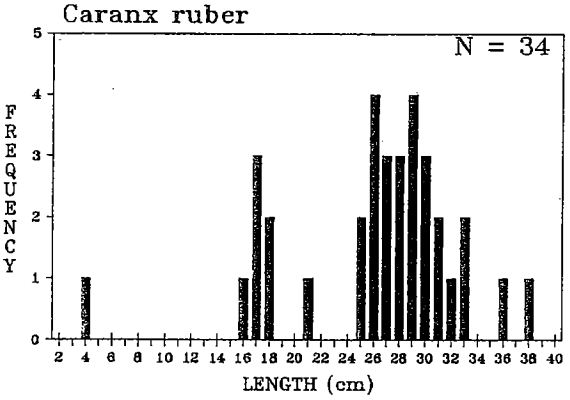
Caranx crysos



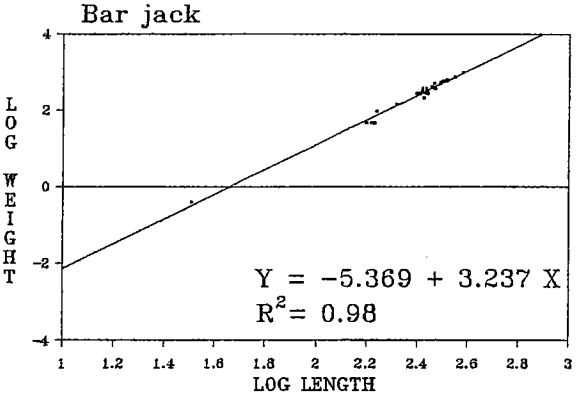
Blue runner



Caranx ruber

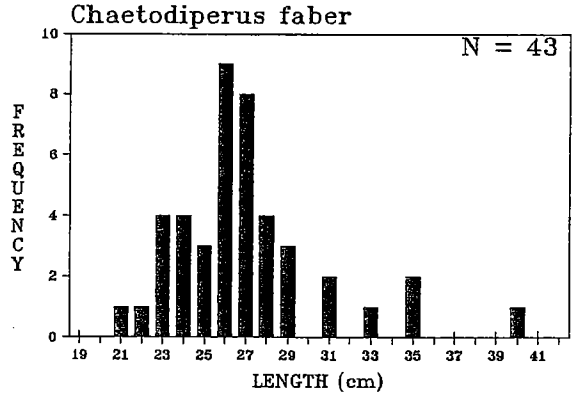


Bar jack

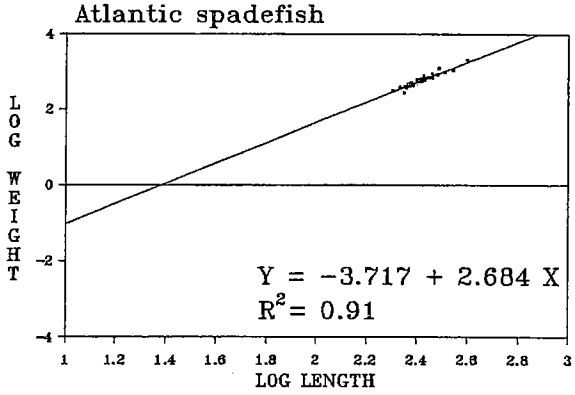


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

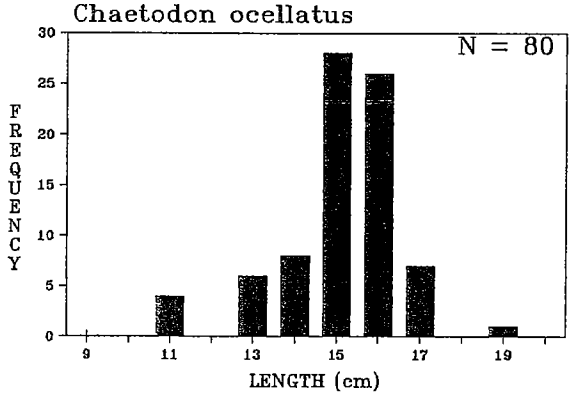
Chaetodiperus faber



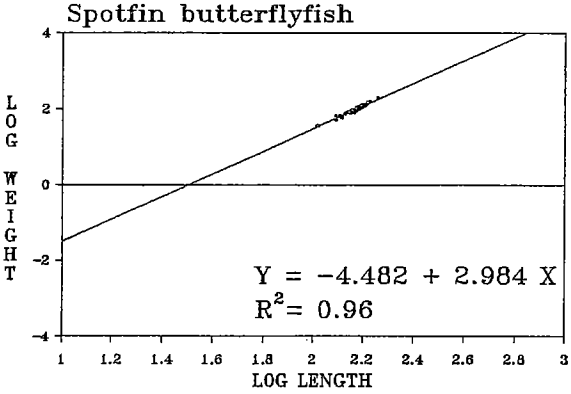
Atlantic spadefish



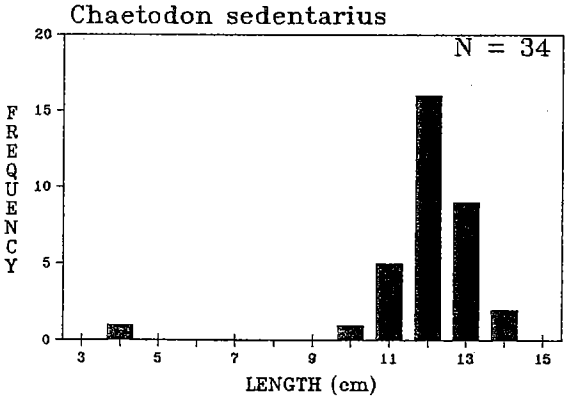
Chaetodon ocellatus



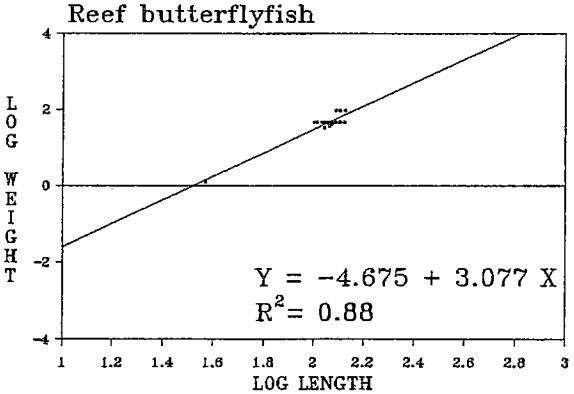
Spotfin butterflyfish



Chaetodon sedentarius

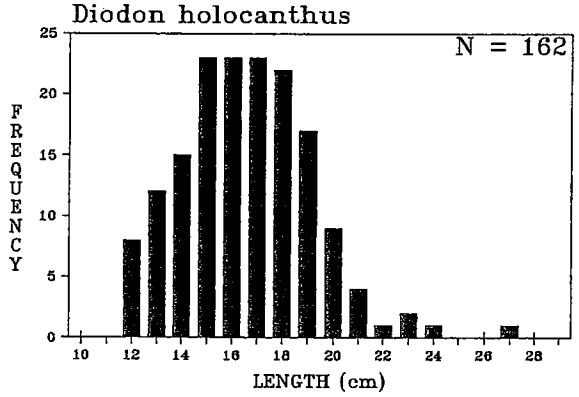


Reef butterflyfish

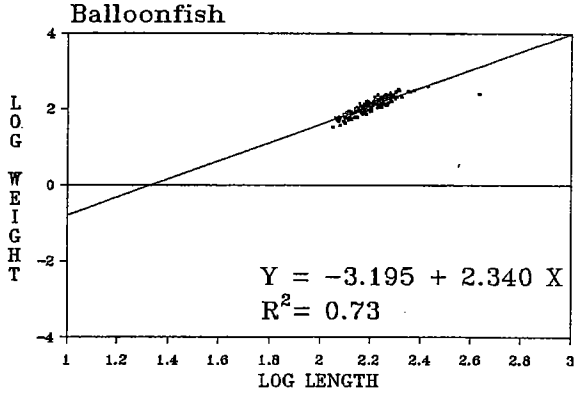


