

APPENDIX TWO

FISH BIOMASS CONVERSION EQUATIONS

BY

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INTRODUCTION

Fish abundance determined from the AGRRA belt transects has been reported throughout this volume as density estimates (number of individuals/100m²). Most investigators using the AGRRA protocol have utilized a consistent methodology for censusing fish so that abundance estimates reported as density are especially useful in making regional comparisons of fish abundance. In some instances, however, where individual species within the reported taxa have widely varying morphologies, biomass (weight) may be a more representative measure of fish abundance. Biomass is an important attribute of populations that may be of interest to ecologists and resource managers since it provides insight into the trophic structure of the community and the production capacity of a reef (Bohnsack and Harper, 1988; Anderson and Neumann, 1996). Some of the authors in this volume have chosen to present their fish abundance results as biomass (grams/100m²). Fish weight was estimated using previously established length-weight relationships for Caribbean fishes (Table 1).

METHODS

Fish weight was calculated using the power function: $W = aL^b$, where W is the weight (grams), L is the length (cm), and a and b are parameters estimated by linear regression of logarithmically transformed length-weight data. The parameters a and b shown in Table 1 were adjusted for unit length from linear regressions performed on fish lengths (mm) reported previously in the literature. Most of the length-weight relationships were determined from southern Florida specimens (Bohnsack and Harper, 1988), with exceptions as noted from Bohnsack and Harper (1988), Bullock et al. (1992), Claro and Garcia-Arteaga (1994), and Letourneur et al. (1998).

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Table 1. Length-weight relationships for the AGRRA fishes.

Scientific name	Common name	<i>a</i>	<i>b</i>	Comments ²
<i>Acanthurus bahianus</i>	Ocean Surgeonfish	0.0237	2.9752	
<i>Acanthurus chirurgus</i>	Doctorfish	0.0040	3.5328	
<i>Acanthurus coeruleus</i>	Blue Tang	0.0415	2.8346	
<i>Aluterus scriptus</i>	Scrawled Filefish	0.8230	1.8136	
<i>Anisotremus surinamensis</i>	Black Margate	0.0059	3.3916	
<i>Anisotremus virginicus</i>	Porkfish	0.0148	3.1674	
<i>Balistes vetula</i>	Queen Triggerfish	0.0267	2.9903	
<i>Bodianus rufus</i>	Spanish Hogfish	0.0144	3.0532	
<i>Cantherhines macrocerus</i>	Whitespotted Filefish	0.0562	2.6534	
<i>Cantherhines pullus</i>	Orangespotted Filefish	0.0684	2.5632	
<i>Canthidermis sufflamen</i>	Ocean Triggerfish	0.0176	3.0554	
<i>Caranx ruber</i>	Bar Jack	0.0074	3.2370	
<i>Centropyge argi</i>	Cherubfish	0.0601	2.6920	* No data available for species; used <i>Centropyge tibicen</i> as model (4)
<i>Cephalopholis cruentata</i> ¹	Graysby	0.0135	3.0439	(was <i>Epinephelus cruentatus</i>)
<i>Cephalopholis fulva</i> ¹	Coney	0.0175	3.0000	(was <i>Epinephelus fulvus</i>); * St. Croix data used: n=1644, a=0.0175, b=3.0 (1)
<i>Chaetodon aculeatus</i>	Longsnout Butterflyfish	0.0220	3.1897	* No data available for species; used <i>Chaetodon capistratus</i> as model
<i>Chaetodon capistratus</i>	Foureye Butterflyfish	0.0220	3.1897	
<i>Chaetodon ocellatus</i>	Spotfin Butterflyfish	0.0318	2.9838	
<i>Chaetodon sedentarius</i>	Reef Butterflyfish	0.0252	3.0760	
<i>Chaetodon striatus</i>	Banded Butterflyfish	0.0222	3.1395	
<i>Epinephelus adscensionis</i>	Rock Hind	0.0111	3.1124	* No data available for species; used <i>Epinephelus guttatus</i> as model
<i>Epinephelus guttatus</i>	Red Hind	0.0111	3.1124	
<i>Epinephelus itajara</i>	Jewfish	0.0131	3.0560	* Gulf of Mexico data used; n=66, a=0.0131, b=3.056 (2)
<i>Epinephelus marginatus</i>	Dusky Grouper	0.0065	3.2292	* No data available for species; used <i>Epinephelus striatus</i> as model
<i>Epinephelus morio</i>	Red Grouper	0.0123	3.0350	
<i>Epinephelus striatus</i>	Nassau Grouper	0.0065	3.2292	
<i>Haemulon album</i>	White Margate	0.0167	3.0423	
<i>Haemulon aurolineatum</i>	Tomtate	0.0100	3.2077	
<i>Haemulon carbonarium</i>	Caesar Grunt	0.0147	3.0559	
<i>Haemulon chrysargyreum</i>	Smallmouth Grunt	0.3971	2.1567	
<i>Haemulon flavolineatum</i>	French Grunt	0.0127	3.1581	
<i>Haemulon macrostomum</i>	Spanish Grunt	0.0244	3.0295	
<i>Haemulon melanurum</i>	Cottonwick	0.0226	2.9527	
<i>Haemulon parra</i>	Sailors Choice	0.0199	2.9932	
<i>Haemulon plumieri</i>	White Grunt	0.0121	3.1612	
<i>Haemulon sciurus</i>	Bluestriped Grunt	0.0194	2.9996	
<i>Haemulon striatum</i>	Striped Grunt	0.0175	3.0990	
<i>Holacanthus bermudensis</i>	Blue Angelfish	0.0319	2.8994	
<i>Holacanthus ciliaris</i>	Queen Angelfish	0.0337	2.9004	
<i>Holacanthus tricolor</i>	Rock Beauty	0.0428	2.8577	
<i>Lachnolaimus maximus</i>	Hogfish	0.0203	2.9880	
<i>Lutjanus analis</i>	Mutton Snapper	0.0162	3.0112	
<i>Lutjanus apodus</i>	Schoolmaster	0.0194	2.9779	

