Fisheries Technical Workshop #1: “Length-Based Stock Assessment of Puerto Rico Reef Fishes & Computer-based Tools Laboratory”

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Sustaining Coral Reef Fisheries of Puerto Rico

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Workshop Technical Report
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Fisheries Technical Workshop
"Length-Based Stock Assessment of Puerto Rico Reef Fishes & Computer-based Tools Laboratory"

Conveners: Drs. Jerry Ault and Steve Smith, University of Miami's Rosenstiel School of Marine and Atmospheric Science

Local Host: Dr. Craig Lilyestrom, Puerto Rico Dept. of Natural and Environmental Resources

Locations & Dates:

DNER Fisheries Research Laboratory, Joyuda	**DNER, San Juan**
Day 1: August 22, 2011, 0900-1500	Day 1: August 24, 2011, 0900-1500
Day 2: August 23, 2011, 0900-1200	Day 2: August 25, 2011, 0900-1200

Workshop Goal.- The goals of these 2-day technical workshops will be to (1) present research results on the development and application of length-based approaches to sustainability analysis of Puerto Rico reef fishes, and (2) to conduct hands-on training in the use of computer tools for length-based stock assessment. On workshop Day 1, research results will be presented on data assimilation, analysis, and modeling aspects of length-based assessments of Puerto Rico reef fishes. On workshop Day 2, a laboratory will be conducted for training in the use of computer tools for carrying out length-based assessments.

Target Audience.- This workshop is intended for reef fisheries scientists and managers from government and academia, as well as representatives from the commercial and recreational fishing communities and non-governmental organizations in Puerto Rico. Two 2-day workshops will accommodate participants based in the San Juan and Mayaguez regions.

Background.- The coral reef fisheries of the Puerto Rico reef ecosystem support multimillion-dollar fishing and tourism industries. The sustainability of these fisheries is a key conservation concern given their economic and ecological importance, the significant dependence of subsistence and artisanal fishers on reef fisheries for their livelihoods, and the considerable and growing threats to coral reef habitats (i.e. coral bleaching and disease, pollution and climate change). Sustainability refers to the ability of an exploited stock to produce goods and services, including yields at suitable levels in the short term, while maintaining sufficient stock reproductive capacity to continue providing these goods and services into the indefinite future. The data- and model-limited situations confronting most coral reef fisheries, including those of Puerto Rico, have hampered application of modern stock assessment techniques that meet the legal mandate of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). We have developed a class of length-based methods for stock assessment of data-limited fisheries (Ault et al. 2008). These approaches have relatively simple data requirements, provide a community-level perspective on exploitation effects, and also enable evaluation of stock-specific sustainability that conforms to the legal requirements of the MSFCMA.

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OVERVIEW

The coral reef fisheries of the Puerto Rico reef ecosystem, inhabited by hundreds of reef fishes and macroinvertebrates, supports multimillion-dollar fishing and tourism industries. The sustainability of multispecies coral reef fisheries in Puerto Rico is a key conservation concern given their economic and ecological importance the significant dependence of subsistence and artisanal fishers on reef fisheries for their livelihoods, and the considerable and growing threats to coral reef habitats (i.e. coral bleaching and disease, pollution and climate change). Sustainability refers to the ability of an exploited stock to produce goods and services, including yields at suitable levels in the short term, while maintaining sufficient stock reproductive capacity to continue providing these goods and services into the indefinite future. The objective of this research is to develop a quantitative toolbox that will facilitate the conservation efforts of state and federal managers and increase regional capacity to build sustainable reef fisheries in Puerto Rico. The long-term conservation outcome is to achieve sustainable levels of fishing for exploited groupers, snappers, and parrotfishes in Puerto Rico.

INTRODUCTION

The coral reef fisheries of the Puerto Rico reef ecosystem, inhabited by hundreds of reef fishes and macroinvertebrates, supports multimillion-dollar fishing and tourism industries (**Fig. 1**). The sustainability of multispecies coral reef fisheries in Puerto Rico is a key conservation concern given their economic and ecological importance, the significant dependence of subsistence and artisanal fishers on reef fisheries for their livelihoods, and the considerable and growing threats to coral reef habitats (i.e. coral bleaching and disease, pollution and climate change).

Sustainability refers to the ability of an exploited stock to produce goods and services, including yields at suitable levels in the short term, while maintaining sufficient stock reproductive capacity to continue providing these goods and services into the indefinite future. The data- and model-limited situations confronting most coral reef fisheries, including those of Puerto Rico, have hampered application of modern stock assessment techniques that meet the legal mandate of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The objective of this research is to develop a quantitative toolbox of data assimilation and length-based fishery assessment methods to compute reference points for the multispecies coral reef fisheries that will facilitate the conservation efforts of state and federal managers and increase regional capacity to build sustainable reef fisheries in Puerto Rico. Our proposed approach is novel in that it has relatively simple data requirements and provides a community-level perspective on exploitation effects, yet also enables evaluation of stock-specific sustainability that conforms to the legal requirements of the MSFCMA. The long-term conservation outcome is to achieve sustainable levels of

fishing for exploited groupers, snappers, and parrotfishes in Puerto Rico through development of new framework of assimilation and modeling methods and by working closely with regional managers and scientists to implement the framework.

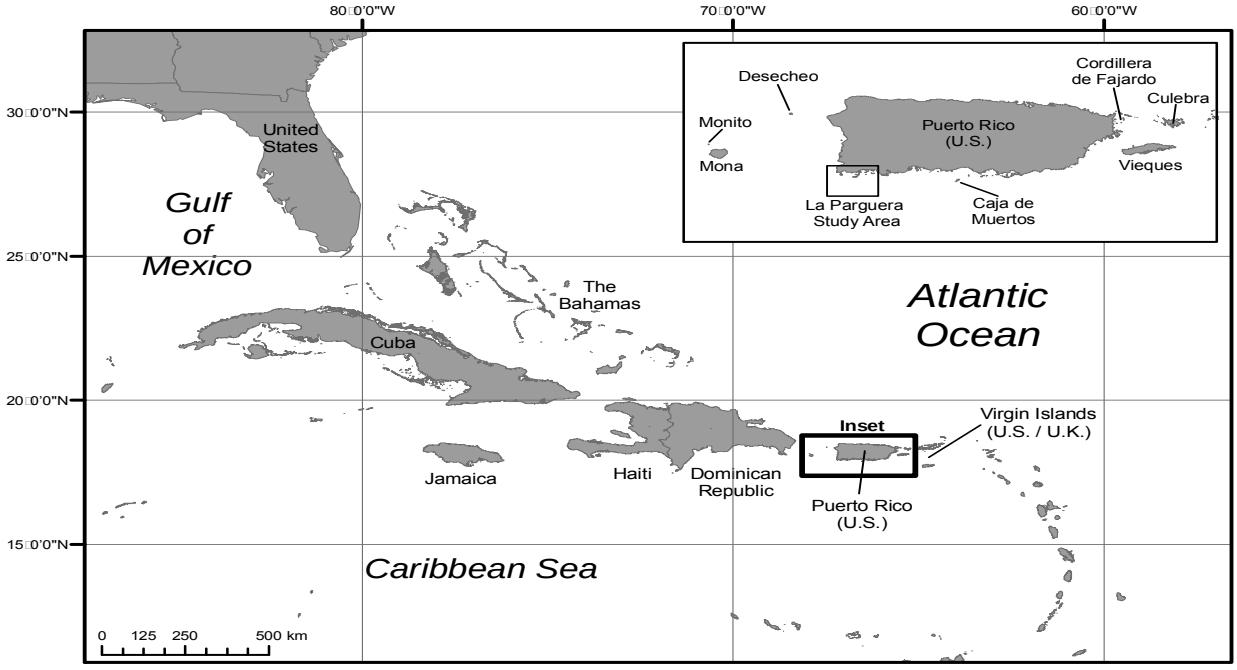


Figure 1.- Map of the northern Caribbean Sea, with inset showing the island archipelago of Puerto Rico and the La Parguera region.

Major Threats and Opportunities

Intensive exploitation and overfishing are perhaps the major threats to this ecosystem. Overfishing has been identified as one of the top three global threats by the NOAA Coral Reef Conservation Program. Substantial reductions in commercial reef fish catches in Puerto Rico over the past several decades have been observed, resulting in harvest moratoria on several species (for example Nassau grouper and goliath grouper). At risk are the economic well-being of coastal human communities as well as the ecological resilience and sustainability of the coral reef ecosystem. Reef fisheries in Puerto Rico target important guilds of fish species including top predators (e.g., groupers and snappers) and herbivores (e.g., parrotfishes). Overfishing not only threatens the long-term viability of individual species, but also impacts the overall health of the coral reef ecosystem. For example, depletion of top predators can disrupt the ecosystem food web, and depletion of herbivores can give a competitive advantage to algae over coral for available substrate, in turn leading to loss of coral cover and general degradation of coral reefs. The end result of these impacts may be a general decline in the productive capacity of the coral reef ecosystem to produce fishery yields and an increased vulnerability to climate change.

Insufficient and poor quality data and lack of an appropriate modeling framework have prevented sophisticated evaluations of the sustainability of reef fisheries. Generally lacking are the data needed to conduct modern stock assessments, including demographic rates and historical time-series of age-size structured catches by species, and the associated fishing effort by gear and sector. While the quality and scope of reef fishery catch-effort data have generally improved in Puerto Rico over the past two decades for the commercial fleet, comparable data from the recreational fleet are not available prior to 2000. There is an obvious lack of a quantitative framework to assess the sustainability of reef fishes in Puerto Rico and to guide management decision-making.

An opportunity to overcome these data and model limitations has recently been provided by Ault et al. (2008), who developed a new quantitative system of length-based empirical estimation and numerical model analyses to evaluate exploitation status via resource reference points (or sustainability benchmarks) for coral reef fishes of the snapper-grouper complex in Puerto Rico. Of the 25 reef fish species assessed, 16 were overfished according to federal benchmarks for sustainability, six were fished sustainably, and three could not be reliably determined due to insufficient data. These findings indicate that a majority of snapper-grouper species in Puerto Rico are currently fished at unsustainable levels.

Over the past decade, requirements for fishery assessment and management in the USA have moved towards a more precautionary approach that strives to 'prevent overfishing while achieving, on a continuing basis, the optimal yield from each fishery for the United States fishing industry' (MSFCMA [Magnuson-Stevens Fishery Conservation and Management Act]. Under this legal framework, determination of the sustainability of a fishery must also consider relevant socioeconomic and ecological factors, particularly whether fishing could deleteriously impact the reproductive capacity of the resource. This new process involves regulation of fishing mortality rate, over which management has some direct control, and how it should change depending upon stock reproductive potential and associated fishery yields. The data limited situations confronting coral reef fisheries in Puerto Rico have hampered application of modern stock assessment techniques that meet the legal mandate of the MSFCMA.

The use of length composition data and associated models to assess Caribbean reef fisheries is relatively novel, and the analysis of Ault et al. (2008) represented a first attempt to apply these assessment methods across the exploited reef fish community in Puerto Rico. There are some advantages to this length-based assessment method for

estimating total mortality because it has relatively simple data requirements and has been shown to have relatively robust properties for assessing exploitation impacts on coral reef fishes. Unique owing to its zero-bias properties at equilibrium, the method is also relatively insensitive to trends in recruitment and exhibits desirable properties for detecting statistical differences between sustainable and non-sustainable rates (Ehrhardt and Ault 1992; Ault et al. 2005). It also enables evaluation of stock-specific sustainability that conforms to the legal requirements of the MSFCMA.

1.0 Data Sources & LBAR Analyses

1.1 Data Sources and Processing

Length composition data were obtained from long-term fishery-dependent and fishery-independent sampling programs with the assistance of DNER personnel (**Table 1.1**). Initial analyses focused on the two principal fishery-dependent sampling programs, the Trip Interview Program (TIP) that samples commercial catches and the Marine Recreational Fisheries Statistical Survey (MRFSS) that samples recreational catches. Data processing procedures were developed using the SAS statistical software to create analysis-ready length-compostion datasets for both the TIP and MRFSS databases, including creating uniform data codes for species, time, space, gears, etc., to facilitate comparative analyses among data sources (**Fig. 1.1**). The cross-compatible species code table for the TIP and MRFSS databases is provided in **Appendix A**. The cross-compatible spatial codes for Puerto Rico municipios are given in **Table 1.2**. Maps showing bathymetric and habitat features of the coastal region of Puerto Rico along with the numbering scheme for coastal municipios are provided in **Figs. 1.2A-B**.

1.2 Species Classification

Both the TIP and MRFSS databases include all species of fishes and invertebrates inspected and measured by scientific sampling personnel during interviews of commercial and recreational fishers at ports and marinas. Procedures were developed to distinguish reef-fish species from other species in the catch. A core group of species from principal reef-fish families (snappers, groupers, grunts, parrotfishes, boxfishes, etc.) were identified that primarily occur in hardbottom, live coral habitats. All other species were evaluated for their proportion occurrence in intercepted trips with reef species vs. all intercepted trips. The ratio of proportion occurrence in reef fish trips, p(reef), to proportion occurrence in all trips, p(total) was used to classify species as reef-associated (ratio approx. 1 or greater) or non-reef (ratio less than 1). Some species exclusively occurred in reef fish trips, and were added to the core group of reef fishes. The process was iterated several times to finalize the classification of species into 3 groups (**Tables 1.3-1.5**):

(1) reef species: species that almost exclusively occur in coral reef habitats;

(2) reef-associated species: species that occur in coral reef habitats but can also occur in non-reef habitats;

(3) non-reef species: species that do not usually occur in coral reef habitats.

Our analysis identified 109 reef-fish species from 17 families in the combined commercial and sport catches (**Table 1.3**). Additionally, we identified 21 reef-associated species and 21 non-reef species in commercial catches (**Table 1.4**), and 9 reef-associated species and 34 non-reef species in sport catches (**Table 1.5**).

1.3 Time, Space, and Gear Characteristics

Intercept data from commercial trips during 1992-2007 and sport trips during 2000-2009 were analyzed with respect to time, space, and gear characteristics. The number of trip intercepts per year ranged from 273 to 963 for commercial sampling (**Table 1.6A**) and from 163 to 444 for sport sampling (**Table 1.6B**). Sampling was distributed among all seasons of the year for both sampling programs. Sampling was conducted around the entire island of Puerto Rico each year, but both programs emphasized specific municipios with the highest probabilities of encountering fishers returning from fishing trips (**Tables 1.7-1.8, Fig. 1.3**). To faciliate spatial analyses of length composition data, municipios were combined into 4 regions representing different fishing environments around Puerto Rico (**Fig. 1.3**). A majority of commercial trips in all four regions captured at least one reef species during the period 1992-2007 (**Table 1.9A**), whereas a majority of sport trips captured at least one reef species only in the South region during 2000-2009 (**Table 1.9B**). These results suggest that reef-fishes are a primary target of the commercial fleet and a secondary target of the sport fleet.

Using the TIP database, ten principal reef-fish species were identified based on their occurrence in 10 or more trip interviews during each year for the period 1992-2007. Five gear types were found to account for the majority of captures of these species (**Table 1.10**), with some variation among species as to primary (orange highlight) and secondary (green highlight) gears. Relatively little seasonal variation was observed for a gear type with respect to either the number of trip intercepts (**Table 1.11**) or species occurrence (**Fig. 1.4**), suggesting that the principal reef-fish gears are used year-round and the target reef species are captured year-round. In contrast, there were substantial differences among gears with respect to spatial deployment, with all 5 gears used only in the West-Southwest region and 2-3 gears principally used in the other regions (**Table 1.12**). Species trip occurrence for a gear type also differed by region in many cases. Several examples are shown in **Figs. 1.5-1.7**. Hogfish occurrence in spear gear trips was consistently highest in the South region compared to the East or West-Southwest regions; spear/SCUBA gear is not used in the North region (**Fig. 1.5**). Trap trip occurrence for silk snapper, a deepwater species, was high in the North and West-Southwest regions and low to zero elsewhere, whereas occurrence was low in the North and West regions and high in the East and South regions for white grunt, yellowtail snapper, and red hind, three generally shallow-water species (**Fig. 1.6**). These findings indicate that regional differences in species occurrence may partly be a function of the target depth range. Regional occurrence in bottom line trips further suggests that target depth ranges may have changed through time (**Fig. 1.7**): the deepwater silk snapper had low occurrence in the North region in 1994-96 but had high occurrence in this region in 2003-05, whereas the opposite time trend was observed in the North region for shallow-water yellowtail snapper and red hind

1.4 Lbar Estimation

Estimation of Lbar, the average length in the exploited phase, requires designation of the minimum capture length, LC, above which fishes are generally retained in the catch and brought back to the dock for sale, consumption, etc. In cases where fishery regulations specify a minimum legal size, LC is set to this size. In cases where a minimum size is not regulated, LC must be estimated from the catch data. **Figures 1.8-1.9** show examples of the LC estimation procedure for red hind. Using the TIP database,values of LC were estimated for each 3-year time period for each principal gear type. The results for red hind suggest that LC has increased from the mid-1990s to mid-2000s for the trap gear (**Figure 1.8**). The results also suggest that LC may differ somewhat among gears for the same time period, with the trap gear retaining smaller fishes compared to bottom lines or spears (**Figure 1.9**). For comparability of Lbar estimates through time and among gears, LC values toward the upper end of the estimate range were selected for each species. For the red hind example, LC was designated at 26 cm which alleviated the discrepancies in size-selectivity for smaller fishes among gears and through time.

Exploited phase length composition data were extracted from the two main fishery-independent sampling programs, the SEAMAP program utilizing trap and bottom line gears and the NOAA Biogeography Team diver visual survey, for the reef species present in the TIP and MRFSS catch sampling. Both fishery-independent sampling programs were predominately conducted in the West-Southwest region (**Fig. 1.10**). Comparability of Lbar estimates among the various fishery-dependent and -independent sampling programs was evaluated. Statistical procedures for estimating Lbar are described in Ault et al. (2005). Illustrative results of these analyses are shown in **Figs. 1.11-1.14**. Yellowtail snapper Lbar estimates for two consecutive years were comparable for the TIP and MRFSS catch sampling, and indicated no directional bias in Lbar by data source (**Fig. 1.11**). Likewise, Lbar estimates for red hind were nearly identical for the TIP and MRFSS sampling programs in 2001(**Fig. 1.12**) and for the TIP and SEAMAP programs in the West-Southwest region in 1993 (**Fig. 1.13**). It should be noted in particular that both the TIP and SEAMAP sampling in the West region during 1993 used the same gears (traps and bottom lines). In contrast, Lbar estimates for stoplight parrotfish were higher in MRFSS catch sampling compared to TIP catch sampling and diver visual sampling (**Fig. 1.14**). These differences in Lbar for the stoplight parrotfish may be gear related: the MRFSS catches were almost exclusively from spearfishing, and the length composition for spear gears in general are skewed toward larger individuals, suggesting that spearfishers are more selective for larger fishes compared fishers using other gears.

Our analyses suggest that the commercial and sport fleets in Puerto Rico are sampling the same population of a given reef fish species, and that slight differences in

length composition between the two sampling programs are mostly a function of how different gears are deployed in different regions and depth ranges. The two fishery-independent programs also appear to be sampling the same reef fish stocks as the commercial and sport fleets in the West-Southwest region for the same gears and/or depth ranges. Our strategy for estimating Puerto Rico-wide Lbar values for reef fishes was thus to combine length compostion data from the various sampling programs and gears as the most representative information for a given species.