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

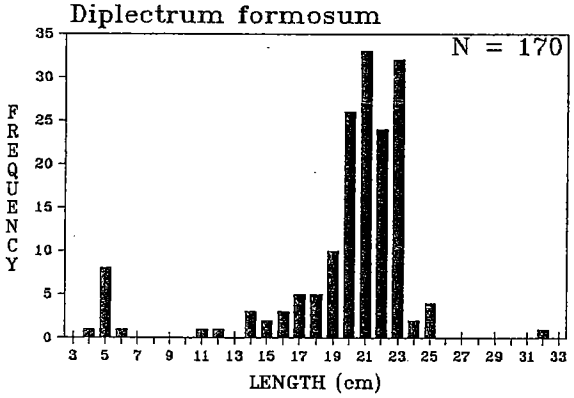
Diodon holocanthus



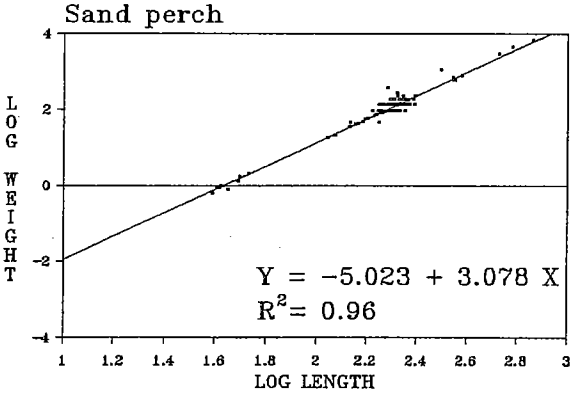
Balloonfish



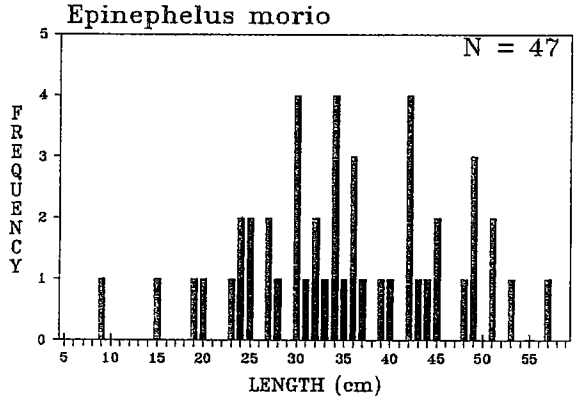
Diplectrum formosum



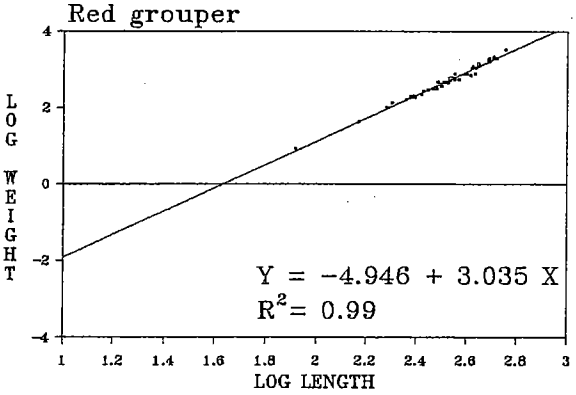
Sand perch



Epinephelus morio

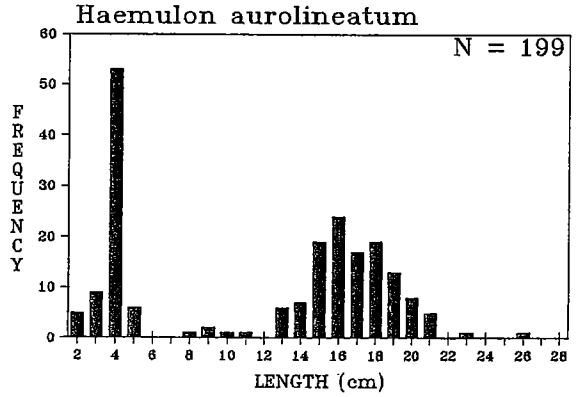


Red grouper



Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

Haemulon aurolineatum



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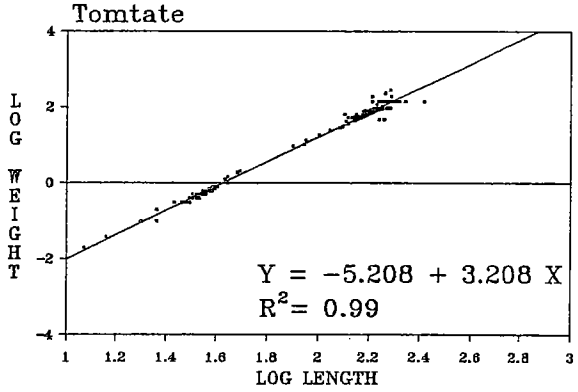
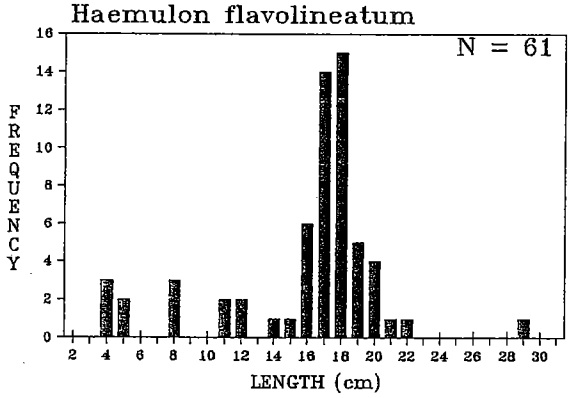
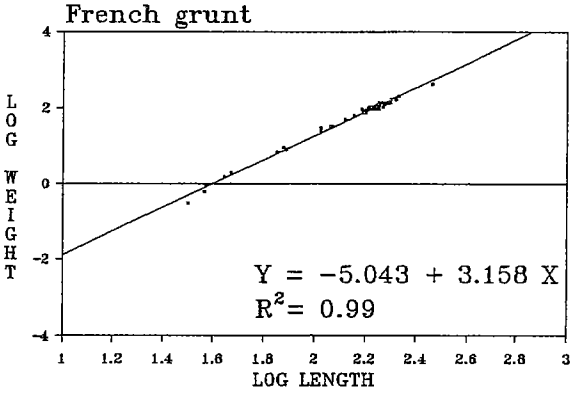