<i>Lutjanus cyanopterus</i>	Cubera Snapper	0.0151	3.0601	
<i>Lutjanus griseus</i>	Gray Snapper	0.0232	2.8809	
<i>Lutjanus jocu</i>	Dog Snapper	0.0308	2.8574	
<i>Lutjanus mahogoni</i>	Mahogany Snapper	0.0429	2.7190	
<i>Lutjanus synagris</i>	Lane Snapper	0.0295	2.8146	
<i>Melichthys niger</i>	Black Durgon	0.0562	2.6534	* No data available for species; used <i>Cantherhines macrocerus</i> as model
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	0.0239	3.0825	
<i>Mycteroperca acutirostris</i>	Comb Grouper	0.0068	3.2051	* No data available for species; used <i>Mycteroperca bonaci</i> as model
<i>Mycteroperca bonaci</i>	Black Grouper	0.0068	3.2051	
<i>Mycteroperca interstitialis</i>	Yellowmouth Grouper	0.0068	3.2051	* No data available for species; used <i>Mycteroperca bonaci</i> as model
<i>Mycteroperca microlepis</i>	Gag	0.0130	3.0305	
<i>Mycteroperca phenax</i>	Scamp	0.0068	3.2051	* No data available for species; used <i>Mycteroperca bonaci</i> as model
<i>Mycteroperca tigris</i>	Tiger Grouper	0.0094	3.1200	* Cuban data used: n=145, a=0.0094, b=3.12 (3)
<i>Mycteroperca venenosa</i>	Yellowfin Grouper	0.0095	3.1400	* St. Thomas/St. John data used: n=103, a=0.0069, b=3.14 (1)
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	0.0405	2.7180	
<i>Pomacanthus arcuatus</i>	Gray Angelfish	0.0344	2.9680	
<i>Pomacanthus paru</i>	French Angelfish	0.0203	3.1264	
<i>Scarus coelestinus</i>	Midnight Parrotfish	0.0153	3.0618	
<i>Scarus coeruleus</i>	Blue Parrotfish	0.0124	3.1109	
<i>Scarus guacamaia</i>	Rainbow Parrotfish	0.0155	3.0626	
<i>Scarus inserti</i> ¹	Striped Parrotfish	0.0147	3.0548	(was <i>S. croicensis</i>)
<i>Scarus sp.</i>	Unidentified Scarus	0.0250	2.9214	* Used <i>Sparisoma viride</i> as model
<i>Scarus taeniopterus</i>	Princess Parrotfish	0.0335	2.7086	
<i>Scarus trispinosus</i>	Greenlip Parrotfish	0.0153	3.0618	* No data available for species; used <i>Scarus coelestinus</i> as model
<i>Scarus vetula</i>	Queen Parrotfish	0.0250	2.9214	* No data available for species; used <i>Sparisoma viride</i> as model
<i>Sparisoma atomarium</i>	Greenblotch Parrotfish	0.0121	3.0275	
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	0.0046	3.4291	
<i>Sparisoma chrysopterum</i>	Redtail Parrotfish	0.0099	3.1708	
<i>Sparisoma radians</i>	Bucktooth Parrotfish	0.0121	3.0275	* No data available for species; used <i>Sparisoma atomarium</i> as model
<i>Sparisoma rubripinne</i>	Redfin Parrotfish	0.0156	3.0641	
<i>Sparisoma spp.</i>	Unidentified Sparisoma	0.0250	2.9214	* Used <i>Sparisoma viride</i> as model
<i>Sparisoma viride</i>	Stoplight Parrotfish	0.0250	2.9214	
<i>Sphyraena barracuda</i>	Great Barracuda	0.0050	3.0825	
<i>Xanthichthys ringens</i>	Sargassum Triggerfish	0.0267	2.9903	* No data available for species; used <i>Balistes vetula</i> as model

¹ Genus and species names according to the classification in Eschmeyer et al. (1998).

² (1) = Bohnsack and Harper (1988); (2) = Bullock et al. (1992); (3) = Claro and Garcia-Arteaga (1994); (4) = Letourneur et al. (1998)