Annual estimates of Lbar based solely on the commercial fleet data, the largest and longest source of length composition data, were nearly identical to Lbar estimates using the combined data from all sources, as shown for 5 principal species: yellowtail snapper (**Table 1.13**), red hind (**Table 1.14**), white grunt (**Table 1.15**), hogfish (**Table 1.16**), and stoplight parrotfish (**Table 1.17**). Time-series estimates of Lbar were computed for all other reef-fish species using the following procedure for cases with small sample sizes: (i) data were pooled for up to three consecutive years until a minimum sample size of 30 or more length observations was reached; (ii) if the 30-observation minimum was not reached, the time period was excluded from estimation. Species sample sizes by data source by year are provided in **Appendix B**, which also denotes the time periods for pooling data to reach the 30-observation minimum threshold. Time-series estimates of Lbar for 54 additional reef-fish species are given in **Appendix C**.

1.5 Tables and Figures

Table 1.1: Data sources analyzed for species length composition.

Database	Description	Years
TIP	Commercial Trip Intercepts	1983-2007
MRFSS	Sport Trip Intercepts	2000-2009
SEAMAP	Fishery-independent, trap & hook-line gears	1991-2006
NOAA BioGeo	Fishery-Independent, diver visual surveys	2000-2010

Table 1.2: Coastal municipio database codes.

muni_nr	muni_fips	muni_name	muni_cd
01	71	Isabela	IS
02	115	Quebradillas	QB
03	27	Camuy	CY
04	65	Hatillo	HA
05	13	Arecibo	AC
06	17	Barceloneta	BC
07	91	Manati	MT
08	145	Vega Baja	VB
09	143	Vega Alta	VA
10	51	Dorado	DO
11	137	Toa Baja	TB
12	33	Catano	CT
13	127	San Juan	SJ
14	31	Carolina	CN
15	87	Loiza	LZ
16	119	Rio Grande	RG
17	89	Luquillo	LQ
18	53	Fajardo	FJ
19	37	Ceiba	CE
20	103	Naguabo	NG
21	69	Humacao	HU
22	151	Yabucoa	YB
23	95	Maunabo	MB
24	49	Culebra	CU
25	147	Vieques	VQ
26	109	Patillas	PA
27	15	Arroyo	AY
28	57	Guayama	GM
29	123	Salinas	SN
30	133	Santa Isabel	SI
31	75	Juana Diaz	JD
32	113	Ponce	PO
33	111	Penuelas	PE
34	59	Guayanilla	GL
35	55	Guanica	GC
36	79	Lajas	LJ
37	23	Cabo Rojo	CJ
38	97	Mayaguez	MG
39	11	Anasco	AN
40	117	Rincon	RC
41	3	Aguada	AD
42	5	Aguadilla	AL

Table 1.3: Reef fishes observed in commercial and sport trips.

Family	Common	Latin
Acanthuridae	ocean surgeon	Acanthurus bahianus
Acanthuridae	doctorfish	Acanthurus chirurgus
Acanthuridae	blue tang	Acanthurus coeruleus
Balistidae	gray triggerfish	Balistes capriscus
Balistidae	queen triggerfish	Balistes vetula
Balistidae	ocean triggerfish	Canthidermis sufflamen
Balistidae	black durgon	Melichthys niger
Chaetodontidae	foureye butterflyfish	Chaetodon capistratus
Chaetodontidae	spotfin butterflyfish	Chaetodon ocellatus
Chaetodontidae	banded butterflyfish	Chaetodon striatus
Diodontidae	balloonfish	Diodon holocanthus
Diodontidae	porcupinefish	Diodon hystrix
Fistulariidae	bluespotted cornetfish	Fistularia tabacaria
Haemulidae	black margate	Anisostremus surinamensis
Haemulidae	porkfish	Anisotremus virginicus
Haemulidae	margate	Haemulon album
Haemulidae	tomtate	Haemulon aurolineatum
Haemulidae	ceasar grunt	Haemulon carbonarium
Haemulidae	smallmouth grunt	Haemulon chrysargyreum
Haemulidae	French grunt	Haemulon flavolineatum
Haemulidae	Spanish grunt	Haemulon macrostomum
Haemulidae	sailors choice	Haemulon parra
Haemulidae	white grunt	Haemulon plumierii
Haemulidae	bluestriped grunt	Haemulon sciurus
Haemulidae	striped grunt	Haemulon striatum
Holocentridae	squirrelfish	Holocentrus adscensionis
Holocentridae	longspine squirrelfish	Holocentrus rufus
Holocentridae	blackbar soldierfish	Myripristis jacobus
Holocentridae	longjaw squirrelfish	Neoniphon marianus
Holocentridae	bigeye soldierfish	Ostichthys trachypoma
Holocentridae	reef squirrelfish	Sargocentron coruscum
Labridae	Spanish hogfish	Bodianus rufus
Labridae	painted wrasse	Halichoeres caudalis
Labridae	yellowhead wrasse	Halichoeres garnoti
Labridae	clown wrasse	Halichoeres maculipinna
Labridae	blackear wrasse	Halichoeres poeyi
Labridae	puddingwife	Halichoeres radiatus
Labridae	hogfish	Lachnolaimus maximus
Lutjanidae	black snapper	Apsilus dentatus
Lutjanidae	queen snapper	Etelis oculatus
Lutjanidae	mutton snapper	Lutjanus analis
Lutjanidae	schoolmaster	Lutjanus apodus
Lutjanidae	blackfin snapper	Lutjanus buccanella
Lutjanidae	red snapper	Lutjanus campechanus
Lutjanidae	cubera snapper	Lutjanus cyanopterus
Lutjanidae	gray snapper	Lutjanus griseus
Lutjanidae	dog snapper	Lutjanus jocu

Lutjanidae	mahogany snapper	Lutjanus mahogani
Lutjanidae	Caribbean red snapper	Lutjanus purpureus
Lutjanidae	lane snapper	Lutjanus synagris
Lutjanidae	silk snapper	Lutjanus vivanus
Lutjanidae	yellowtail snapper	Ocyurus chrysurus
Lutjanidae	wenchman	Pristipomoides aquilonaris
Lutjanidae	vermilion snapper	Rhomboplites aurorubens
Monocanthidae	unicorn filefish	Aluterus monoceros
Monocanthidae	orange filefish	Aluterus schoepfii
Monocanthidae	scrawled filefish	Aluterus scriptus
Monocanthidae	whitespotted filefish	Cantherhines macrocerus
Monocanthidae	orangespotted filefish	Cantherhines pullus
Mullidae	yellow goatfish	Mulloidichthys martinicus
Mullidae	red goatfish	Mullus auratus
Mullidae	spotted goatfish	Pseudupeneus maculatus
Ostraciidae	honeycomb cowfish	Acanthostracion polygonia
Ostraciidae	scrawled cowfish	Acanthostracion quadricornis
Ostraciidae	spotted trunkfish	Lactophrys bicaudalis
Ostraciidae	trunkfish	Lactophrys trigonus
Ostraciidae	smooth trunkfish	Lactophrys triqueter
Pomacanthidae	queen angelfish	Holacanthus ciliaris
Pomacanthidae	rock beauty	Holacanthus tricolor
Pomacanthidae	gray angelfish	Pomacanthus arcuatus
Pomacanthidae	French angelfish	Pomacanthus paru
Priacanthidae	glasseye snapper	Heteropriacanthus cruentatus
Priacanthidae	bigeye	Priacanthus arenatus
Scaridae	emerald parrotfish	Nicholsina usta
Scaridae	midnight parrotfish	Scarus coelestinus
Scaridae	blue parrotfish	Scarus coeruleus
Scaridae	rainbow parrotfish	Scarus guacamaia
Scaridae	striped parrotfish	Scarus iseri
Scaridae	princess parrotfish	Scarus taeniopterus
Scaridae	queen parrotfish	Scarus vetula
Scaridae	greenblotch parrotfish	Sparisoma atomarium
Scaridae	redband parrotfish	Sparisoma aurofrenatum
Scaridae	redtail parrotfish	Sparisoma chrysopterum
Scaridae	yellowtail parrotfish	Sparisoma rubripinne
Scaridae	stoplight parrotfish	Sparisoma viride
Sciaenidae	jackknife-fish	Equetus lanceolatus
Sciaenidae	spotted drum	Equetus punctatus
Sciaenidae	reef croaker	Odontoscion dentex
Serranidae	graysby	Cephalopholis cruentata
Serranidae	coney	Cephalopholis fulva
Serranidae	marbled grouper	Dermatolepis inermis
Serranidae	rock hind	Epinephelus adscensionis
Serranidae	yellowedge grouper	Epinephelus flavolimbatus
Serranidae	red hind	Epinephelus guttatus
Serranidae	goliath grouper	Epinephelus itajara
Serranidae	red grouper	Epinephelus morio
Serranidae	misty grouper	Epinephelus mystacinus

Serranidae	warsaw grouper	Epinephelus nigritus
Serranidae	Nassau grouper	Epinephelus striatus
Serranidae	black grouper	Mycteroperca bonaci
Serranidae	yellowmouth grouper	Mycteroperca interstitialis
Serranidae	gag	Mycteroperca microlepis
Serranidae	tiger grouper	Mycteroperca tigris
Serranidae	yellowfin grouper	Mycteroperca venenosa
Serranidae	Atlantic creolefish	Paranthias furcifer
Serranidae	greater soapfish	Rypticus saponaceus
Serranidae	tattler	Serranus phoebe
Serranidae	tobaccofish	Serranus tabacarius
Serranidae	chalk bass	Serranus tortugarum

Table 1.4: Reef-associated and non-reef species observed in commercial trips.

Family	Common	Latin	n total trips	p(total)	n reef trips	p(reef)	ratio reef to total
Reef-associated species							
Carangidae	yellow jack	Caranx bartholomaei	130	0.0157	101	0.0182	1.16
Carangidae	blue runner	Caranx crysos	109	0.0131	93	0.0167	1.27
Carangidae	crevalle jack	Caranx hippos	20	0.0024	19	0.0034	1.42
Carangidae	horse-eye jack	Caranx latus	267	0.0321	215	0.0387	1.20
Carangidae	bar jack	Caranx ruber	648	0.0780	602	0.1083	1.39
Carangidae	Atlantic moonfish	Selene setapinnis	15	0.0018	11	0.0020	1.10
Carangidae	greater amberjack	Seriola dumerili	36	0.0043	30	0.0054	1.24
Carangidae	permit	Trachinotus falcatus	31	0.0037	23	0.0041	1.11
Carangidae	palometa	Trachinotus goodei	18	0.0022	15	0.0027	1.24
Carcharhinidae	lemon shark	Negaprion brevirostris	13	0.0016	12	0.0022	1.38
Gerridae	striped mojarra	Eugerres plumieri	11	0.0013	7	0.0013	0.95
Gerridae	yellowfin mojarra	Gerres cinereus	61	0.0073	60	0.0108	1.47
Malacanthidae	sand tilefish	Malacanthus plumieri	12	0.0014	11	0.0020	1.37
Sciaenidae	Atlantic croaker	Micropogonias undulatus	12	0.0014	8	0.0014	1.00
Sparidae	sea bream	Archosargus rhomboidalis	19	0.0023	19	0.0034	1.49
Sparidae	jolthead porgy	Calamus bajonado	360	0.0433	358	0.0644	1.49
Sparidae	sheepshead porgy	Calamus penna	605	0.0728	601	0.1081	1.48
Sphyraenidae	great barracuda	Sphyraena barracuda	12	0.0014	8	0.0014	1.00
Sphyraenidae	guaguanche	Sphyraena guachancho	15	0.0018	13	0.0023	1.29
Sphyraenidae	southern sennet	Sphyraena picudilla	34	0.0041	24	0.0043	1.05
Stromateidae	butterfish	Peprilus triacanthus	62	0.0075	62	0.0112	1.49
Other species							
Carangidae	bigeye scad	Selar crumenophthalmus	33	0.0040	7	0.0013	0.32
Centropomidae	smallscale fat snook	Centropomus parallelus	13	0.0016	3	0.0005	0.34
Centropomidae	common snook	Centropomus undecimalis	74	0.0089	26	0.0047	0.52
Clupeidae	Atlantic thread herring	Opisthonema oglinum	17	0.0021	2	0.0004	0.18
Coryphaenidae	dolphinfish	Coryphaena hippurus	217	0.0261	11	0.0020	0.08
Hemiramphidae	ballyhoo	Hemiramphus brasiliensis	19	0.0023	6	0.0011	0.47
Lobotidae	Atlantic tripletail	Lobotes surinamensis	13	0.0016	5	0.0009	0.57
Megalopidae	tarpon	Megalops atlanticus	10	0.0012	1	0.0002	0.15
Mugilidae	white mullet	Mugil curema	29	0.0035	12	0.0022	0.62
Scombridae	wahoo	Acanthocybium solandri	100	0.0120	12	0.0022	0.18
Scombridae	little tunny	Euthynnus alletteratus	116	0.0140	25	0.0045	0.32
Scombridae	skipjack tuna	Katsuwonus pelamis	146	0.0176	34	0.0061	0.35
Scombridae	king mackerel	Scomberomorus cavalla	633	0.0762	229	0.0412	0.54
Scombridae	cero	Scomberomorus regalis	398	0.0479	196	0.0353	0.74
Scombridae	albacore	Thunnus alalunga	21	0.0025	6	0.0011	0.43
Scombridae	yellowfin tuna	Thunnus albacares	167	0.0201	11	0.0020	0.10
Scombridae	blackfin tuna	Thunnus atlanticus	222	0.0267	33	0.0059	0.22
Trichiuridae	Atlantic cutlassfish	Trichiurus lepturus	13	0.0016	2	0.0004	0.23
Xiphiidae	swordfish	Xiphias gladius	14	0.0017	1	0.0002	0.11
crustacea	Caribbean spiny lobster	Panulirus argus	2203	0.2652	742	0.1334	0.50
mollusca	queen conch	Strombus gigas	21	0.0025	6	0.0011	0.43

Table 1.5: Reef-associated and non-reef species observed in sport trips.

Family	Common	Latin	n total trips	p(total)	n reef trips	p(reef)	ratio reef to total
Reef-associated species							
Carangidae	yellow jack	Caranx bartholomaei	40	0.0149	15	0.0144	0.97
Carangidae	blue runner	Caranx crysos	148	0.0551	60	0.0576	1.05
Carangidae	black jack	Caranx lugubris	15	0.0056	13	0.0125	2.24
Carangidae	bar jack	Caranx ruber	60	0.0223	34	0.0326	1.46
Carangidae	greater amberjack	Seriola dumerili	15	0.0056	9	0.0086	1.55
Gerridae	yellowfin mojarra	Gerres cinereus	53	0.0197	20	0.0192	0.97
Haemulidae	barred grunt	Conodon nobilis	11	0.0041	6	0.0058	1.41
Malacanthidae	sand tilefish	Malacanthus plumieri	21	0.0078	20	0.0192	2.46
Sparidae	pluma porgy	Calamus pennatula	19	0.0071	18	0.0173	2.44
Other species							
Albulidae	bonefish	Albula vulpes	12	0.0045	4	0.0038	0.86
Belonidae	Atlantic agujon	Tylosurus acus	12	0.0045	2	0.0019	0.43
Carangidae	crevalle jack	Caranx hippos	78	0.0290	25	0.0240	0.83
Carangidae	horse-eye jack	Caranx latus	107	0.0398	32	0.0307	0.77
Carangidae	Atlantic bumper	Chloroscombrus chrysurus	10	0.0037	3	0.0029	0.77
Carangidae	permit	Trachinotus falcatus	15	0.0056	3	0.0029	0.52
Carangidae	palometa	Trachinotus goodei	34	0.0127	12	0.0115	0.91
Centropomidae	common snook	Centropomus undecimalis	76	0.0283	4	0.0038	0.14
Clupeidae	scaled sardine	Harengula jaguana	21	0.0078	2	0.0019	0.25
Clupeidae	Spanish sardine	Sardinella aurita	10	0.0037	2	0.0019	0.52
Coryphaenidae	dolphinfish	Coryphaena hippurus	633	0.2355	14	0.0134	0.06
Elopidae	ladyfish	Elops saurus	17	0.0063	4	0.0038	0.61
Ephippidae	Atlantic spadefish	Chaetodipterus faber	10	0.0037	2	0.0019	0.52
Gerridae	Irish pompano	Diapterus auratus	16	0.0060	4	0.0038	0.64
Gerridae	striped mojarra	Eugerres plumieri	38	0.0141	3	0.0029	0.20
Haemulidae	burro grunt	Pomadasys crocro	26	0.0097	6	0.0058	0.60
Istiophoridae	blue marlin	Makaira nigricans	13	0.0048	0	0.0000	0.00
Lobotidae	Atlantic tripletail	Lobotes surinamensis	69	0.0257	7	0.0067	0.26
Megalopidae	tarpon	Megalops atlanticus	11	0.0041	4	0.0038	0.94
Mugilidae	white mullet	Mugil curema	15	0.0056	1	0.0010	0.17
Polynemidae	littlescale threadfin	Polydactylus oligodon	12	0.0045	1	0.0010	0.21
Polynemidae	barbu	Polydactylus virginicus	28	0.0104	4	0.0038	0.37
Sciaenidae	sand drum	Umbrina coroides	21	0.0078	5	0.0048	0.61
Scombridae	wahoo	Acanthocybium solandri	186	0.0692	6	0.0058	0.08
Scombridae	little tunny	Euthynnus alletteratus	45	0.0167	5	0.0048	0.29
Scombridae	skipjack tuna	Katsuwonus pelamis	44	0.0164	7	0.0067	0.41
Scombridae	king mackerel	Scomberomorus cavalla	86	0.0320	20	0.0192	0.60
Scombridae	cero	Scomberomorus regalis	130	0.0484	44	0.0422	0.87
Scombridae	yellowfin tuna	Thunnus albacares	24	0.0089	1	0.0010	0.11
Scombridae	blackfin tuna	Thunnus atlanticus	35	0.0130	3	0.0029	0.22
Sphyraenidae	great barracuda	Sphyraena barracuda	132	0.0491	20	0.0192	0.39
Sphyraenidae	guaguanche	Sphyraena guachancho	12	0.0045	2	0.0019	0.43
Sphyraenidae	southern sennet	Sphyraena picudilla	20	0.0074	5	0.0048	0.64
Tetraodontidae	checkered puffer	Sphoeroides testudineus	19	0.0071	4	0.0038	0.54

Table 1.6: Number of intercepted trips by year and season and associated percent reef trips for (A) TIP and (B) MRFSS.