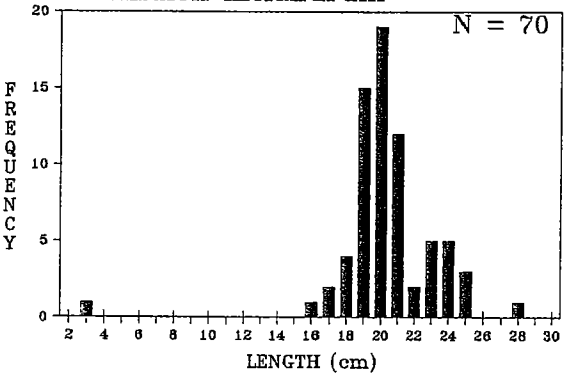
Haemulon flavolineatum



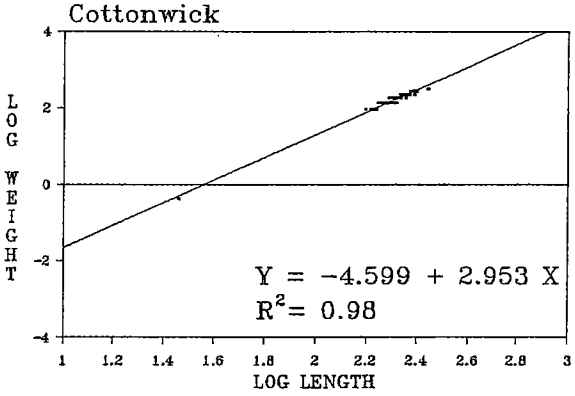
French grunt



Haemulon melanurum

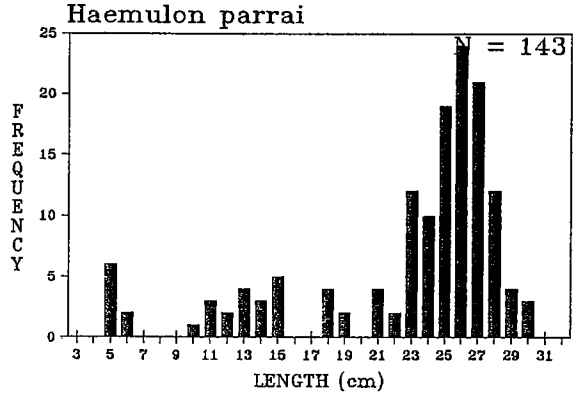


Cottonwick

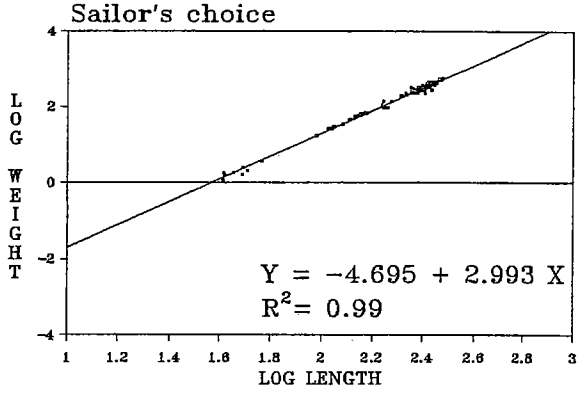


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

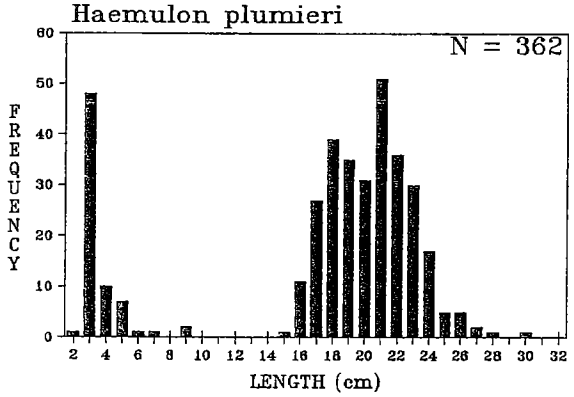
Haemulon parrai



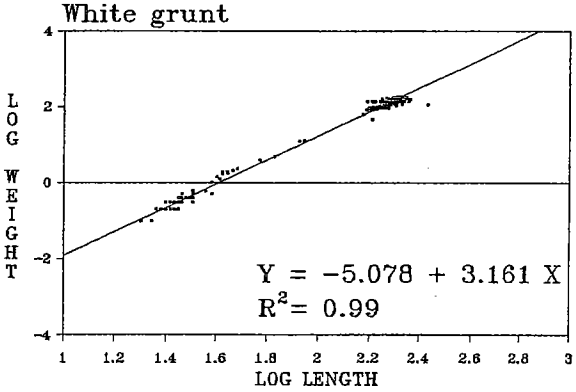
Sailor's choice



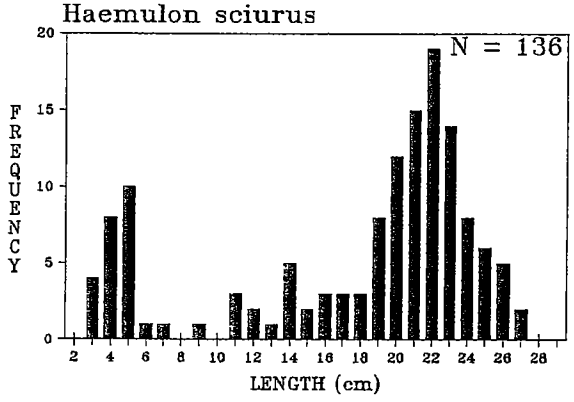
Haemulon plumieri



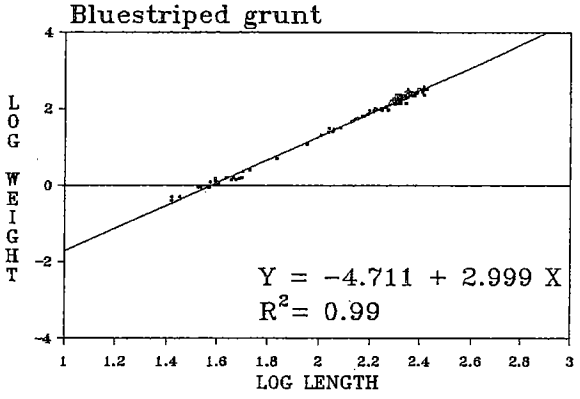
White grunt



Haemulon sciurus

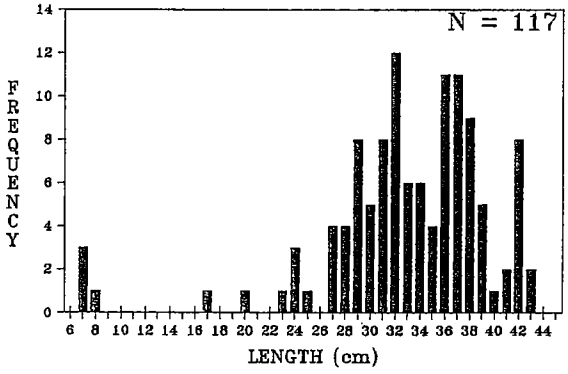


Bluestriped grunt

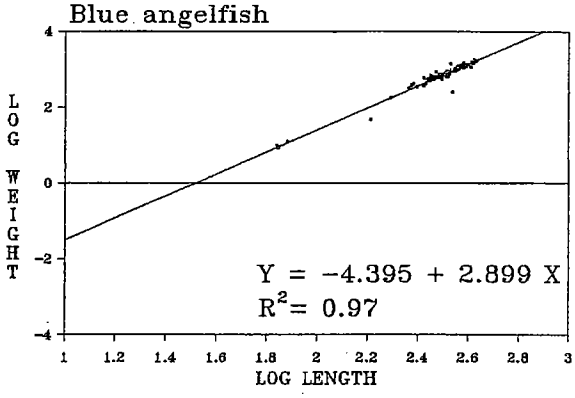