(A) TIP--commercial

	Total	Jan-Feb		Mar-Apr		May-Jun		Jul-Aug		Sep-Oct		Nov-Dec	
Year	Trips	n trips	% reef	n trips	% reef	n trips	% reef	n trips	% reef	n trips	% reef	n trips	% reef
1992	963	119	81.5	270	80.4	165	78.8	111	80.2	228	87.7	70	71.4
1993	571	99	80.8	111	66.7	112	42.0	94	76.6	106	71.7	49	73.5
1994	344	49	69.4	89	78.7	44	72.7	59	37.3	69	71.0	34	58.8
1995	455	93	84.9	136	73.5	102	57.8	41	70.7	43	62.8	40	60.0
1996	329	100	65.0	76	77.6	57	52.6	16	75.0	54	61.1	26	50.0
1997	273	41	80.5	35	74.3	50	50.0	50	64.0	65	70.8	32	65.6
1998	434	54	61.1	42	64.3	106	71.7	92	68.5	55	80.0	85	62.4
1999	521	91	73.6	107	65.4	105	61.0	86	59.3	66	63.6	66	59.1
2000	482	86	62.8	75	64.0	89	71.9	70	64.3	83	65.1	79	64.6
2001	640	87	63.2	125	78.4	99	73.7	93	71.0	131	75.6	105	67.6
2002	520	102	75.5	98	66.3	81	66.7	81	70.4	83	63.9	75	73.3
2003	571	125	60.8	101	78.2	102	69.6	67	56.7	105	75.2	71	66.2
2004	699	106	66.0	117	67.5	81	56.8	113	70.8	168	63.1	114	60.5
2006	863	140	56.4	135	54.1	85	49.4	135	68.9	208	64.9	160	51.9
2007	642	161	50.9	63	47.6	112	45.5	114	50.9	118	59.3	74	66.2

(B) MRFSS--sport

	Total	Jan-Feb		Mar-Apr		May-Jun		Jul-Aug		Sep-Oct		Nov-Dec	
Year	Trips	n trips	% reef	n trips	% reef	n trips	% reef	n trips	% reef	n trips	% reef	n trips	% reef
2000	377	40	17.5	90	35.6	32	56.3	28	46.4	50	46.0	137	23.4
2001	444	114	29.8	94	51.1	70	44.3	49	51.0	51	58.8	66	9.1
2002	212	28	14.3	24	33.3	27	44.4	36	38.9	39	38.5	58	19.0
2003	407	99	58.6	52	48.1	31	38.7	47	55.3	86	44.2	92	28.3
2004	245	97	41.2	37	45.9	44	29.5	24	37.5	17	47.1	26	19.2
2005	172	28	64.3	28	67.9	31	35.5	17	47.1	40	67.5	28	53.6
2006	163	48	50.0	31	38.7	22	36.4	16	56.3	18	33.3	28	17.9
2007	244	56	42.9	49	38.8	37	40.5	25	60.0	45	33.3	32	28.1
2008	228	59	30.5	21	38.1	42	33.3	30	43.3	27	48.1	49	22.4
2009	196	36	22.2	42	38.1	29	41.4	10	70.0	29	55.2	50	14.0

Table 1.7: Number of commercial trip intercepts by municipio and year, and associated percent of trips capturing reeffishes.

	1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004		2006		2007	
muni_nr	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef	Trips	%reef
1	.	.	.	.	.	.	1	100	3	33.3	2	50	.	.	.	.	2	100	4	50	3	100	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.	3	66.7	15	86.7	.	.	.	.	.	.	.	.	.	.	1	100	1	100
4	.	.	.	.	.	.	.	.	1	0	.	.	1	100	3	33.3	.	.	2	50	.	.	.	.	.	.	4	0	3	33.3
5	12	100	6	66.7	.	.	.	.	.	.	27	40.7	25	68	13	61.5	34	50	63	73	36	30.6	29	65.5	84	81	63	66.7	38	68.4
6	.	.	.	.	.	.	1	100	.	.	11	9.1	11	72.7	14	35.7	12	16.7	5	80	17	70.6	2	0	2	0	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	4	100	6	83.3	8	62.5	3	66.7	8	100	2	0	4	100	7	71.4	17	88.2	9	88.9
9	.	.	.	.	.	.	.	.	.	.	.	.	2	100	1	100	.	.	2	100	.	.	1	0	1	0	5	100	4	75
10	6	100	4	100	1	100	.	.	.	.	1	0	3	33.3	4	50	2	50	5	100	2	100	.	.	4	100	8	75	4	100
11	.	.	.	.	.	.	.	.	.	.	.	.	1	100	.	.	.	.	.	.	.	.	1	100	.	.	.	.	.	.
12	1	100	.	.	1	100	.	.	.	.	1	0	3	33.3	3	100	.	.	6	50	.	.	3	100	1	100	1	0	.	.
13	312	91	154	93.5	63	95.2	72	93.1	8	100	5	80	2	100	8	100	13	100	6	83.3	6	83.3	18	100	36	80.6	53	83	9	55.6
14	.	.	.	.	.	.	.	.	.	.	1	0	1	100	2	0	1	0	.	.	.	.	.	.	3	66.7	.	.	.	.
15	.	.	.	.	1	100	.	.	.	.	5	100	2	0	1	0	.	.	.	.	.	.	.	.	.	.	4	50	1	100
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	100
18	10	80	5	100	34	50	45	62.2	4	100	10	100	18	83.3	24	95.8	19	94.7	15	100	24	87.5	30	93.3	37	81.1	27	85.2	32	87.5
19	49	98	42	92.9	17	82.4	25	96	18	83.3	15	93.3	14	71.4	6	100	.	.	14	92.9	6	83.3	4	100	1	100	3	66.7	5	80
20	3	100	.	.	.	.	1	100	5	80	3	100	.	.	.	.	3	100	2	100	.	.	1	100	2	50	18	33.3	23	26.1
21	19	78.9	6	66.7	7	57.1	27	81.5	6	66.7	16	87.5	7	100	5	100	2	100	4	50	6	100	1	100	14	85.7	11	90.9	7	71.4
22	18	83.3	30	46.7	19	68.4	38	81.6	12	66.7	17	82.4	12	25	2	50	5	80	4	75	4	100	6	100	13	76.9	12	75	8	100
23	.	.	1	0	1	0	2	100	.	.	.	.	.	.	.	.	.	.	2	100	.	.	.	.	.	.	2	100	3	66.7
24	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	1	100	.	.	.	.	.	.	.	.
25	.	.	9	88.9	10	80	71	94.4	59	79.7	29	96.6	53	71.7	44	68.2	52	63.5	35	54.3	9	77.8	18	44.4	16	68.8	1	100	1	0
26	3	100	1	100	1	100	.	.	.	.	.	.	.	.	.	.	1	100	.	.	.	.	.	.	.	.	.	.	1	0
27	15	100	.	.	8	87.5	13	100	8	100	1	100	9	100	10	100	6	100	14	100	8	100	7	100	3	100	4	100	8	75
28	19	100	.	.	2	100	13	100	2	100	1	100	5	80	11	90.9	12	91.7	12	100	12	91.7	10	100	7	100	2	50	1	100
29	74	93.2	.	.	6	100	4	100	.	.	2	100	2	100	1	100	3	100	1	100	4	100	4	75	2	100	.	.	.	.
30	5	60	1	100	.	.	.	.	.	.	1	100	.	.	.	.	2	100	.	.	1	100	.	.	.	.	.	.	.	.
31	15	40	2	50	2	100	9	55.6	4	50	6	50	14	71.4	25	80	8	75	13	84.6	7	100	12	100	8	100	7	100	.	.
32	.	.	.	.	1	100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	60	7	100
33	119	47.1	90	26.7	33	30.3	87	19.5	79	31.6	51	29.4	52	48.1	70	55.7	60	58.3	85	81.2	60	75	48	52.1	29	51.7	71	18.3	29	24.1
34	.	.	.	.	.	.	1	100	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	.	.	.	.	.	.	.
35	2	100	4	100	9	100	.	.	2	100	.	.	.	.	.	.	.	.	.	.	.	.	21	47.6	1	100	36	38.9	62	67.7
36	46	100	49	95.9	28	100	1	100	5	100	16	93.8	18	83.3	21	85.7	8	100	56	96.4	29	89.7	34	97.1	15	100	9	55.6	45	73.3
37	119	73.1	78	79.5	80	47.5	39	48.7	48	83.3	34	88.2	86	74.4	103	61.2	103	69.9	96	60.4	110	70	117	60.7	193	48.2	217	56.7	188	29.8
38	63	82.5	11	100	2	50	1	100	2	100	3	66.7	13	92.3	10	70	23	73.9	38	71.1	56	58.9	55	74.5	81	70.4	57	66.7	45	73.3
39	2	100	.	.	.	.	.	.	.	.	.	.	6	83.3	15	66.7	25	72	24	83.3	24	75	20	65	27	66.7	8	100	10	50
40	12	75	7	85.7	.	.	.	.	.	.	.	.	4	50	.	.	5	60	6	83.3	10	80	8	62.5	6	100	40	75	8	50
41	19	68.4	43	4.7	18	16.7	4	0	14	21.4	3	0	17	52.9	30	36.7	34	52.9	45	44.4	21	66.7	29	41.4	30	40	50	52	11	63.6
42	20	45	28	14.3	.	.	.	.	48	66.7	8	50	44	56.8	72	45.8	44	43.2	73	53.4	61	52.5	88	62.5	76	51.3	122	50.8	78	46.2

Table 1.8: Number of sport trip intercepts by municipio and year, and associated percent of trips capturing reeffishes.

	2000		2001		2002		2003		2004		2005		2006		2007		2008		2009	
muni_nr	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef
1	.	.	.	.	.	.	.	.	1	100	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	1	0	2	50	.	.	.	.	.	.	.	.	2	100	.	.
5	75	14.7	62	38.7	69	24.6	95	35.8	49	32.7	3	66.7	3	0	14	28.6	18	0	25	8
6	3	0	1	100	2	0	1	0	1	100	1	100	1	0	1	100	1	0	3	0
8	6	66.7	29	44.8	15	66.7	39	25.6	10	20	16	6.3	11	18.2	36	13.9	22	27.3	22	45.5
9	1	0	.	.	.	.	.	.	.	.	.	.	.	.	2	100	.	.	.	.
10	17	76.5	3	100	.	.	2	100	2	100	1	100	.	.	.	.	.	.	.	.
11	7	71.4	.	.	1	100	1	100	.	.	2	50	.	.	1	100	.	.	1	100
12	22	54.5	20	60	18	33.3	46	67.4	18	27.8	23	78.3	20	50	36	52.8	17	35.3	43	37.2
13	59	13.6	66	3	29	6.9	17	17.6	16	0	3	0	13	0	18	11.1	13	0	18	5.6
14	31	22.6	15	33.3	19	31.6	9	55.6	12	8.3	4	25	2	0	11	18.2	17	17.6	13	15.4
15	5	20	.	.	2	0	6	33.3	.	.	.	.	.	.	7	42.9	.	.	7	14.3
18	8	25	12	50	1	100	20	45	47	36.2	32	53.1	25	40	39	64.1	16	56.3	16	56.3
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	100
20	.	.	.	.	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	32	18.8	15	0	3	33.3	38	34.2	10	30	2	50	6	0	2	0	7	42.9	2	0
22	1	0	.	.	.	.	1	0	.	.	.	.	.	.	.	.	2	0	2	0
24	.	.	2	50	1	100	3	66.7	.	.	3	100	2	50	.	.	1	100	.	.
25	.	.	2	50	.	.	.	.	.	.	2	100	.	.	3	100	1	100	.	.
26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	100	.	.
28	10	50	.	.	.	.	1	0	3	100	3	100	2	100	6	33.3	4	100	.	.
29	.	.	.	.	1	0	1	0	.	.	1	100	.	.	1	0	.	.	5	0
30	3	66.7	.	.	2	50	.	.	.	.	.	.	.	.	.	.	3	0	4	75
32	34	58.8	6	50	4	0	9	77.8	3	33.3	5	60	6	83.3	10	90	11	63.6	5	80
33	8	37.5	.	.	.	.	.	.	.	.	.	.	4	100	2	100	.	.	.	.
35	3	66.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	100	.	.
36	3	33.3	2	50	3	33.3	1	100	7	57.1	5	80	20	45	18	0	22	18.2	7	28.6
37	27	70.4	28	60.7	8	37.5	17	41.2	15	26.7	21	76.2	11	54.5	9	55.6	7	28.6	8	50
38	6	16.7	89	43.8	16	43.8	70	70	36	66.7	17	76.5	9	100	26	42.3	39	41	4	25
39	.	.	21	61.9	.	.	7	14.3	.	.	4	0	4	50	.	.	4	50	.	.
40	11	18.2	70	47.1	9	44.4	14	50	11	45.5	18	44.4	16	12.5	2	50	12	50	6	83.3
41	5	20	1	0	.	.	2	0	4	75	.	.	8	25	.	.	1	0	.	.
42	.	.	.	.	7	42.9	5	0	.	.	6	33.3	.	.	.	.	3	0	1	100

Table 1.9: Trip intercepts and % reeffish trips by region and time block for (A) TIP and (B) MRFSS.

(A) TIP

	North		East		South		West-SW	
Time	**Trips**	**% reef**	**Trips**	**% reef**	**Trips**	**% reef**	**Trips**	**% reef**
1992-93	495	91.9	192	82.8	344	57.6	503	70.8
1994-96	152	92.8	402	77.9	273	43.6	301	61.1
1995-97	189	59.8	275	80.4	261	58.6	503	64.6
2000-02	234	62.4	207	77.3	310	79.7	891	65.8
2003-05	196	78.6	143	79.0	130	70.8	801	60.0
2006-08	226	73.0	153	69.3	140	37.1	986	52.9

(B) MRFSS

	North		East		South		West-SW	
Time	**Trips**	**% reef**	**Trips**	**% reef**	**Trips**	**% reef**	**Trips**	**% reef**
2000-02	578	28.2	78	24.4	68	50.0	309	47.6
2003-05	380	37.4	158	42.4	26	69.2	260	56.9
2006-08	266	25.6	104	51.0	50	72.0	215	37.7

Table 1.10: Number of trips by gear for selected reeffishes, TIP sampling 1992-2007. Colored cells indicate the principal gear type (orange) and secondary gear type (green) used to catch the specific species.

	Number of Trips					
Common Name	**Total**	**Beach Seine**	**Trap**	**Bottom Line**	**Spear/Scuba**	**Trammel Net**
queen triggerfish	668	16	192	112	103	151
white grunt	1735	91	488	424	16	421
hogfish	710	9	116	32	427	69
schoolmaster	715	11	186	212	83	135
lane snapper	1475	102	389	610	23	47
silk snapper	819	3	212	546	1	1
yellowtail snapper	2183	139	319	1258	19	145
redtail parrotfish	888	26	296	29	29	421
stoplight parrotfish	736	14	161	7	57	424
red hind	1549	16	276	601	361	144

Table 1.11: Number of intercepted trips by gear and season and associated percent reef trips for TIP sampling 1992-2007.

		Jan-Feb		Mar-Apr		May-Jun		Jul-Aug		Sep-Oct		Nov-Dec	
Gear	**Time**	**n trips**	**% reef**	**n trips**	**% reef**	**n trips**	**% reef**	**n trips**	**% reef**	**n trips**	**% reef**	**n trips**	**% reef**
Beach Seine	1992-93	3	100.0	7	100.0	1	100.0	1	100.0	5	100.0	4	100.0
	1994-96	5	100.0	3	100.0	4	75.0	2	100.0	6	50.0	3	66.7
	1995-97	4	75.0	2	0.0	18	33.3	11	45.5	3	66.7	7	42.9
	2000-02	16	62.5	20	40.0	20	45.0	23	52.2	19	47.4	20	35.0
	2003-05	13	69.2	12	41.7	8	37.5	10	70.0	10	30.0	6	83.3
	2006-08	17	64.7	7	100.0	7	85.7	3	66.7	7	71.4	8	37.5
Trap	1992-93	40	95.0	38	94.7	15	100.0	12	100.0	13	100.0	9	100.0
	1994-96	32	84.4	46	91.3	26	84.6	14	92.9	19	84.2	29	93.1
	1995-97	30	90.0	17	94.1	40	100.0	25	96.0	41	87.8	40	87.5
	2000-02	46	93.5	58	93.1	34	100.0	23	100.0	33	93.9	36	94.4
	2003-05	28	92.9	21	95.2	19	100.0	22	86.4	47	87.2	26	84.6
	2006-08	38	73.7	14	71.4	7	85.7	14	92.9	33	60.6	14	71.4
Bottom Line	1992-93	101	94.1	96	95.8	93	80.6	85	97.6	50	96.0	21	100.0
	1994-96	104	94.2	137	98.5	83	85.5	32	96.9	76	93.4	13	100.0
	1995-97	61	96.7	68	92.6	71	77.5	93	74.2	57	84.2	33	81.8
	2000-02	73	80.8	96	80.2	100	82.0	89	79.8	101	81.2	85	82.4
	2003-05	85	75.3	104	83.7	78	83.3	78	79.5	105	96.2	56	92.9
	2006-08	84	83.3	75	82.7	73	65.8	108	78.7	157	85.4	101	91.1
Spear/Scuba	1992-93	37	62.2	59	37.3	36	22.2	32	21.9	49	30.6	33	30.3
	1994-96	64	35.9	50	34.0	53	22.6	29	27.6	43	11.6	47	23.4
	1995-97	43	41.9	65	35.4	85	49.4	28	35.7	35	40.0	45	33.3
	2000-02	76	48.7	60	51.7	65	58.5	59	54.2	65	47.7	60	48.3
	2003-05	54	44.4	42	40.5	43	18.6	47	42.6	53	24.5	56	35.7
	2006-08	94	22.3	63	20.6	53	18.9	95	42.1	81	30.9	54	22.2
Trammel Net	1992-93	9	88.9	15	100.0	10	90.0	7	100.0	11	100.0	9	100.0
	1994-96	12	100.0	17	100.0	8	100.0	5	100.0	9	100.0	3	100.0
	1995-97	19	94.7	12	100.0	10	100.0	25	96.0	16	100.0	24	95.8
	2000-02	29	100.0	29	100.0	22	95.5	26	100.0	41	97.6	27	100.0
	2003-05	17	88.2	22	100.0	19	100.0	7	100.0	22	100.0	17	88.2
	2006-08	23	91.3	10	90.0	22	90.9	11	90.9	14	92.9	7	100.0

Table 1.12: Trip intercepts and % reeffish trips by region, gear and time block TIP. Green colored cells indicate the principal region where the specific gear type was used.

		North		East		South		West-SW	
Gear	Time	Trips	% reef	Trips	% reef	Trips	% reef	Trips	% reef
Beach Seine	1992-93	1	100	.	.	1	100	19	100
	1994-96	.	.	2	0	3	66.7	18	88.9
	1997-99	8	12.5	3	33.3	1	0	33	51.5
	2000-02	14	0	2	100	2	100	100	51
	2003-05	4	0	.	.	1	0	54	59.3
	2006-08	6	16.7	2	100	1	100	40	75
Trap	1992-93	10	100	22	95.5	20	90	75	98.7
	1994-96	3	66.7	49	95.9	57	96.5	57	75.4
	1997-99	50	84	41	100	61	95.1	41	90.2
	2000-02	75	92	36	97.2	81	97.5	38	94.7
	2003-05	52	94.2	19	94.7	47	97.9	45	75.6
	2006-08	50	68	29	79.3	13	84.6	28	67.9
Bottom Line	1992-93	314	96.8	96	79.2	6	83.3	30	96.7
	1994-96	140	98.6	253	93.7	2	100	50	84
	1997-99	84	64.3	173	90.2	4	100	122	87.7
	2000-02	116	53.4	96	90.6	4	100	328	87.8
	2003-05	105	88.6	98	89.8	1	0	302	82.8
	2006-08	135	87.4	80	91.3	7	57.1	376	78.7
Spear/Scuba	1992-93	.	.	2	50	185	37.3	59	25.4
	1994-96	.	.	33	57.6	184	23.9	69	18.8
	1997-99	6	66.7	40	35	156	44.2	99	35.4
	2000-02	9	33.3	56	48.2	184	72.3	136	25.7
	2003-05	9	33.3	24	29.2	69	55.1	193	28
	2006-08	12	83.3	36	22.2	91	24.2	301	26.9
Trammel Net	1992-93	.	.	.	.	1	100	60	96.7
	1994-96	.	.	.	.	1	100	53	100
	1997-99	.	.	1	100	3	100	102	97.1
	2000-02	.	.	1	100	13	100	160	98.8
	2003-05	1	100	.	.	3	100	100	96
	2006-08	1	100	.	.	3	100	83	91.6

Table 1.13: Time-series of Lbar estimates for yellowtail snapper, TIP only and combined data sources.

					TIP only				All sources			
family	**latin**	**common**	**year**	**LC**	**n**	**lbar (FL mm)**	**lw_se**	**up_se**	**n**	**lbar**	**lw_se**	**up_se**
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1983	240	190	285.9	3.0	3.0	190	285.9	3.0	3.0
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1984	240	1060	284.3	1.0	1.0	1060	284.3	1.0	1.0
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1985	240	1149	295.0	1.2	1.2	1149	295.0	1.2	1.2
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1986	240	1365	288.2	1.2	1.2	1365	288.2	1.2	1.2
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1987	240	438	276.1	1.7	1.7	438	276.1	1.7	1.7
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1988	240	1115	287.9	1.2	1.2	1115	287.9	1.2	1.2
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1989	240	693	288.6	1.6	1.6	693	288.6	1.6	1.6
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1990	240	1393	292.0	1.1	1.1	1393	292.0	1.1	1.1
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1991	240	7831	295.2	0.5	0.5	7838	295.3	0.5	0.5
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1992	240	7040	290.1	0.5	0.5	7053	290.1	0.5	0.5
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1993	240	5021	287.4	0.5	0.5	5034	287.4	0.5	0.5
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1994	240	3821	287.0	0.6	0.6	3826	287.0	0.6	0.6
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1995	240	3767	302.2	0.8	0.8	3768	302.2	0.8	0.8
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1996	240	496	286.8	1.8	1.8	496	286.8	1.8	1.8
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1997	240	574	297.2	2.2	2.2	575	297.2	2.2	2.2
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1998	240	1742	315.6	1.5	1.5	1750	315.3	1.5	1.5
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	1999	240	2062	300.4	1.2	1.2	2072	300.3	1.2	1.2
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2000	240	4063	309.2	0.9	0.9	4085	309.1	0.9	0.9
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2001	240	2800	316.0	1.1	1.1	2826	316.0	1.1	1.1
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2002	240	3630	319.0	0.9	0.9	3665	318.9	0.9	0.9
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2003	240	4310	330.5	1.0	1.0	4346	330.5	1.0	1.0
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2004	240	2396	312.4	1.1	1.1	2439	312.6	1.1	1.1
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2005	240	-	-	-	-	50	316.8	8.2	8.5
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2006	240	2663	334.9	1.1	1.1	2687	334.4	1.1	1.1
Lutjanidae	Ocyurus chrysurus	yellowtail snapper	2007	240	3265	323.4	0.9	0.9	3290	323.2	0.9	0.9

Table 1.14: Time-series of Lbar estimates for red hind, TIP only and combined data sources.

					TIP only				All sources			
family	**latin**	**common**	**year**	**LC**	**n**	**lbar (FL mm)**	**lw_se**	**up_se**	**n**	**lbar**	**lw_se**	**up_se**
Serranidae	Epinephelus guttatus	red hind	1983	260	414	307.4	1.9	2.0	414	307.4	1.9	2.0
Serranidae	Epinephelus guttatus	red hind	1984	260	895	303.2	1.3	1.3	895	303.2	1.3	1.3
Serranidae	Epinephelus guttatus	red hind	1985	260	719	304.6	1.4	1.4	719	304.6	1.4	1.4
Serranidae	Epinephelus guttatus	red hind	1986	260	1047	313.7	1.4	1.4	1047	313.7	1.4	1.4
Serranidae	Epinephelus guttatus	red hind	1987	260	875	309.2	1.3	1.4	875	309.2	1.3	1.4
Serranidae	Epinephelus guttatus	red hind	1988	260	738	316.3	1.6	1.6	738	316.3	1.6	1.6
Serranidae	Epinephelus guttatus	red hind	1989	260	565	321.5	2.1	2.1	565	321.5	2.1	2.1
Serranidae	Epinephelus guttatus	red hind	1990	260	549	326.7	2.3	2.4	549	326.7	2.3	2.4
Serranidae	Epinephelus guttatus	red hind	1991	260	1124	330.2	1.5	1.5	2248	317.1	1.0	1.0
Serranidae	Epinephelus guttatus	red hind	1992	260	783	320.2	1.6	1.6	2043	309.6	0.9	0.9
Serranidae	Epinephelus guttatus	red hind	1993	260	427	323.2	2.2	2.2	1218	309.9	1.1	1.1
Serranidae	Epinephelus guttatus	red hind	1994	260	352	325.1	2.2	2.2	997	309.1	1.2	1.3
Serranidae	Epinephelus guttatus	red hind	1995	260	330	317.6	2.4	2.5	330	317.6	2.4	2.5
Serranidae	Epinephelus guttatus	red hind	1996	260	119	318.3	4.1	4.2	119	318.3	4.1	4.2
Serranidae	Epinephelus guttatus	red hind	1997	260	195	320.6	3.8	3.8	195	320.6	3.8	3.8
Serranidae	Epinephelus guttatus	red hind	1998	260	517	321.3	2.0	2.0	517	321.3	2.0	2.0
Serranidae	Epinephelus guttatus	red hind	1999	260	870	339.7	1.8	1.8	874	341.0	1.9	1.9
Serranidae	Epinephelus guttatus	red hind	2000	260	731	331.1	1.8	1.8	752	332.9	2.0	2.0
Serranidae	Epinephelus guttatus	red hind	2001	260	980	325.2	1.6	1.6	1031	325.2	1.5	1.5
Serranidae	Epinephelus guttatus	red hind	2002	260	841	324.0	1.6	1.6	866	324.4	1.6	1.6
Serranidae	Epinephelus guttatus	red hind	2003	260	928	338.7	1.8	1.8	959	338.4	1.8	1.8
Serranidae	Epinephelus guttatus	red hind	2004	260	987	339.1	1.7	1.7	1020	340.0	1.8	1.8
Serranidae	Epinephelus guttatus	red hind	2005	260	-	-	-	-	66	320.7	5.4	5.5
Serranidae	Epinephelus guttatus	red hind	2006	260	837	348.9	1.9	1.9	843	348.6	1.9	1.9
Serranidae	Epinephelus guttatus	red hind	2007	260	408	340.6	2.4	2.5	424	340.3	2.4	2.4

Table 1.15: Time-series of Lbar estimates for white grunt, TIP only and combined data sources.

					TIP only				All sources			
family	**latin**	**common**	**year**	**LC**	**n**	**lbar (FL mm)**	**lw_se**	**up_se**	**n**	**lbar**	**lw_se**	**up_se**
Haemulidae	Haemulon plumierii	white grunt	1983	200	752	227.5	0.8	0.8	752	227.5	0.8	0.8
Haemulidae	Haemulon plumierii	white grunt	1984	200	1991	228.2	0.5	0.5	1991	228.2	0.5	0.5
Haemulidae	Haemulon plumierii	white grunt	1985	200	1138	228.7	0.8	0.8	1138	228.7	0.8	0.8
Haemulidae	Haemulon plumierii	white grunt	1986	200	3482	230.5	0.4	0.4	3482	230.5	0.4	0.4
Haemulidae	Haemulon plumierii	white grunt	1987	200	1946	228.7	0.5	0.5	1946	228.7	0.5	0.5
Haemulidae	Haemulon plumierii	white grunt	1988	200	2478	232.4	0.4	0.4	2478	232.4	0.4	0.4
Haemulidae	Haemulon plumierii	white grunt	1989	200	2581	229.3	0.4	0.4	2581	229.3	0.4	0.4
Haemulidae	Haemulon plumierii	white grunt	1992	200	2701	234.1	0.4	0.4	2709	234.2	0.4	0.4
Haemulidae	Haemulon plumierii	white grunt	1993	200	1838	233.1	0.5	0.5	1857	233.2	0.5	0.5
Haemulidae	Haemulon plumierii	white grunt	1994	200	669	235.6	1.0	1.0	683	235.7	1.0	1.0
Haemulidae	Haemulon plumierii	white grunt	1995	200	1391	237.4	0.6	0.6	1396	237.3	0.6	0.6
Haemulidae	Haemulon plumierii	white grunt	1996	200	218	229.4	1.6	1.6	218	229.4	1.6	1.6
Haemulidae	Haemulon plumierii	white grunt	1997	200	249	237.8	1.5	1.5	252	238.0	1.5	1.5
Haemulidae	Haemulon plumierii	white grunt	1998	200	921	230.3	0.8	0.8	931	230.3	0.7	0.8
Haemulidae	Haemulon plumierii	white grunt	1999	200	1159	230.6	0.7	0.7	1164	230.7	0.7	0.7
Haemulidae	Haemulon plumierii	white grunt	2000	200	1363	237.3	0.8	0.8	1381	237.4	0.8	0.8
Haemulidae	Haemulon plumierii	white grunt	2001	200	1359	233.5	0.7	0.7	1387	233.6	0.7	0.7
Haemulidae	Haemulon plumierii	white grunt	2002	200	1554	234.9	0.7	0.7	1565	235.0	0.7	0.7
Haemulidae	Haemulon plumierii	white grunt	2003	200	1240	234.1	0.8	0.8	1258	234.3	0.8	0.8
Haemulidae	Haemulon plumierii	white grunt	2004	200	789	229.5	0.9	0.9	797	229.6	0.9	0.9
Haemulidae	Haemulon plumierii	white grunt	2005	200	-	-	-	-	39	236.0	3.2	3.2
Haemulidae	Haemulon plumierii	white grunt	2006	200	669	235.0	1.2	1.2	683	235.0	1.2	1.2
Haemulidae	Haemulon plumierii	white grunt	2007	200	263	265.9	2.6	2.6	272	264.8	2.5	2.5

Table 1.16: Time-series of Lbar estimates for hogfish, TIP only and combined data sources.

					TIP only				All sources			
family	**latin**	**common**	**year**	**LC**	**n**	**lbar (FL mm)**	**lw_se**	**up_se**	**n**	**lbar**	**lw_se**	**up_se**
Labridae	Lachnolaimus maximus	hogfish	1983	240	84	356.9	9.0	9.2	84	356.9	9.0	9.2
Labridae	Lachnolaimus maximus	hogfish	1984	240	189	337.2	6.2	6.3	189	337.2	6.2	6.3
Labridae	Lachnolaimus maximus	hogfish	1985	240	76	370.8	10.3	10.6	76	370.8	10.3	10.6
Labridae	Lachnolaimus maximus	hogfish	1986	240	100	325.0	7.9	8.1	100	325.0	7.9	8.1
Labridae	Lachnolaimus maximus	hogfish	1987	240	118	324.8	7.4	7.6	118	324.8	7.4	7.6
Labridae	Lachnolaimus maximus	hogfish	1988	240	180	346.7	6.1	6.2	180	346.7	6.1	6.2
Labridae	Lachnolaimus maximus	hogfish	1989	240	222	376.3	6.3	6.4	222	376.3	6.3	6.4
Labridae	Lachnolaimus maximus	hogfish	1990	240	198	376.6	6.9	7.0	198	376.6	6.9	7.0
Labridae	Lachnolaimus maximus	hogfish	1991	240	237	345.2	5.2	5.2	237	345.2	5.2	5.2
Labridae	Lachnolaimus maximus	hogfish	1992	240	185	363.0	6.4	6.5	185	363.0	6.4	6.5
Labridae	Lachnolaimus maximus	hogfish	1993	240	104	354.4	8.4	8.6	104	354.4	8.4	8.6
Labridae	Lachnolaimus maximus	hogfish	1994	240	77	338.4	9.6	9.9	77	338.4	9.6	9.9
Labridae	Lachnolaimus maximus	hogfish	1995	240	76	354.7	9.8	10.1	76	354.7	9.8	10.1
Labridae	Lachnolaimus maximus	hogfish	1996	240	63	327.4	9.7	10.0	63	327.4	9.7	10.0
Labridae	Lachnolaimus maximus	hogfish	1997	240	46	351.5	11.4	11.8	46	351.5	11.4	11.8
Labridae	Lachnolaimus maximus	hogfish	1998	240	113	324.4	7.5	7.6	113	324.4	7.5	7.6
Labridae	Lachnolaimus maximus	hogfish	1999	240	245	343.4	5.0	5.0	245	343.4	5.0	5.0
Labridae	Lachnolaimus maximus	hogfish	2000	240	217	353.7	5.0	5.1	217	353.7	5.0	5.1
Labridae	Lachnolaimus maximus	hogfish	2001	240	421	326.5	3.1	3.2	424	326.6	3.1	3.2
Labridae	Lachnolaimus maximus	hogfish	2002	240	175	341.3	5.6	5.7	176	340.9	5.6	5.7
Labridae	Lachnolaimus maximus	hogfish	2003	240	182	346.2	6.1	6.2	187	345.8	5.9	6.0
Labridae	Lachnolaimus maximus	hogfish	2004	240	147	351.2	6.8	6.9	149	350.9	6.7	6.8
Labridae	Lachnolaimus maximus	hogfish	2005-06	240	166	374.9	7.7	7.9	173	372.2	7.5	7.6
Labridae	Lachnolaimus maximus	hogfish	2007	240	92	355.3	8.3	8.5	100	354.5	8.1	8.2

Table 1.17: Time-series of Lbar estimates for stoplight parrotfish, TIP only and combined data sources.

					TIP only				All sources			
family	**latin**	**common**	**year**	**LC**	**n**	**lbar (FL mm)**	**lw_se**	**up_se**	**n**	**lbar**	**lw_se**	**up_se**
Scaridae	Sparisoma viride	stoplight parrotfish	1986	220	1472	269.8	0.8	0.8	1472	269.8	0.8	0.8
Scaridae	Sparisoma viride	stoplight parrotfish	1987	220	696	276.5	1.3	1.3	696	276.5	1.3	1.3
Scaridae	Sparisoma viride	stoplight parrotfish	1988	220	649	283.2	1.4	1.4	649	283.2	1.4	1.4
Scaridae	Sparisoma viride	stoplight parrotfish	1989	220	597	279.1	1.4	1.4	597	279.1	1.4	1.4
Scaridae	Sparisoma viride	stoplight parrotfish	1990	220	729	277.3	1.2	1.2	729	277.3	1.2	1.2
Scaridae	Sparisoma viride	stoplight parrotfish	1991	220	767	278.2	1.1	1.1	767	278.2	1.1	1.1
Scaridae	Sparisoma viride	stoplight parrotfish	1992	220	587	271.2	1.3	1.3	587	271.2	1.3	1.3
Scaridae	Sparisoma viride	stoplight parrotfish	1993	220	471	271.9	1.5	1.5	471	271.9	1.5	1.5
Scaridae	Sparisoma viride	stoplight parrotfish	1994	220	264	272.9	2.2	2.3	265	273.1	2.2	2.3
Scaridae	Sparisoma viride	stoplight parrotfish	1995	220	191	290.8	3.0	3.0	191	290.8	3.0	3.0
Scaridae	Sparisoma viride	stoplight parrotfish	1996	220	323	281.4	2.0	2.0	323	281.4	2.0	2.0
Scaridae	Sparisoma viride	stoplight parrotfish	1997	220	215	277.8	2.4	2.4	215	277.8	2.4	2.4
Scaridae	Sparisoma viride	stoplight parrotfish	1998	220	570	272.9	1.5	1.5	570	272.9	1.5	1.5
Scaridae	Sparisoma viride	stoplight parrotfish	1999	220	908	276.2	1.1	1.1	908	276.2	1.1	1.1
Scaridae	Sparisoma viride	stoplight parrotfish	2000	220	993	274.2	1.1	1.1	998	273.9	1.1	1.1
Scaridae	Sparisoma viride	stoplight parrotfish	2001	220	986	274.0	1.1	1.1	1016	274.6	1.1	1.1
Scaridae	Sparisoma viride	stoplight parrotfish	2002	220	1137	277.2	1.0	1.0	1187	276.3	1.0	1.0
Scaridae	Sparisoma viride	stoplight parrotfish	2003	220	570	278.5	1.5	1.5	636	276.5	1.5	1.5
Scaridae	Sparisoma viride	stoplight parrotfish	2004	220	814	268.7	1.2	1.2	858	268.9	1.2	1.2
Scaridae	Sparisoma viride	stoplight parrotfish	2005	220	-	-	-	-	48	279.6	10.4	10.8
Scaridae	Sparisoma viride	stoplight parrotfish	2006	220	610	275.6	1.3	1.3	651	273.7	1.3	1.3
Scaridae	Sparisoma viride	stoplight parrotfish	2007	220	224	287.9	2.2	2.2	296	285.1	2.3	2.3

Figure 1.1: Database processing flow chart.

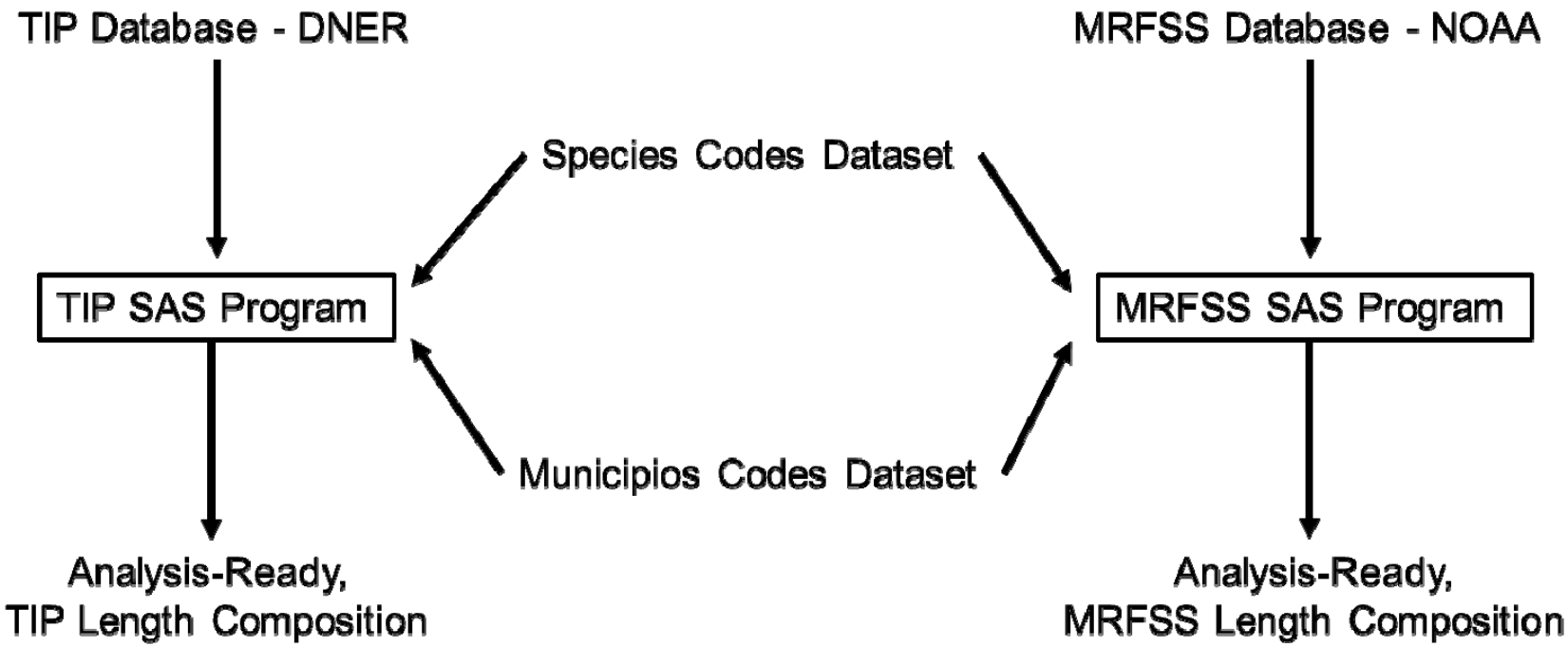


Figure 1.2: A. Bathymetry map showing the 35m contour line, **B.** Map of Puerto Rico showing the municipios and benthic habitat types.