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

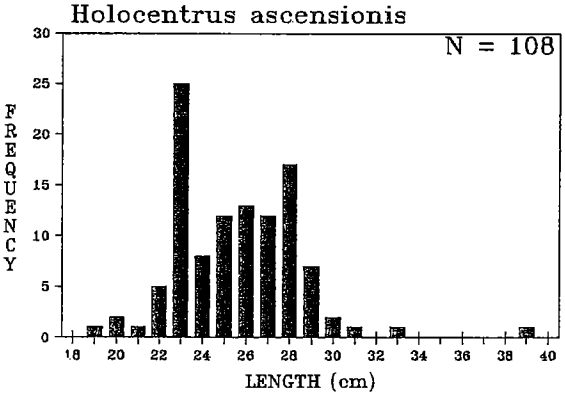
Holacanthus bermudensis



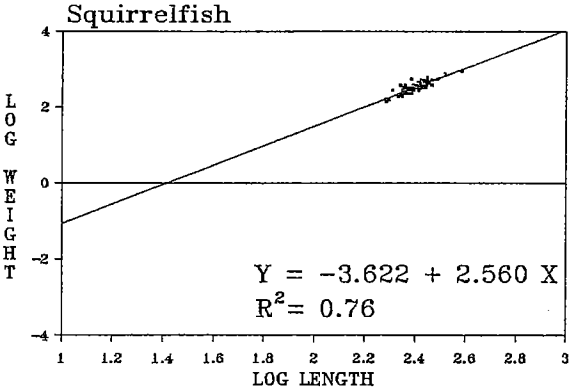
Blue angelfish



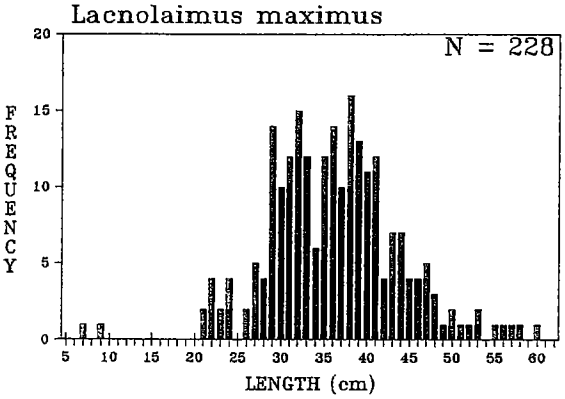
Holocentrus ascensionis



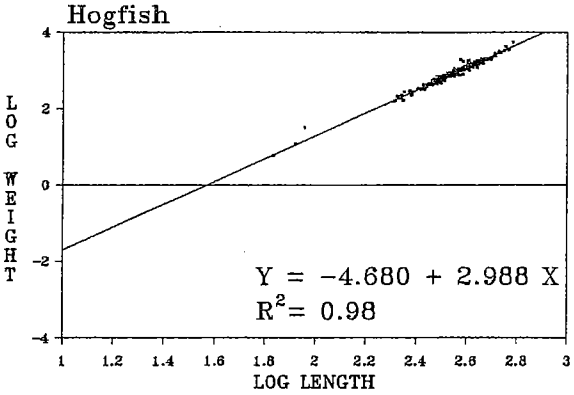
Squirrelfish



Lacnolaimus maximus

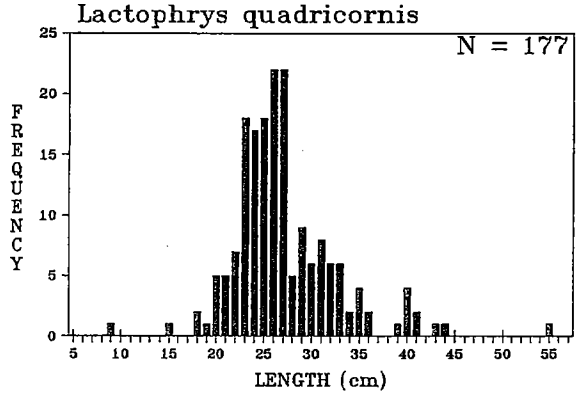


Hogfish

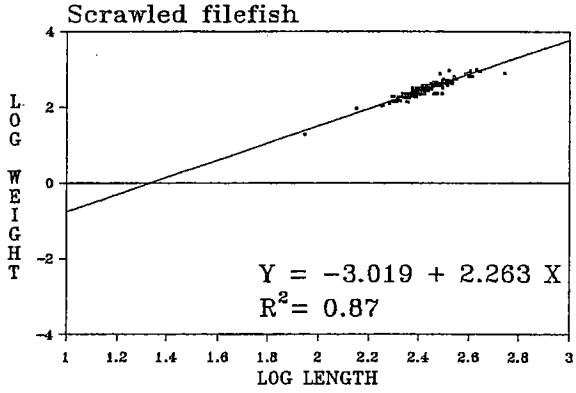


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

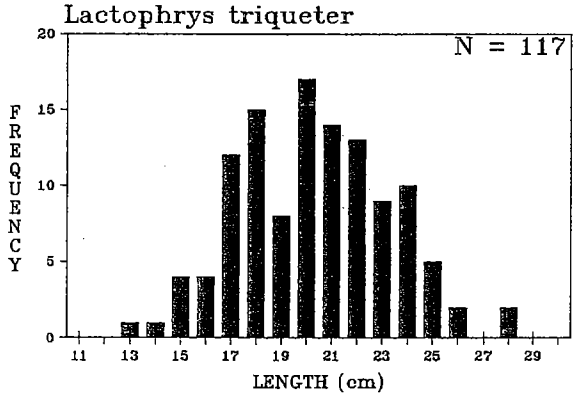
Lactophrys quadricornis



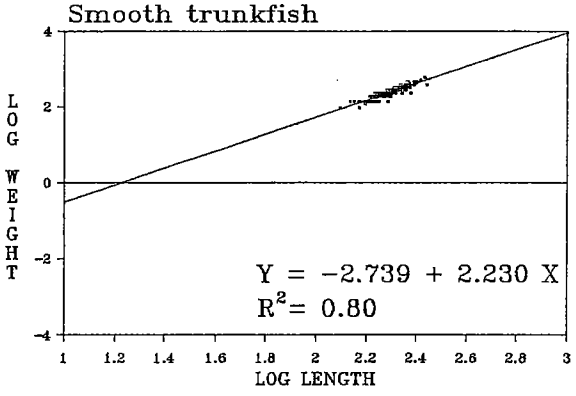
Scrawled filefish