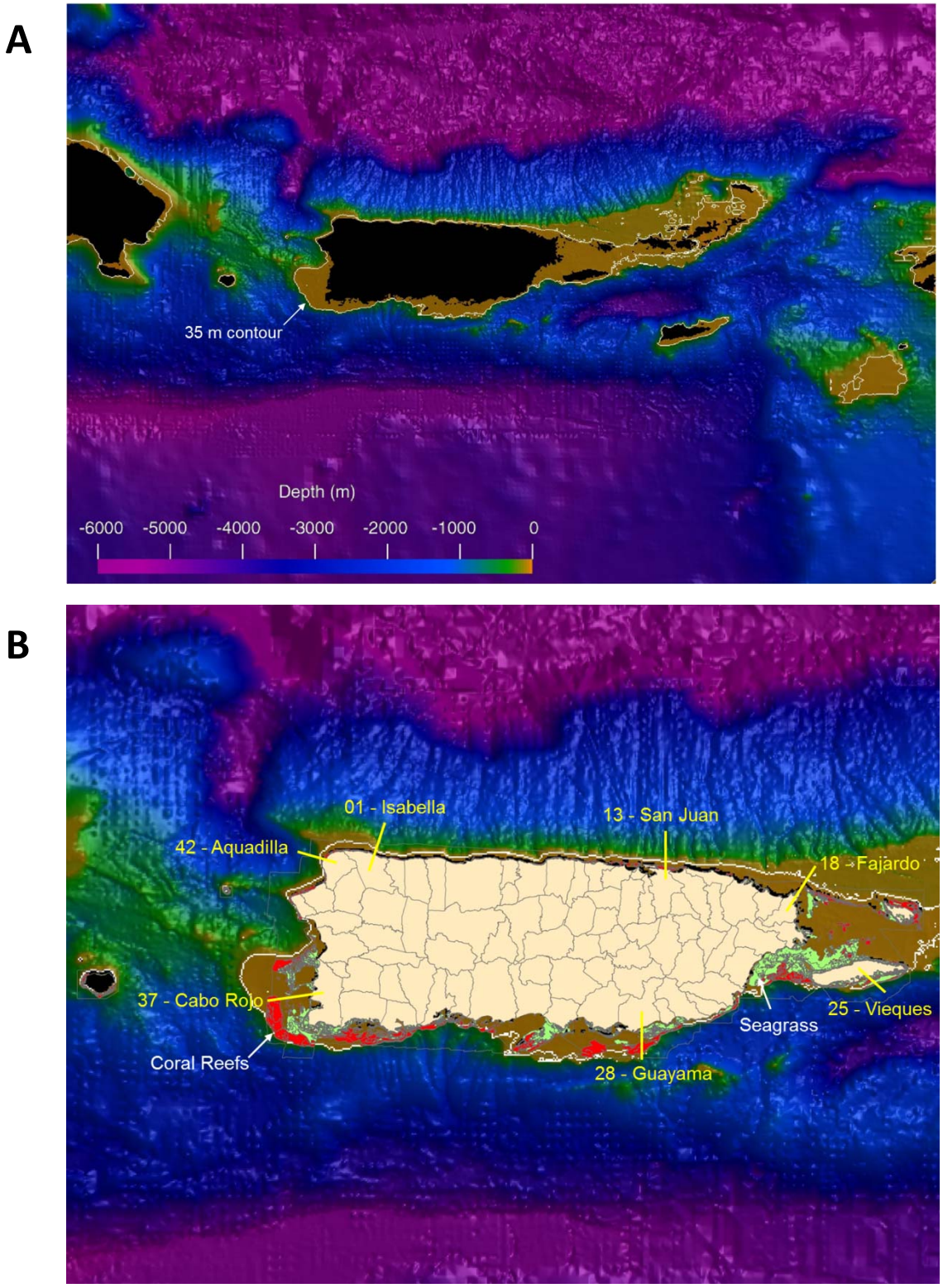


Figure 1.3: Map of Puerto Rico showing the four fishing regions and corresponding principal municipios for the different databases.

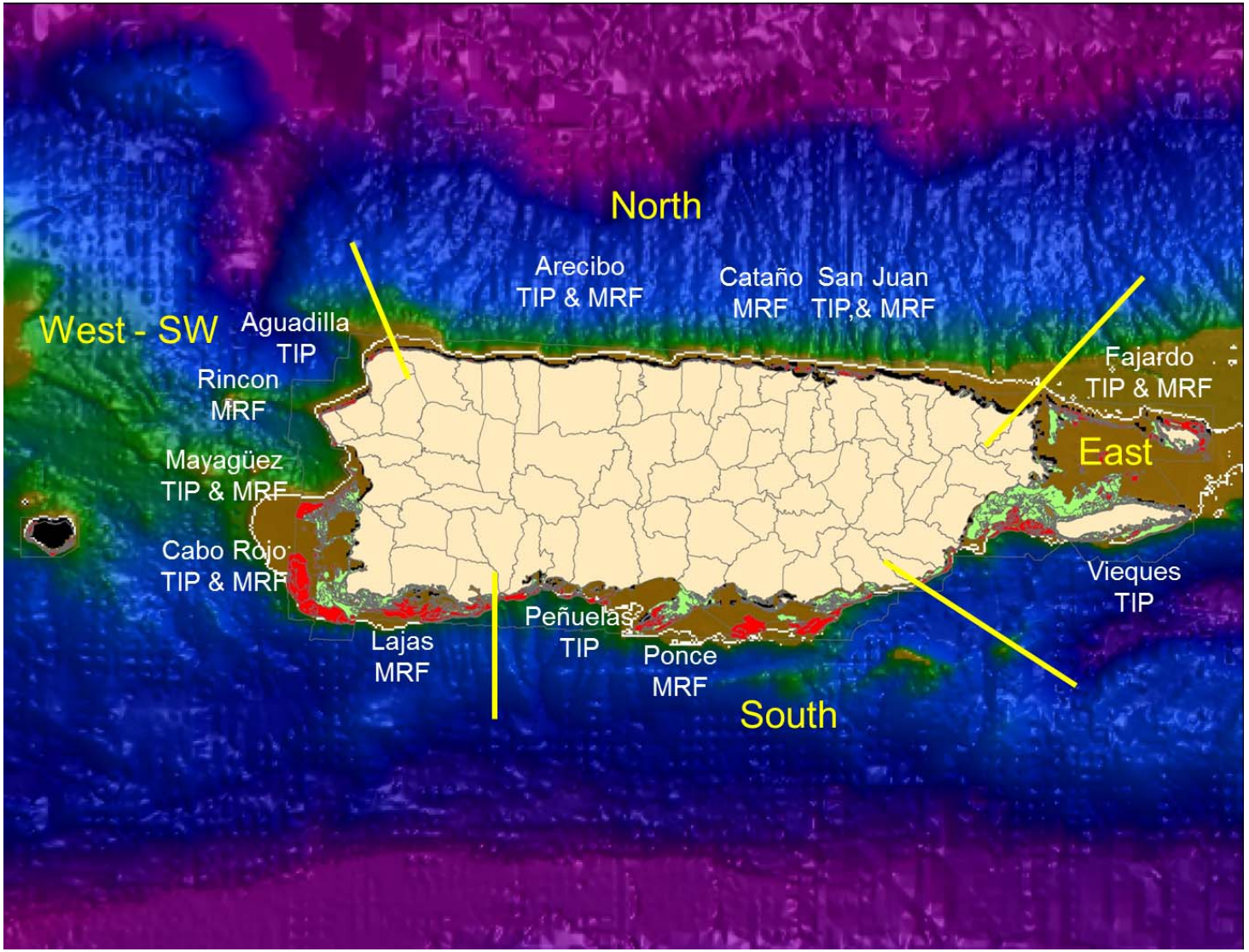


Figure 1.4: Seasonal species occurrence by gear of A. White Grunt (2003-05, Trap), B. Hogfish (1997-99, Spear), C. Yellowtail Snapper (2003-05, Bottom line) and D. Stoplight Parrotfish (2000-02, Trammel net), TIP only.

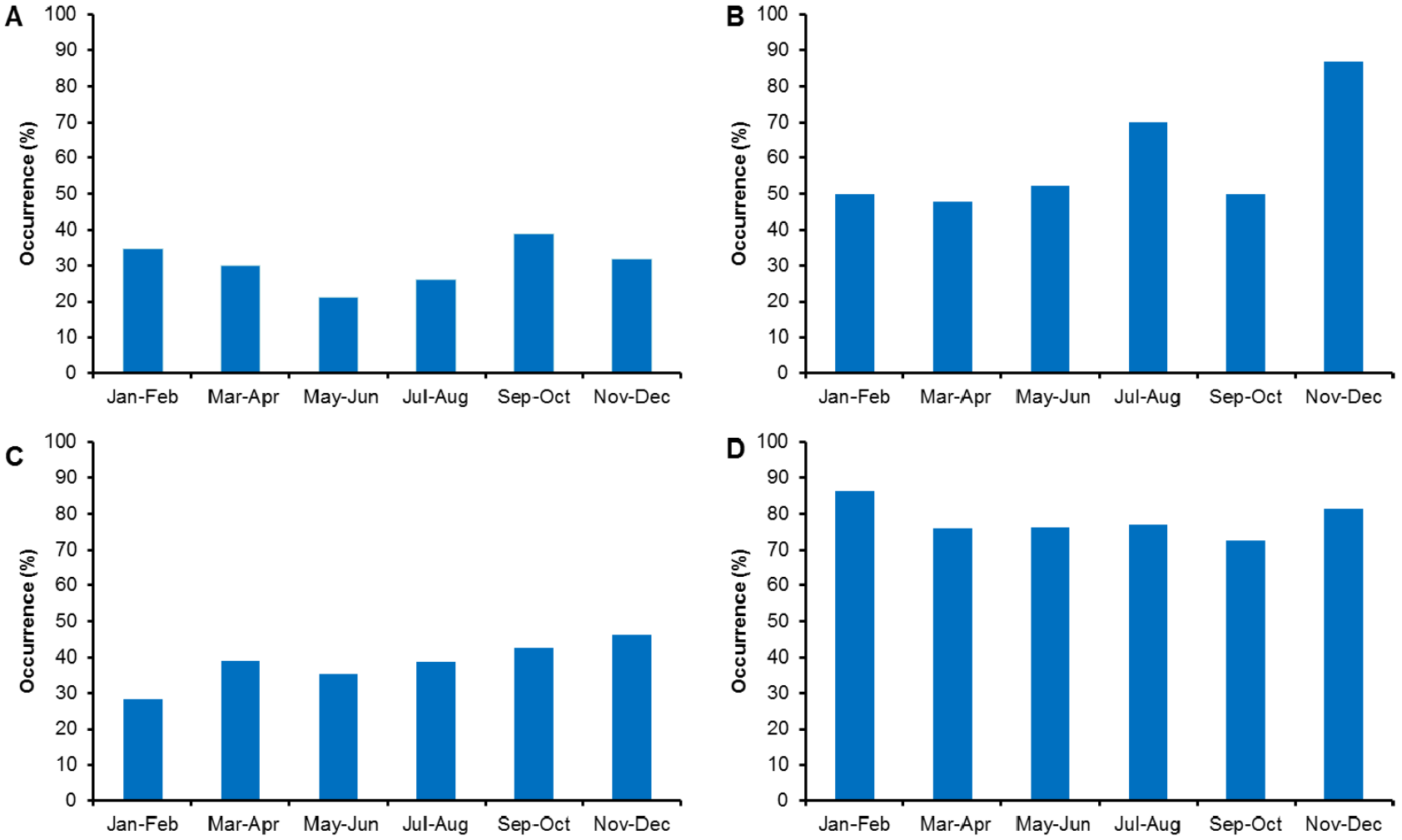


Figure 1.5: Regional species occurrence by gear of Hogfish (Spear), TIP only.

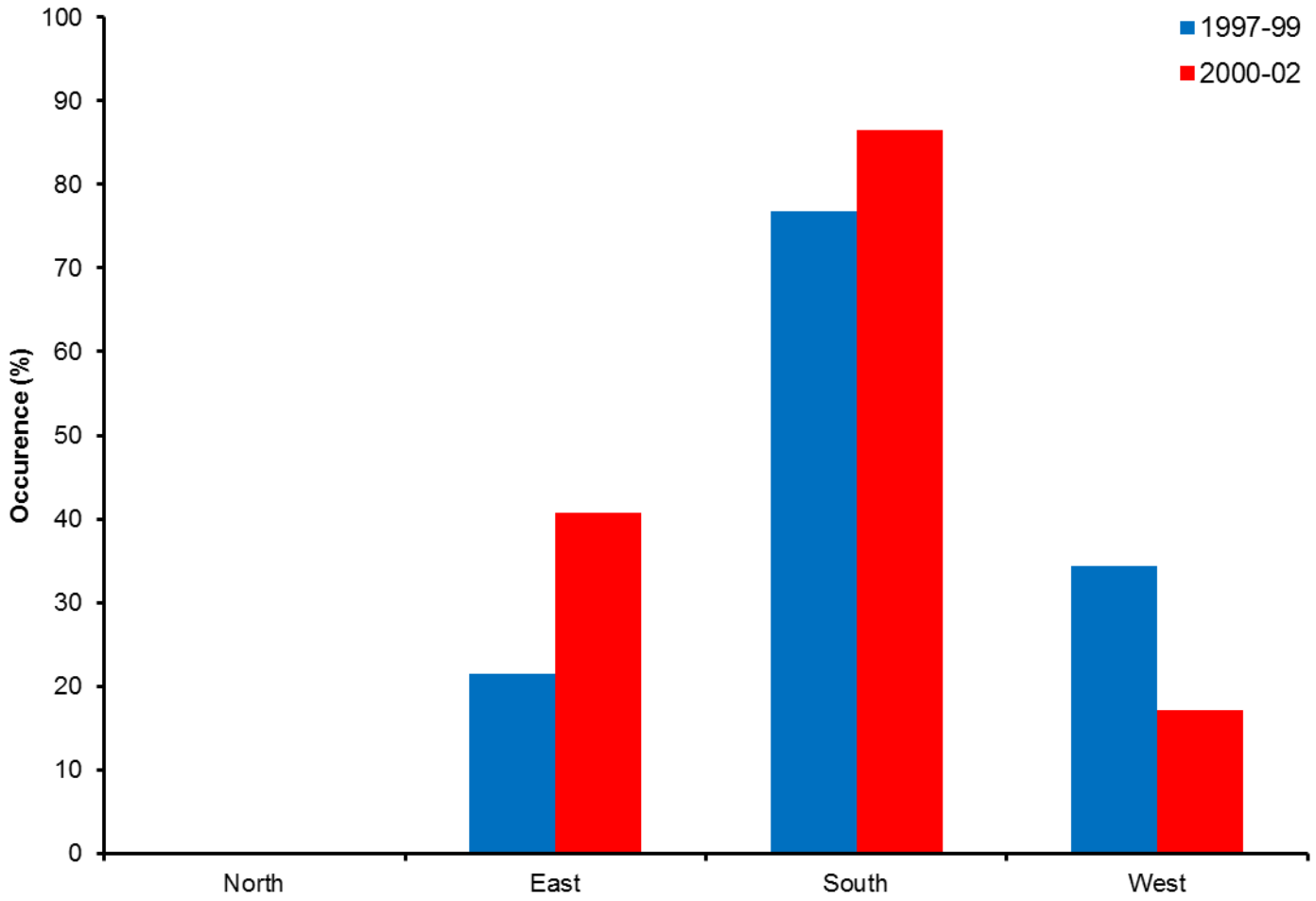


Figure 1.6: Regional species occurrence by trap gear time period 2003-05 of A. Silk Snapper, B. White Grunt, C. Yellowtail Snapper and D. Red Hind, TIP only.

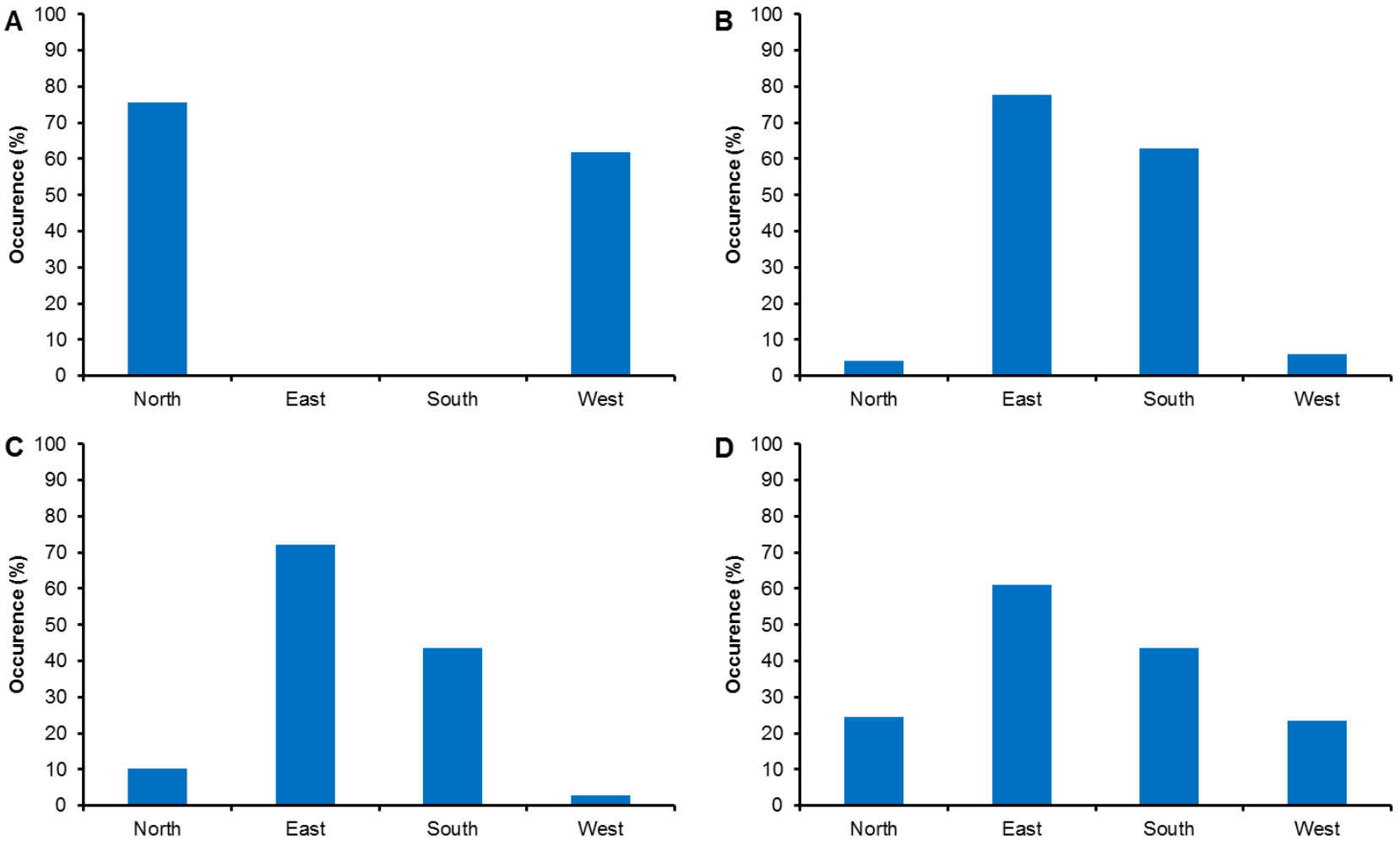


Figure 1.7: Regional species occurrence by bottom line A. Silk Snapper, B. Yellowtail Snapper and C. Red Hind, TIP only.

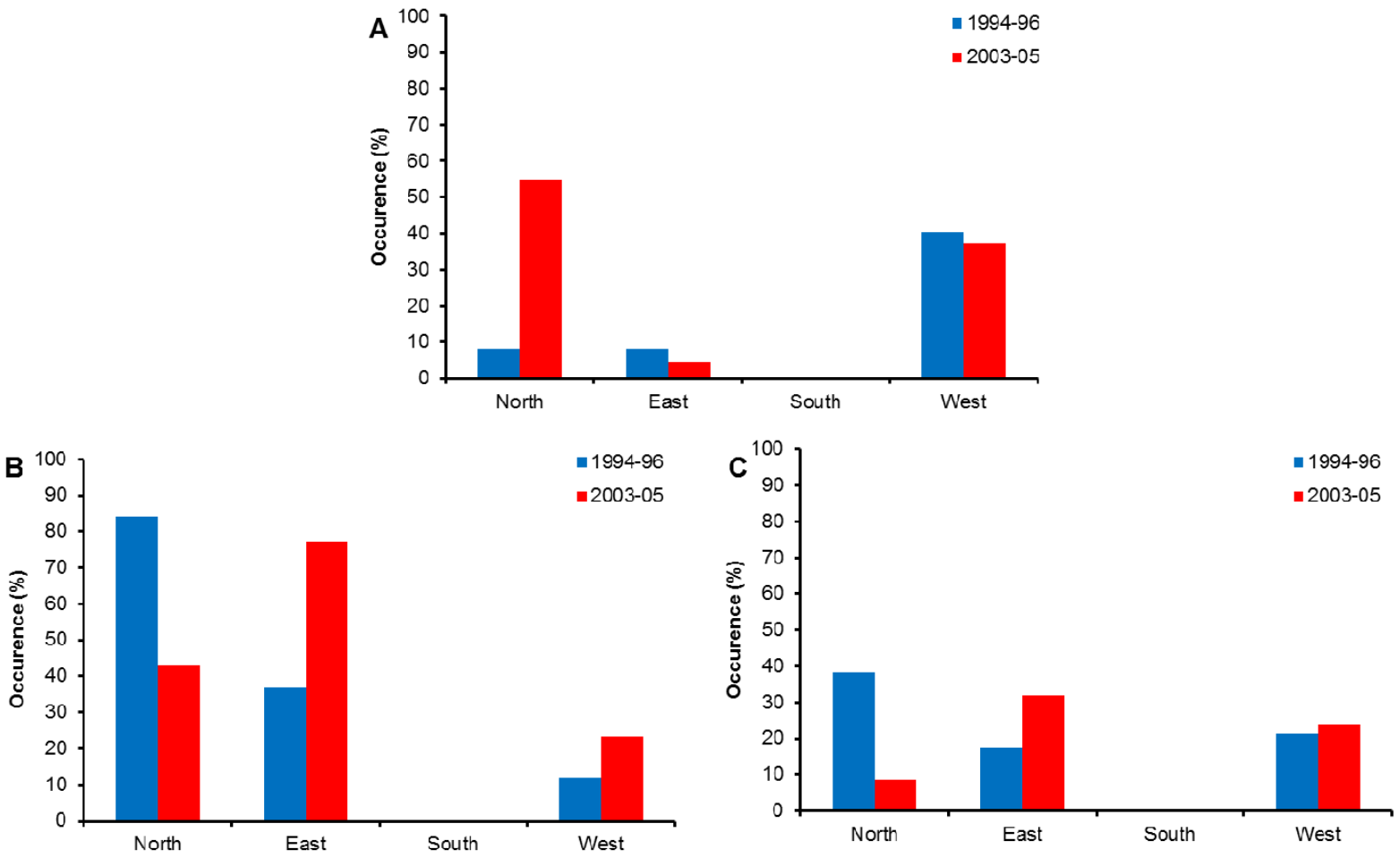


Figure 1.8: LC for Red Hind in trap gear by time period. A. 1994-96, B. 2000-02 and C. 2006-08, TIP only.

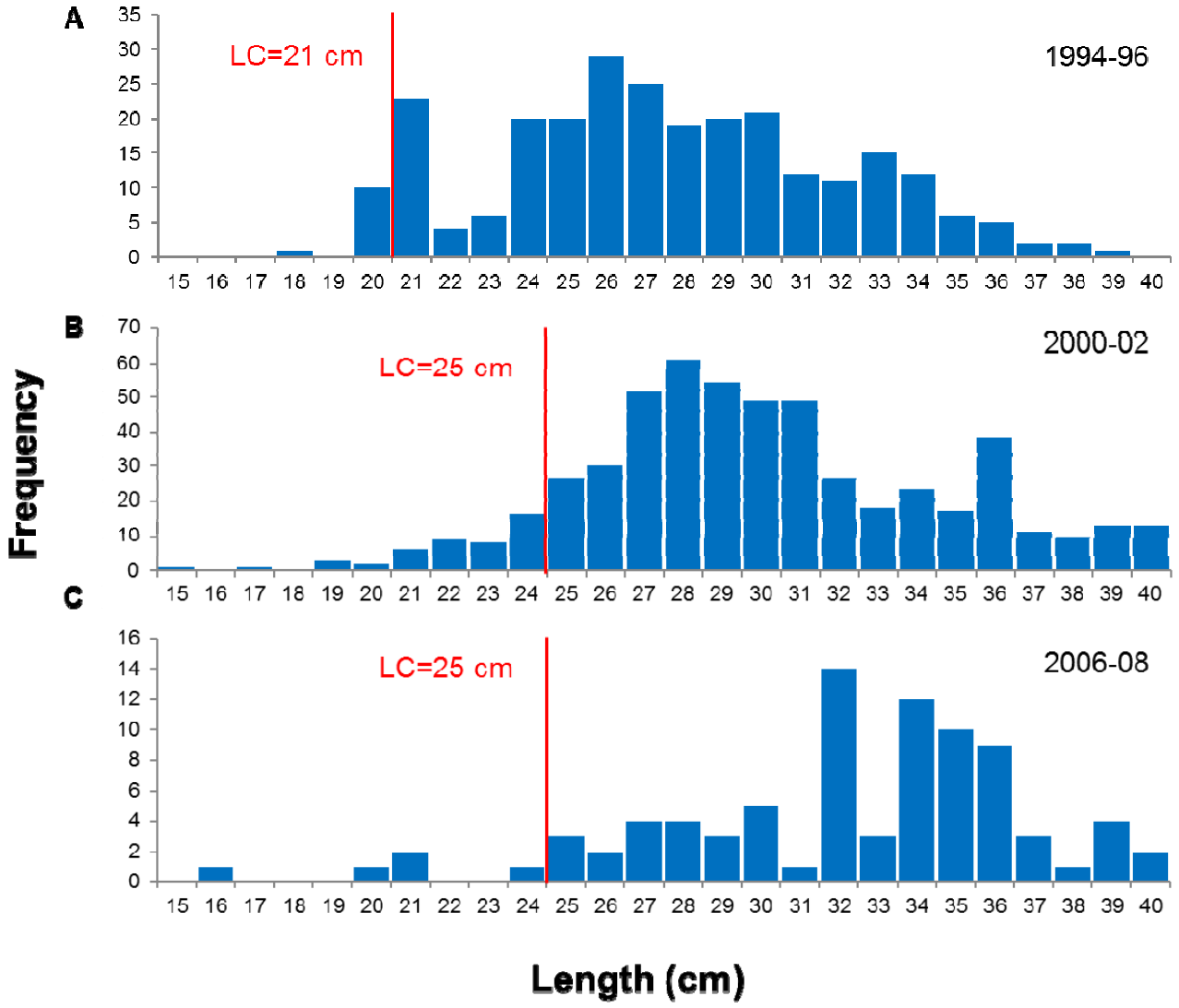


Figure 1.9: LC for Red Hind time period 2003-05 by gear type A. Trap, B. Bottom Line and C.Spear, TIP only.

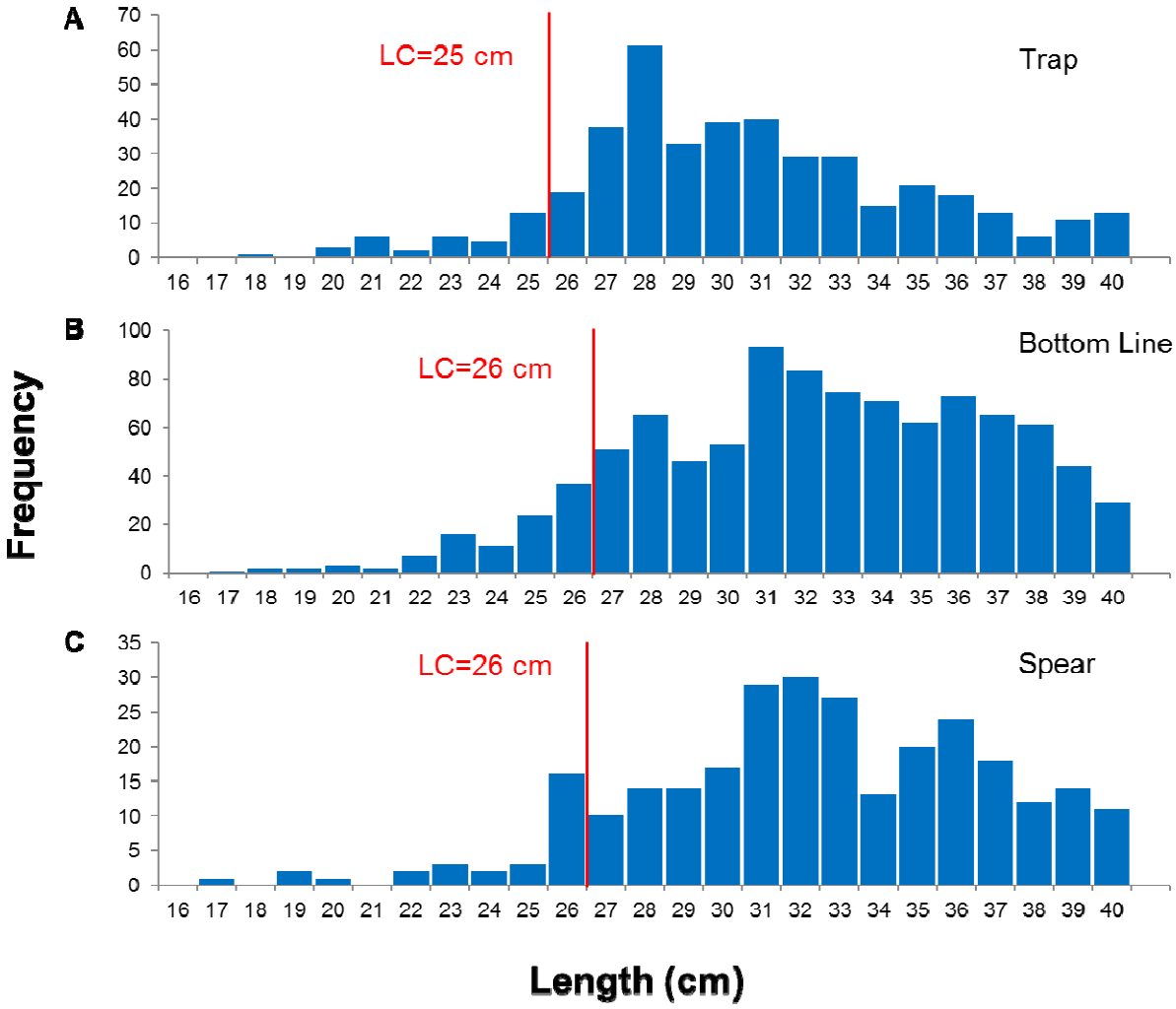


Figure 1.10: Map of Puerto Rico showing fishery-independent sampling sites. Red dots indicate SEAMAP sites and green dots indicate NOAA BioGeo sites.

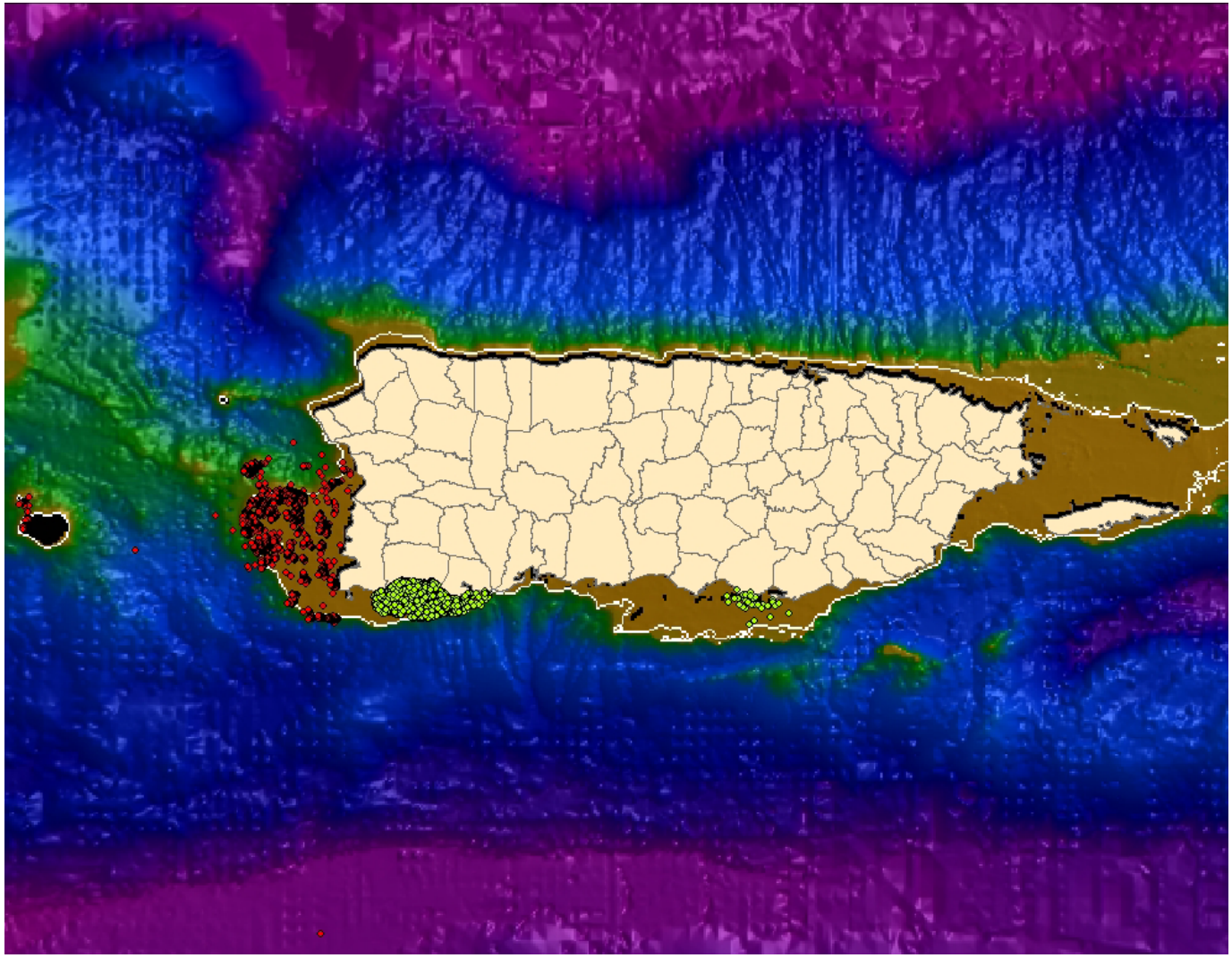


Figure 1.11: Comparison of Lbar estimates for Yellowtail Snapper between TIP and MRFSS data sources.