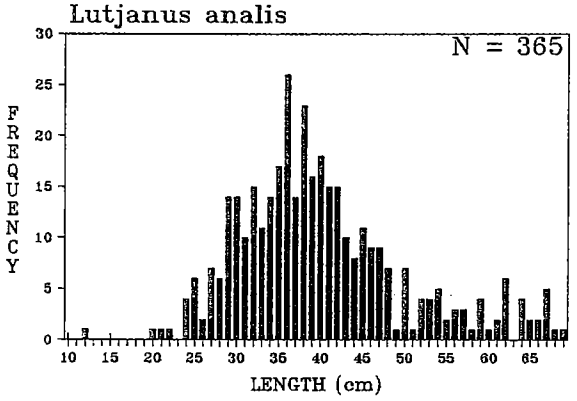
Lactophrys triqueter



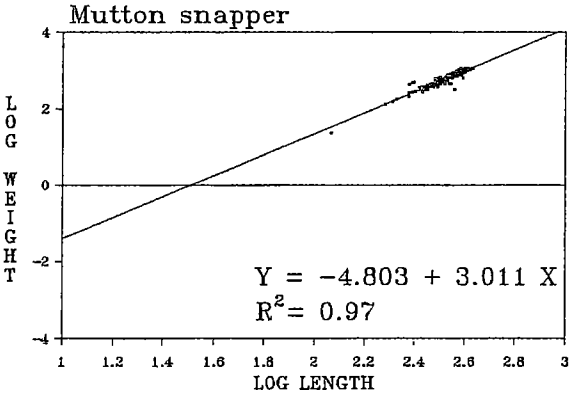
Smooth trunkfish



Lutjanus analis

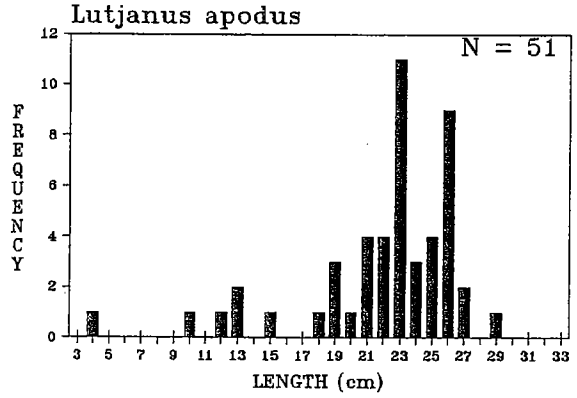


Mutton snapper

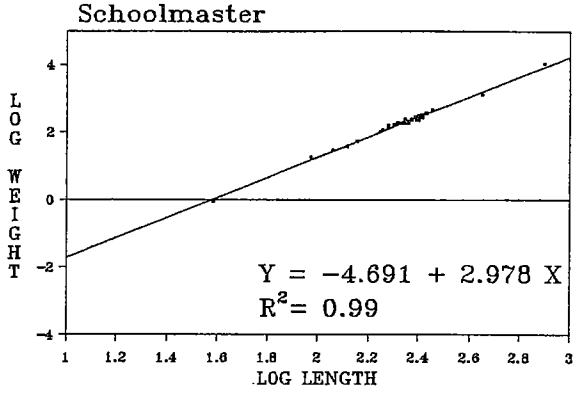


Appendix A.- (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

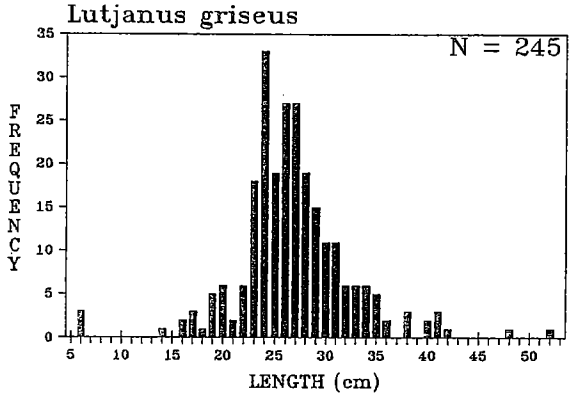
Lutjanus apodus



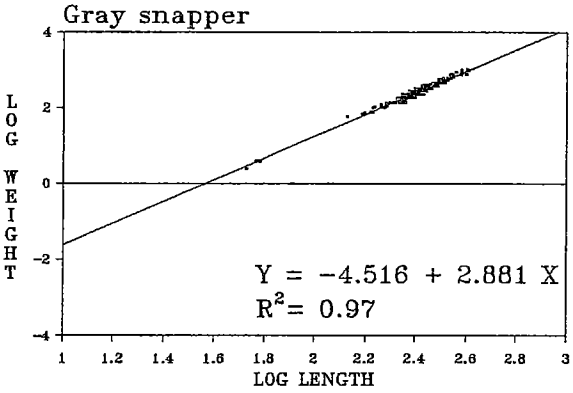
Schoolmaster



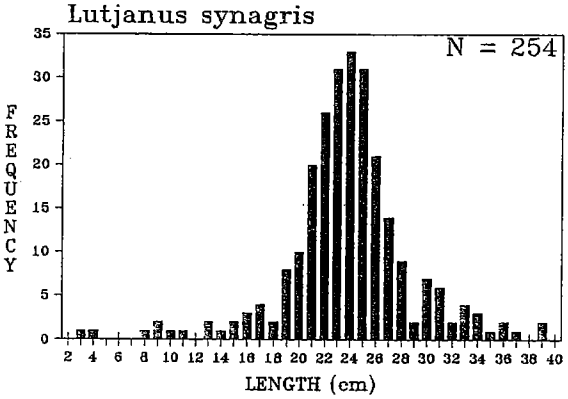
Lutjanus griseus



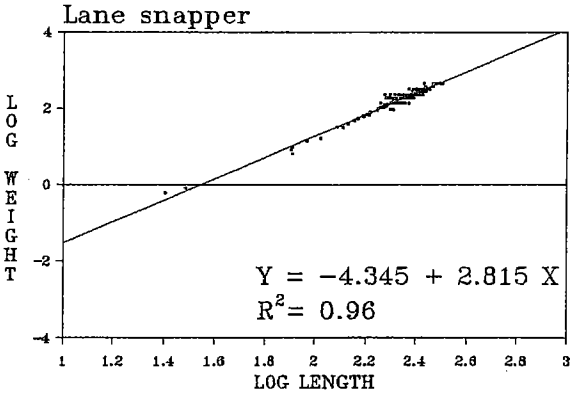
Gray snapper



Lutjanus synagris

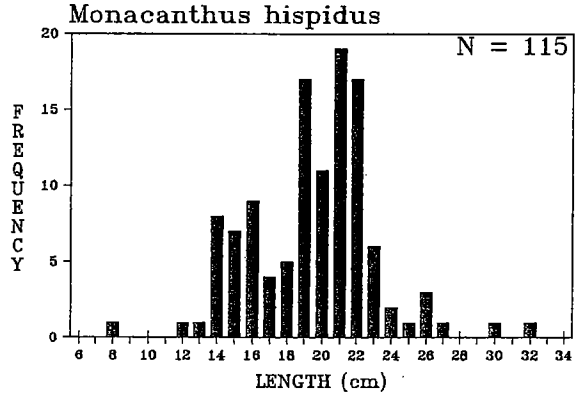


Lane snapper