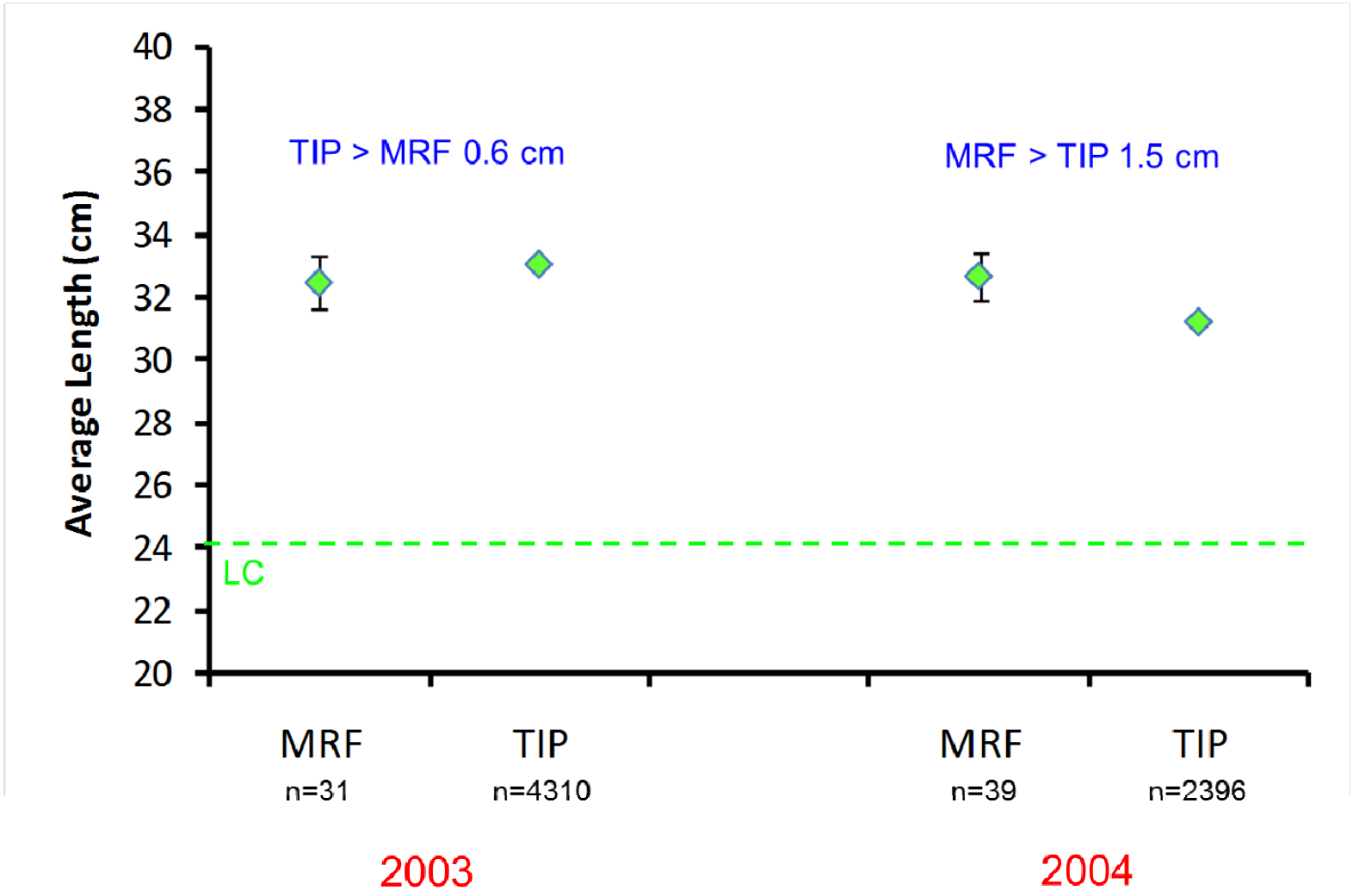


Figure 1.12: Comparison of Lbar estimates for Red Hind in 2001 between MRFSS and TIP data sources.

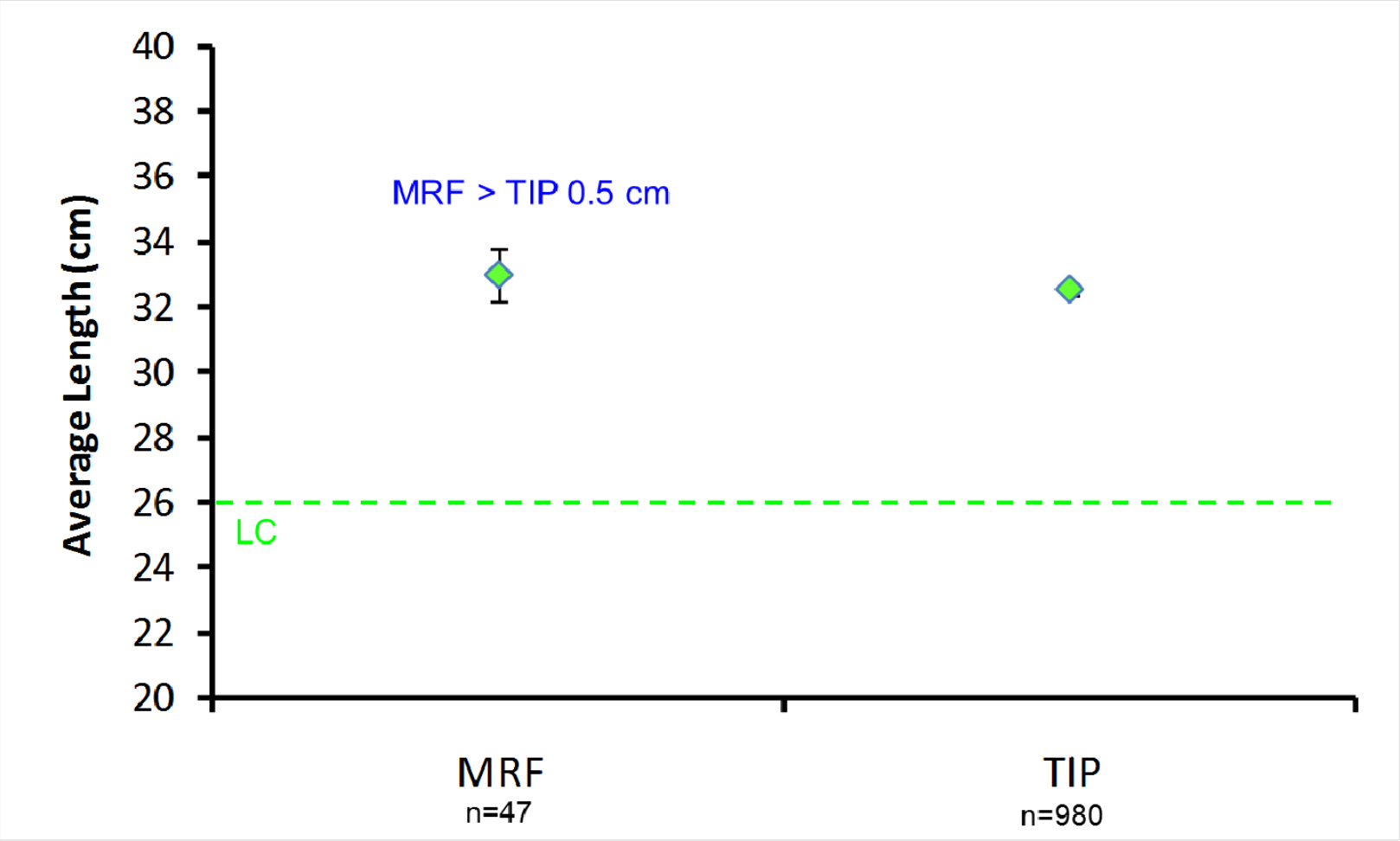


Figure 1.13: Comparison of Lbar estimates for Red Hind in 1993, West Region, between SEAMAP and TIP data sources.

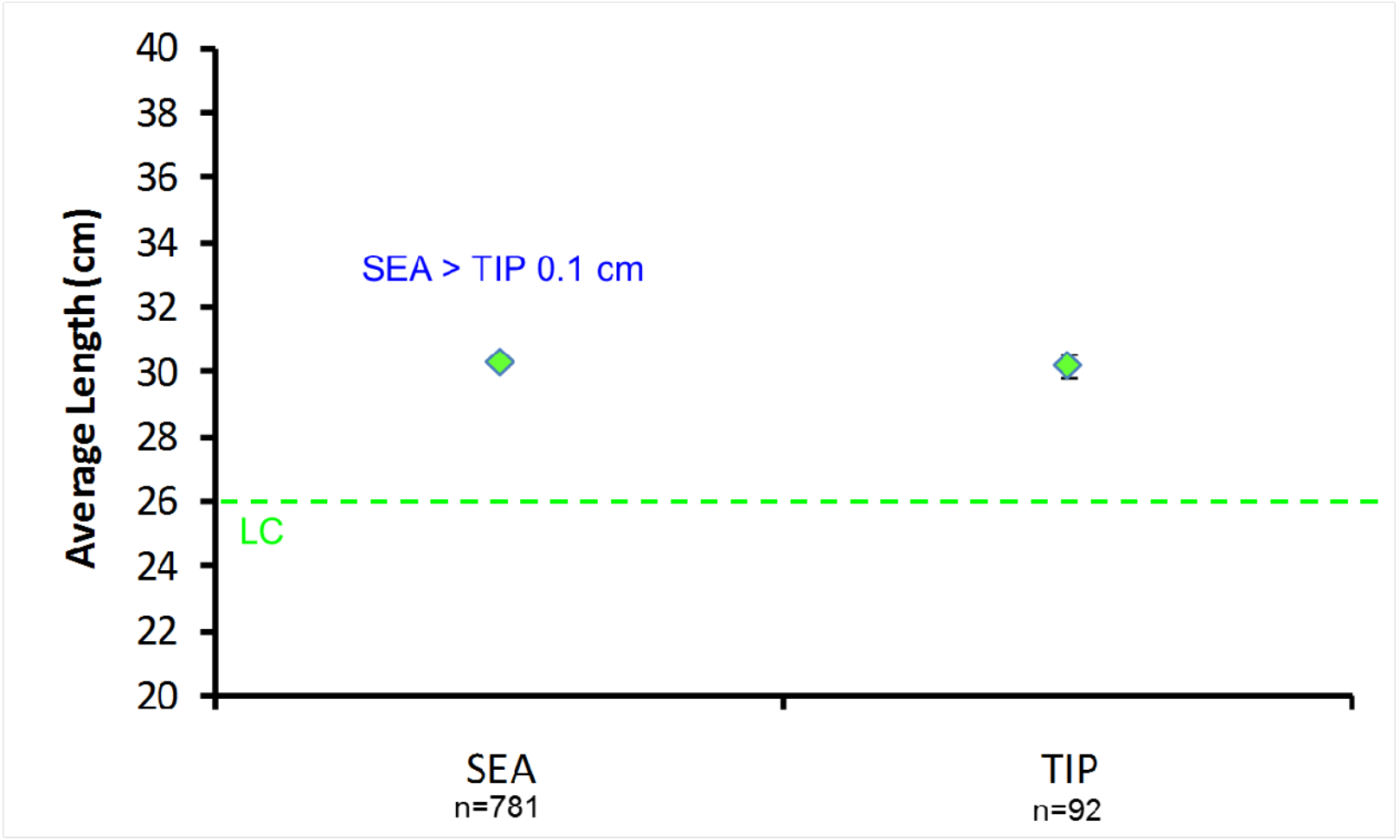
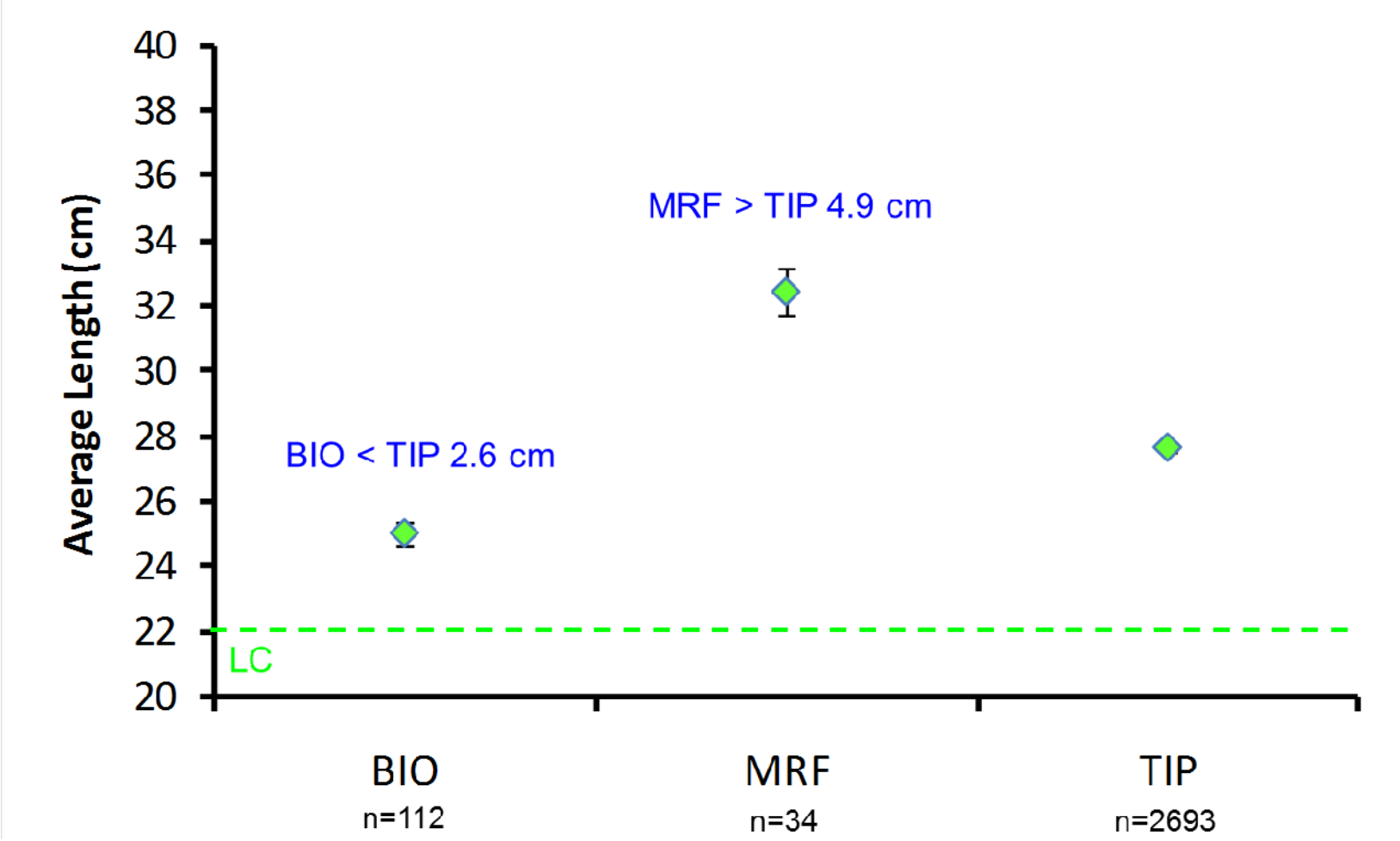


Figure 1.14: Comparison of Lbar estimates for Stoplight Parrotfish, 2001-03, among MRFSS, TIP, and NOAA BioGeography data sources.



2.0 Theory of Length-based Stock Assessment

Indicators are needed to assess reef fisheries and to support the implementation of an ecosystem approach to fisheries (Jennings 2005; Cury & Christensen 2005). The principal stock assessment indicator variable we used to quantify population status for the community of Puerto Rican reef fishes was average length ($\overline{L}$) of the exploited part of the population, which is a metabolic-based indicator that is highly correlated with population size (Beverton & Holt 1957; Ricker 1963; Pauly & Morgan 1987; Ehrhardt & Ault 1992; Kerr & Dickie 2001; Jennings *et al.* 2007). For exploited species, $\overline{L}$ directly reflects the rate of fishing mortality through alterations of the population size structure (Beverton & Holt 1957; Quinn & Deriso 1999). Theoretically, $\overline{L}$ at time *t* is expressed as

$$\overline{L}(t) = \frac{F(t)\int_{a_c}^{a_\lambda} N(a,t)\, L(a,t)\, da}{F(t)\int_{a_c}^{a_\lambda} N(a,t)\, da}, \qquad [1]$$

where a_c is the minimum age at first capture, a_λ the oldest age in the stock, *N(a, t)* the abundance for age class *a*, *L(a, t)* the length at age *a* and *F(t)* is the instantaneous fishing mortality rate at time *t*. In practice, $\overline{L}$ is usually estimated from lengths in the range of length at first capture L_c (or recruitment to the exploited phase of the stock) to the maximum observed length L_λ, the length of a fish at a_λ. *F(t)* could also be the viewing power of divers in fishery-independent visual surveys of reef fish populations (Ault *et al.* 1998).

Using estimates of $\overline{L}$ in time *t*, total instantaneous mortality rate $\hat{Z}(t)$ are estimated using the method of Ehrhardt and Ault (1992)

$$\left[\frac{L_\infty - L_\lambda}{L_\infty - L_c}\right]^{\frac{\hat{Z}(t)}{K}} = \frac{\hat{Z}(t)\left(L_c - \overline{L}(t)\right) + K\left(L_\infty - \overline{L}(t)\right)}{\hat{Z}(t)\left(L_\lambda - \overline{L}(t)\right) + \left(L_\infty - \overline{L}(t)\right)}, \qquad [2]$$

where K and L_∞ are parameters of the von Bertalanffy growth equation. Estimates of Z are computed using an iterative numerical algorithm (computer program LBAR; Ault *et al.* 1996; FAO [Food and Agriculture Organization of the United Nations] 2003). An illustrative graph of the relationship between average size in the exploited phase (Lbar) and fishing mortality rate (F) is shown in **Fig. 2.1**.

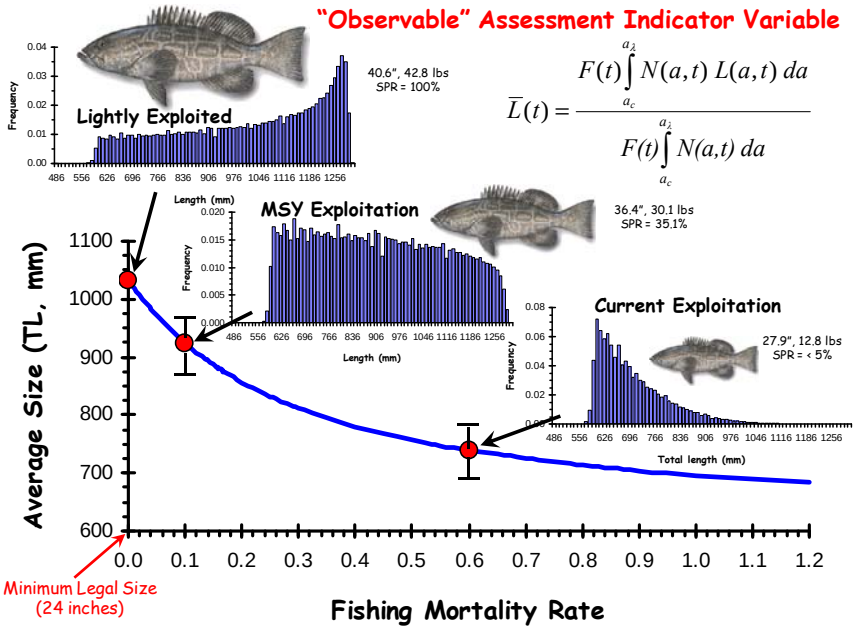


Figure 2.1.- Expected progression of average size in the exploited phase dependent of instantaneous fishing mortality rate.

3.0 Population-Dynamics Data & Sources

Life history parameters for maximum age, growth and maturity for the reef fish species considered (**Table 3.1**) were obtained from the literature syntheses of Ault *et al.* (1998, 2005*b*) and Claro *et al.* (2001).

Table 3.1.- Life-history trait input parameters from literature syntheses of Ault *et al.* (1998, 2005*b*) and Claro *et al.* (2001), and resulting population mortality and sustainability benchmarks estimated from numerical models for exploited Puerto Rican reef fishes (see text for description of parameter estimation methods and symbols used).