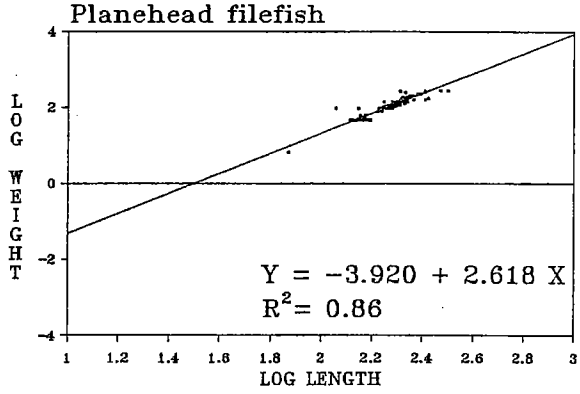


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

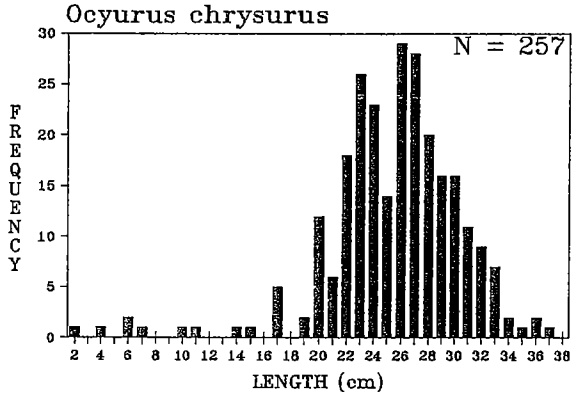
Monacanthus hispidus



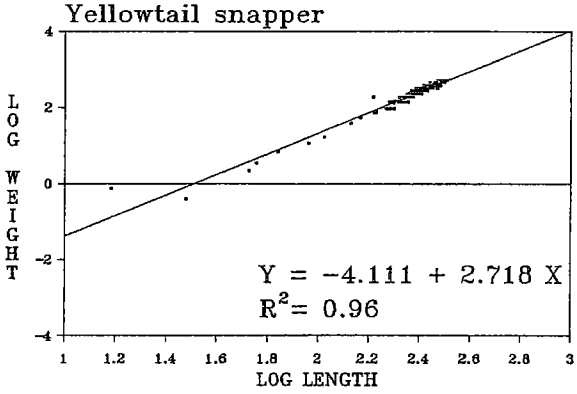
Planehead filefish



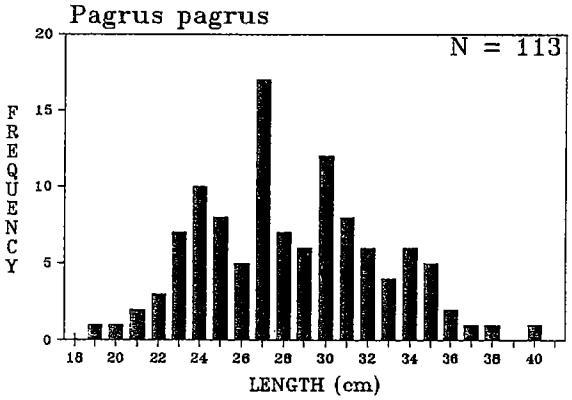
Ocyurus chrysurus



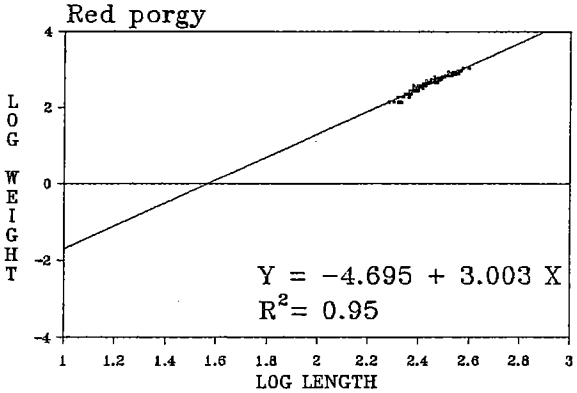
Yellowtail snapper



Pagrus pagrus

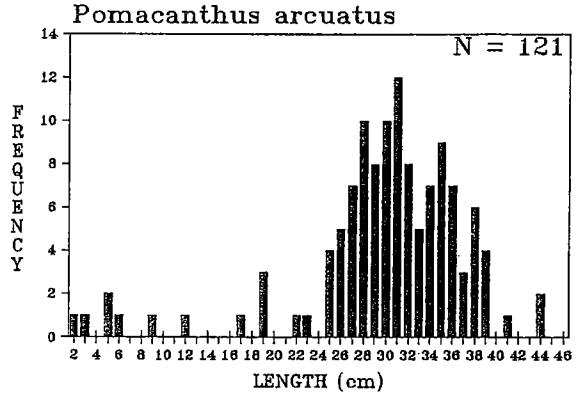


Red porgy

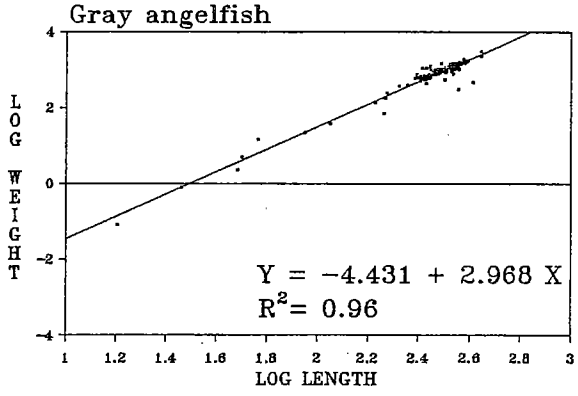


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

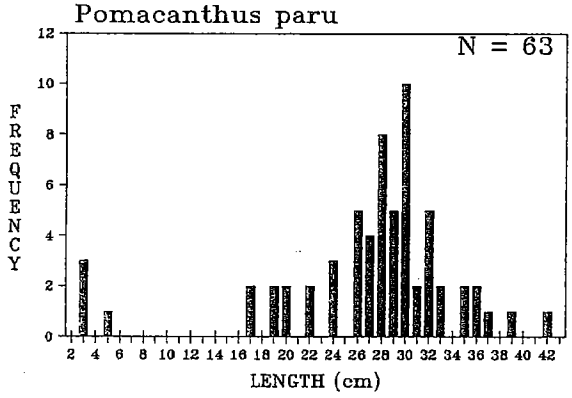
Pomacanthus arcuatus



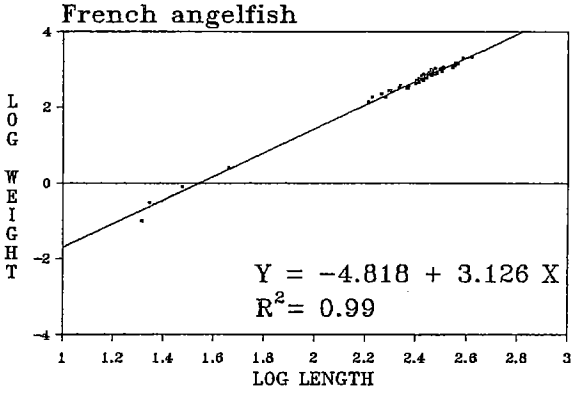
Gray angelfish



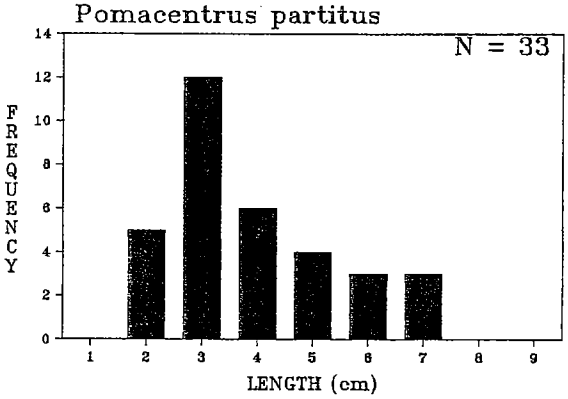
Pomacanthus paru



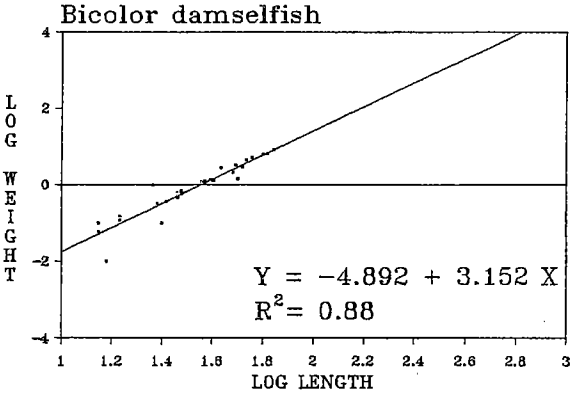
French angelfish



Pomacentrus partitus

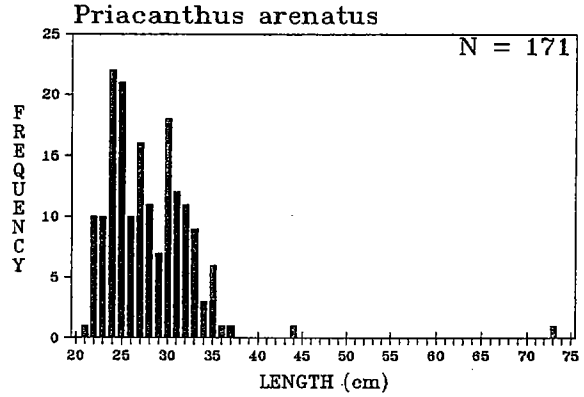


Bicolor damselfish

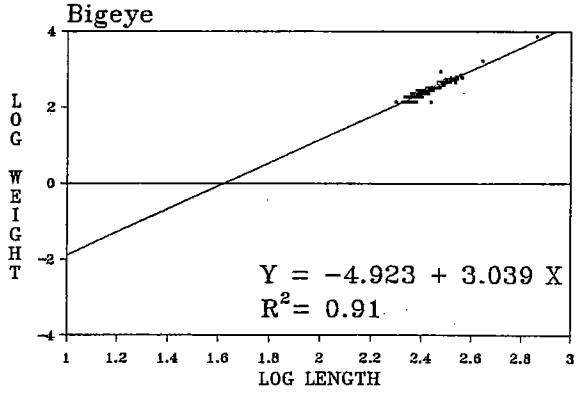


Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

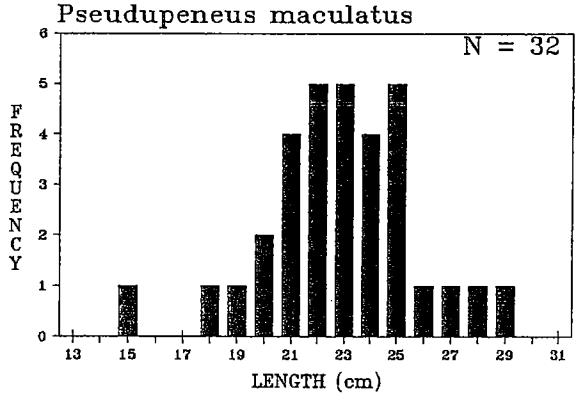
Priacanthus arenatus



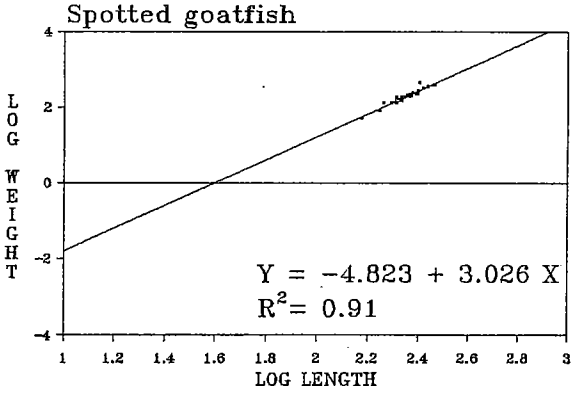
Bigeye



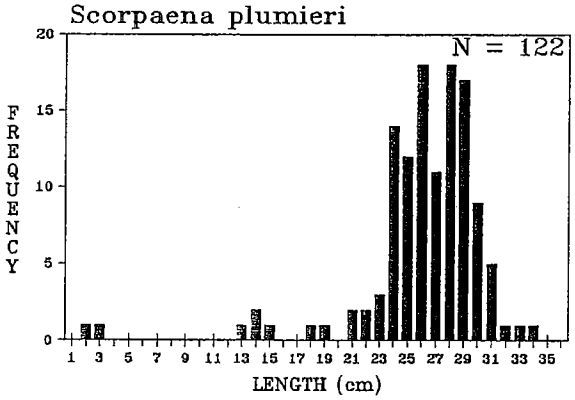
Pseudupeneus maculatus



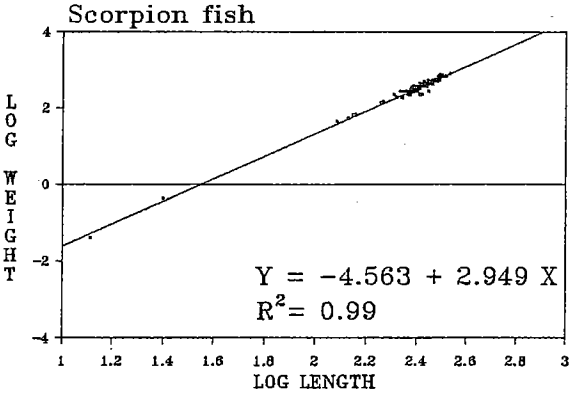
Spotted goatfish



Scorpaena plumieri

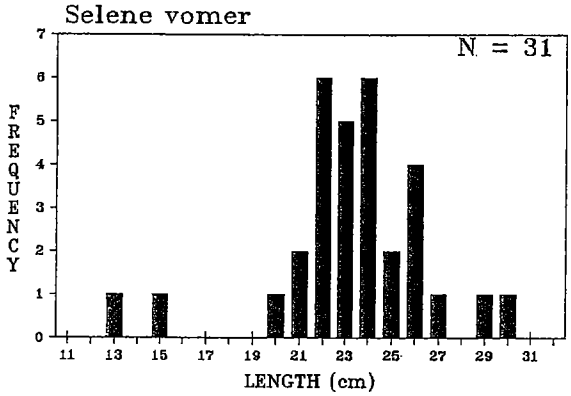


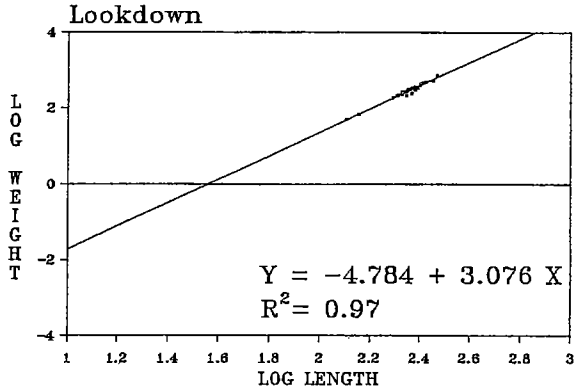
Scorpion fish



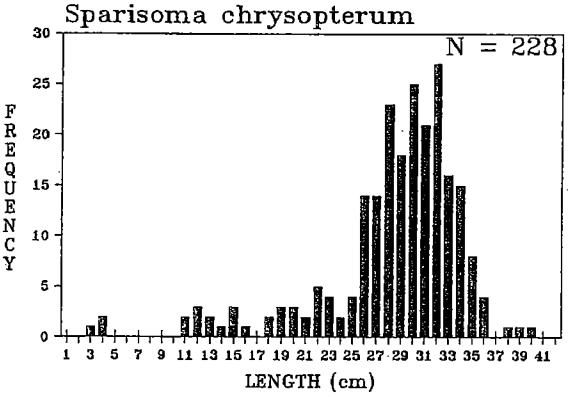
Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.

Selene vomer

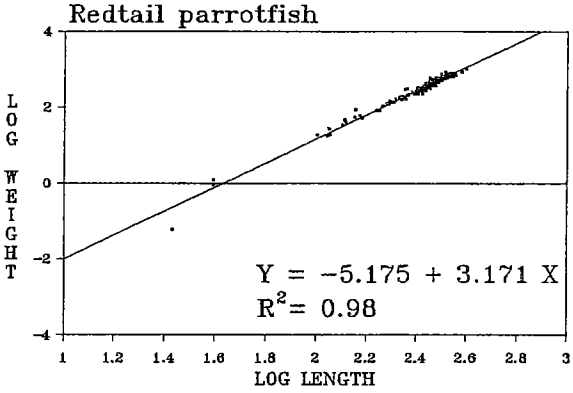




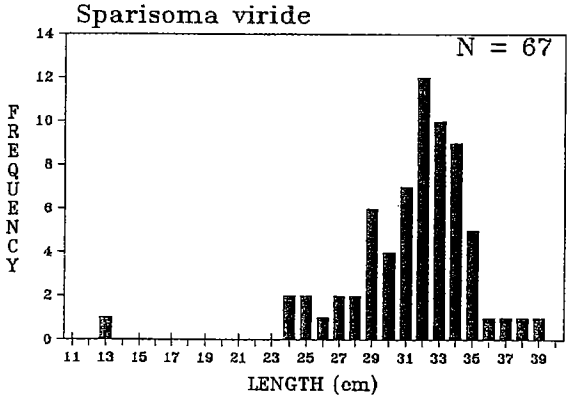
Sparisoma chrysopterum



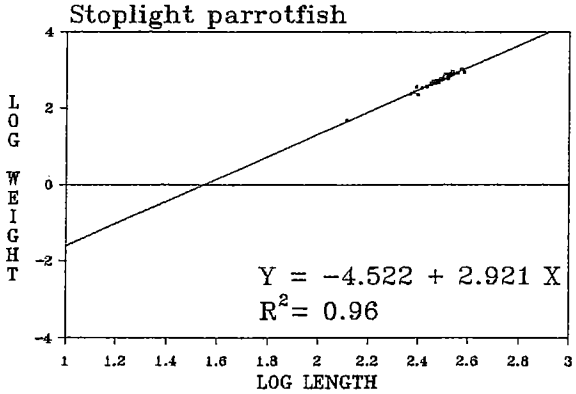
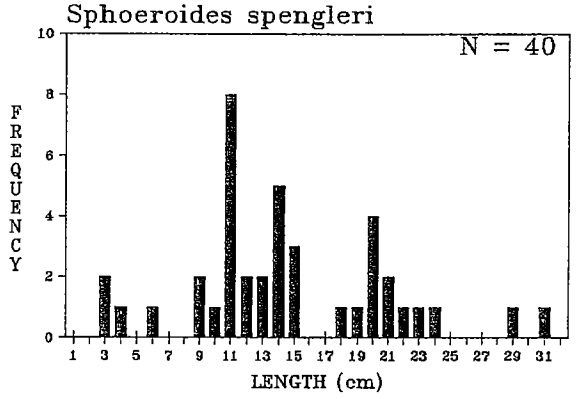
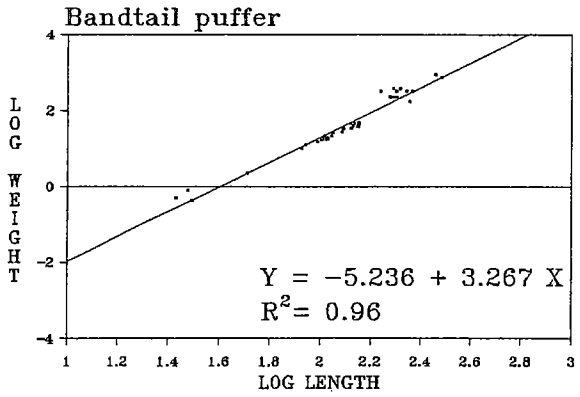
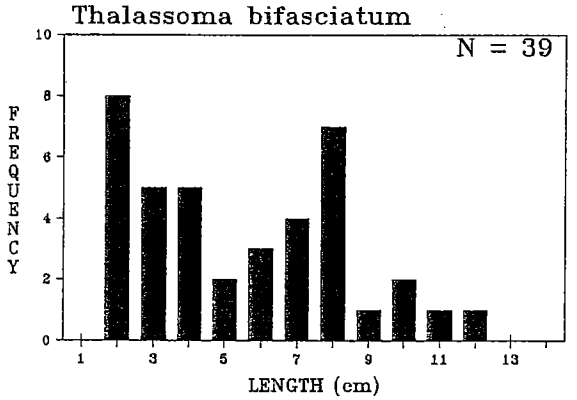
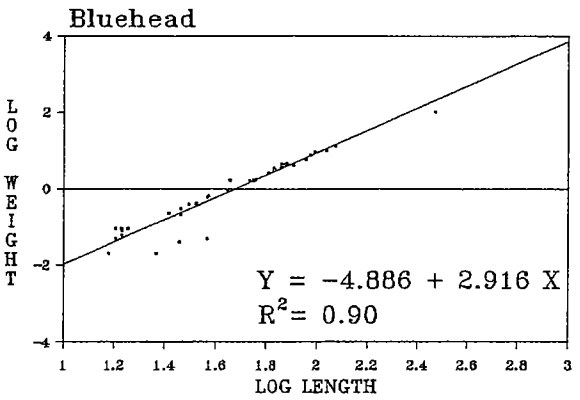
Redtail parrotfish



Sparisoma viride



Stoplight parrotfish



Appendix A.– (cont.) Frequency distribution and regression graphics for southern Florida fish species with >30 measurements.