Puerto Rico Reef Fish 8/19/2011 16:46

common	species	a_λ	K	L_{inf}	a_0	W_{inf}	L_m	L_C	L_{max}	M
Groupers										
Rock hind	Epinephelus adscensionis	12	0.167	499.4	-2.50	2.48	329	210	455	0.2496
Graysby	Epinephelus cruentatus	15	0.130	415.0	-0.94	1.14	165	200	362	0.1997
Coney	Epinephelus fulvus	17	0.145	698.9	-1.08	1.49	185	200	446	0.1762
Red hind V1	Epinephelus guttatus	17	0.200	471.4	-2.40	1.7519	341	260	462	0.1762
Goliath grouper	Epinephelus itajara	37	0.054	2394.0	-3.62	244.86	979	300	2126	0.0810
Red grouper	Epinephelus morio	29	0.160	854.0	-0.19	9.61	434	300	846	0.1033
Nassau grouper	Epinephelus striatus	17	0.153	938.0	-0.10	11.86	483	300	869	0.1762
Tiger grouper	Mycteroperca tigris	26	0.110	740.0	-1.88	6.38	460	300	705	0.1152
Yellowfin grouper	Mycteroperca venenosa	25	0.170	860.0	0.00	15.67	529	300	792	0.1198
Snappers										
Hogfish	Lachnolaimus maximus	23	0.080	912.6	-1.78	14.10	249	250	786	0.1302
Mutton snapper	Lutjanus analis	29	0.129	938.7	-0.74	14.06	276	220	798	0.1033
Schoolmaster	Lutjanus apodus	12	0.180	570.0	0.00	3.28	145	220	504	0.2496
Blackfin snapper	Lutjanus buccanella	9	0.084	729.7	-2.90	2.41	230	220	459	0.3329
Gray snapper	Lutjanus griseus	12	0.136	722.3	-0.86	5.25	230	230	596	0.2496
Dog snapper	Lutjanus jocu	12	0.100	854.0	-2.00	10.19	229	230	643	0.2496
Mahogony snapper	Lutjanus mahogani	10	0.097	618.3	-1.73	3.18	130	230	419	0.2996
Lane snapper	Lutjanus synagris	19	0.097	618.3	-1.73	3.25	206	170	534	0.1577
Silk Snapper	Lutjanus vivanus	9	0.092	781.1	-2.31	9.28	304	190	504	0.3329
Yellowtail snapper	Ocyurus chrysurus	14	0.170	483.8	-1.87	1.54	199	200	451	0.2140
Vermilion snapper	Rhomboplites aurorubens	14	0.144	650.0	-0.24	3.40	273	230	566	0.2140
Grunts										
Porkfish	Anisotremus virginicus	7	0.440	397.0	-0.35	1.72	231	200	381	0.4280
Margate	Haemulon album	10	0.174	753.0	-0.45	8.57	428	220	630	0.2996
French grunt	Haemulon flavolineatum	12	0.179	294.0	0.00	0.57	177	160	260	0.2496
White grunt	Haemulon plumieri	18	0.186	511.9	-0.78	3.06	180	170	496	0.1664
Bluestriped grunt	Haemulon sciurus	8	0.300	413.0	0.00	1.36	205	190	375	0.3745
Parrotfish										
Striped parrotfish	Scarus iserti	12	0.4418	210	0	0.180126	130	210	200	0.2496
Redband parrotfish	Sparisoma aurofrenatum	10	0.5638	281	0	0.377992	170	210	280	0.2996
Redtail parrotfish	Sparisoma chrysopterum	8	0.6244	443	0	1.466109	251	240	440	0.3745
Stoplight parrotfish	Sparisoma viride	12	0.3445	610	0	3.843862	337	220	600	0.2496

Example growth and survivorship functions are shown in **Fig. 3.1**. Age-specific functions of length, weight, biomass, and fecundity are shown for red hind in **Fig. 3.2**. Relationships between the spawning potential ratio and the fishing mortality rate at maximum sustainable yield are plotted for a variety of reef-fish species in **Fig. 3.3**. Relationships between maximum size and natural mortality rate and growth rate are shown in **Fig. 3.4**.

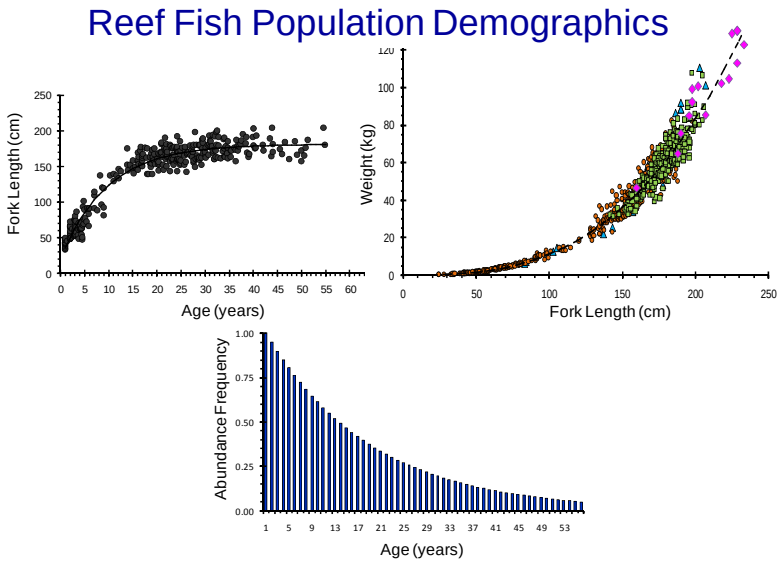


Figure 3.1.- Growth and mortality dependent on age population demographic relationships for a typical Puerto Rico reef fish.

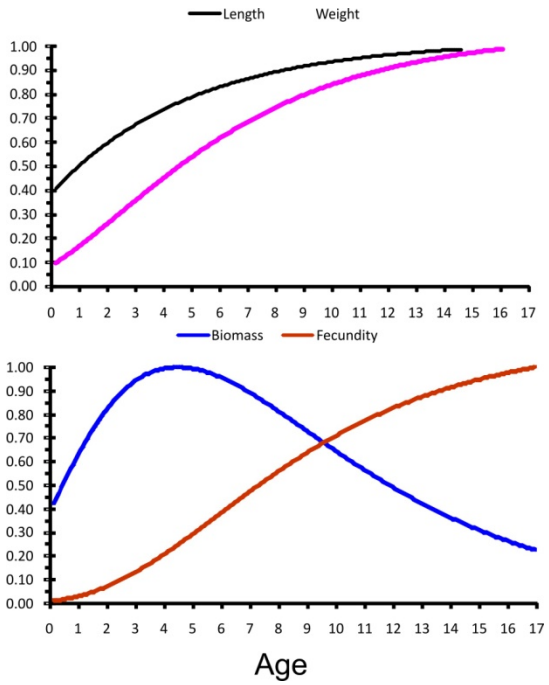


Figure 3.2.- Inter-relationships of growth and mortality dependent on age in the context of population biomass and fecundity (reproductive potential) for red hind, a typical Puerto Rico reef fish.

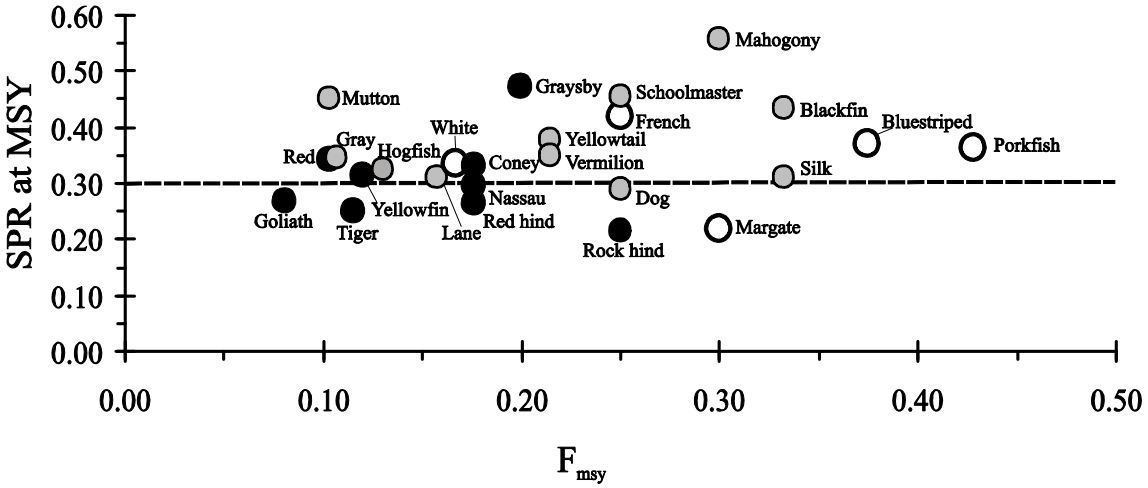


Figure 3.3 Estimated spawning potential ratio (SPR) at maximum sustainable yield (MSY) dependent on F_{msy} for 25 exploited species (groupers = dark circles, snappers = shaded circles and grunts = open circles) from Puerto Rico. The horizontal dashed line is the 30% SPR USA federal standard for sustainability.

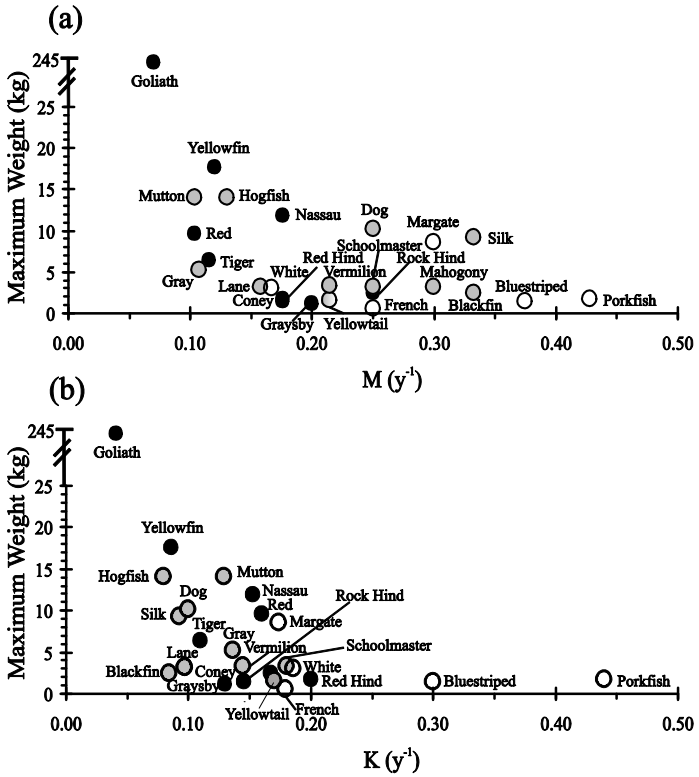


Figure 3.4. Relationships between maximum size (weight in kg) and (*a*) natural mortality rate *M* (y^{-1}), and (*b*) Brody growth coefficient *K* (y^{-1}) for 25 species (groupers = dark circles, snappers = shaded circles and grunts = open circles) of Puerto Rican coral reef fish.

4.0 Length-Based Mortality Analyses

The procedure for using Lbar, average size in the exploited phase, to estimate F, the fishing mortality rate, is shown for red hind in **Figs. 4.1 and 4.2**.

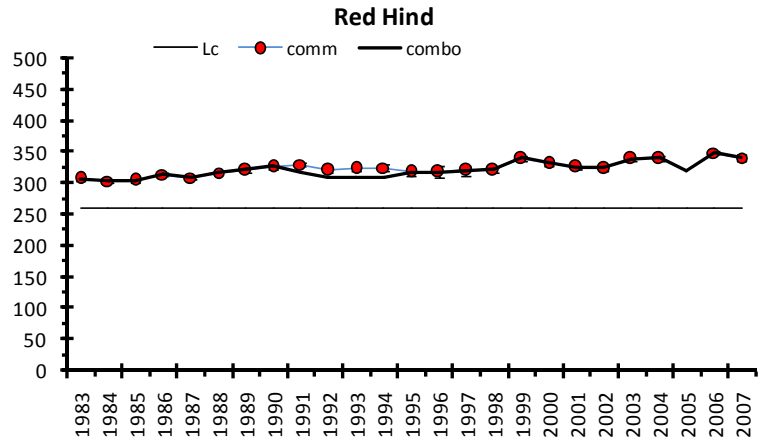


Figure 4.1.- Time series (1983-2008) of mean and 95% CI of average size in the exploitable phase ($\overline{L}$) for red hind (Epinephelus guttatus) from the Puerto Rico commercial fishery based on NOAA Trip Information Program (TIP) data. Solid line is the assumed minimum size of first capture (L_c).

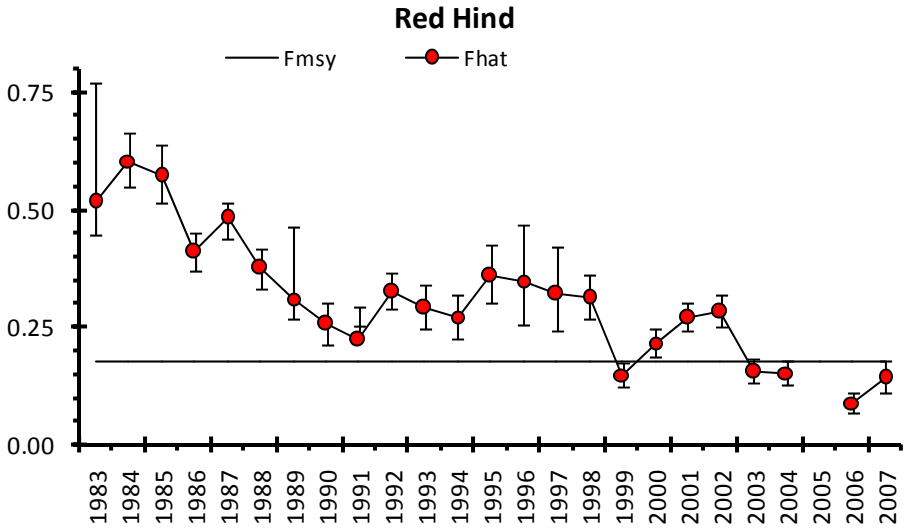


Figure 4.2.- Time series (1983-2008) of mean and 95% CI of instantaneous fishing mortality rate (F) for red hind (Epinephelus guttatus) based on the Puerto Rico commercial fishery based on NOAA Trip Information Program (TIP) data. Solid line is the F corresponding to SPR of 30%.

5.0 Numerical Population Model

We used a stochastic length-based numerical population model (Ault & Olson 1996; Ault *et al.* 1998) to calculate ensemble numbers at given lengths $\tilde{N}_\gamma$ over time for a given cohort γ, generalized as

$$\tilde{N}_\gamma(L_\gamma,t) = \int_{a_r}^{a_\lambda} R_\gamma(\tau - a)S(a)\theta(a)P(L \mid a)da \ , \qquad [3]$$

where $R_\gamma(\tau - a)$ is cohort recruitment lagged back to birth date, *S(a)* is survivorship to age *a*, $\theta(a)$ is a logistic model of sex ratio at age to account for hermaphroditic life histories common to tropical reef fishes, and *P(L|a)* is the probability of being length *L* given the fish is age *a*. This population model simulates the time-transition of recruits to mature adults to maximum size-age using a number of dynamic functions to regulate population birth, growth, and survivorship processes, including fishery harvests (details in Ault *et al*. 1998). A conceptual flowchart of the REEFS model is shown in **Fig. 5.1**.

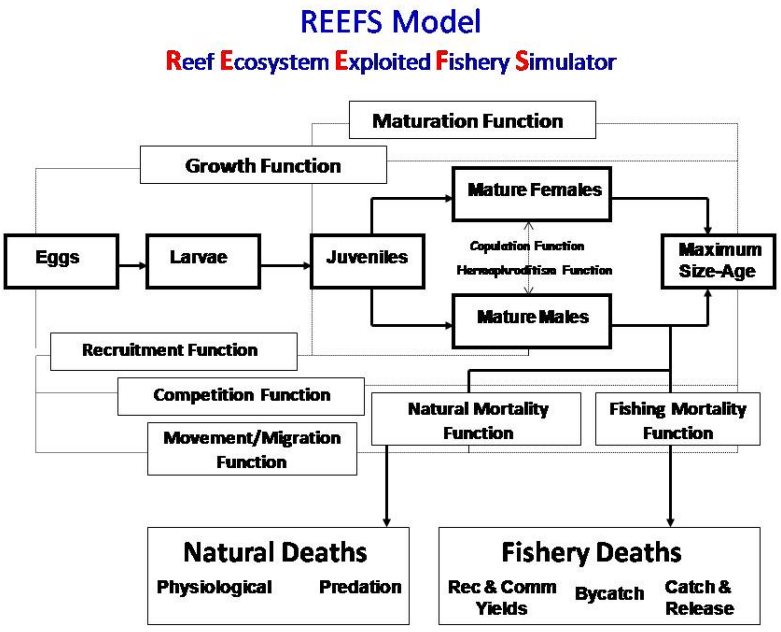


Figure 5.1.- Flowchart of the REEFS (Reef Ecosystem Exploited Fishery Simulation) model.

We calibrated the numerical model (Eq. 3) through a consistency check between model estimates of $\bar{L}$, using $\hat{Z}$ from Eq. (2) as the input, and the $\hat{\bar{L}}$ estimated from data. Additionally, we evaluated the two major components of *Z*, namely fishing mortality rate *F* and natural mortality rate *M*. In this process, we estimated *M* from lifespan applying the procedure of Alagaraja (1984; *sensu* Hoenig 1983) assuming that 5% of a cohort survives to the maximum age/size, and *F* was estimated by subtracting

M from *Z* (Ault *et al*. 1998). We used the calibrated model to compute management benchmarks of stock status to evaluate sustainability in the following analytical process.

6.0 Sustainability Benchmarks & Resource Risk Analyses

6.1 Description

Sustainability analyses involved comparison of various population metrics at current levels of fishing mortality against standard fishery management sustainability benchmarks. We configured the simulation model to assess several reference points to address several sustainability risks, including fishery yields, spawning potential ratio (SPR; Clark 1991) and precautionary control rules (for example Restrepo & Powers 1999). Since population biomass *B(a,t)* is the product of numbers-at-age times weight-at-age *W(a,t)*, yield in weight Y_w from a species during an instant *t* was calculated as

$$Y_w(F, L_c, t) = F(t)\int_{L_c}^{L_\lambda} B(L \mid a,t)dL = F(t)\int_{L_c}^{L_\lambda} N(L \mid a,t)W(L \mid a,t)dL \quad . \qquad [4]$$

We obtained an important measure of stock reproductive potential, spawning stock biomass (SSB) at a given level of fishing mortality, by integrating over individuals in the population between the size of sexual maturity (L_m; 50% maturity, assumed knife-edged) and the maximum size (L_λ)

$$SSB(t) = \int_{L_m}^{L_\lambda} B(L \mid a,t)dL \quad . \qquad [5]$$

Maximum spawning biomass is obtained under conditions of no fishing mortality. Spawning potential ratio (SPR) is a management benchmark that measures a stock's potential to produce yields on a sustainable basis, and is computed as the ratio of current *SSB(t)* relative to that of an unexploited stock.

$$SPR = \frac{SSB_{\text{exploited}}}{SSB_{\text{unexploited}}} \quad . \qquad [6]$$

Estimated SPRs were compared to USA Federal standards which define 30% SPR as the threshold below which a stock is no longer sustainable at current exploitation levels (see Gabriel *et al.* 1989; Restrepo *et al*. 1998). Evaluation of control rules involved determination of F_{msy} (F generating maximum sustainable yield, MSY) and B_{msy} (population biomass at MSY) (**Fig. 6.1**). We defined F = M as a proxy for F_{msy} (Quinn & Deriso 1999; Restrepo & Powers 1999).

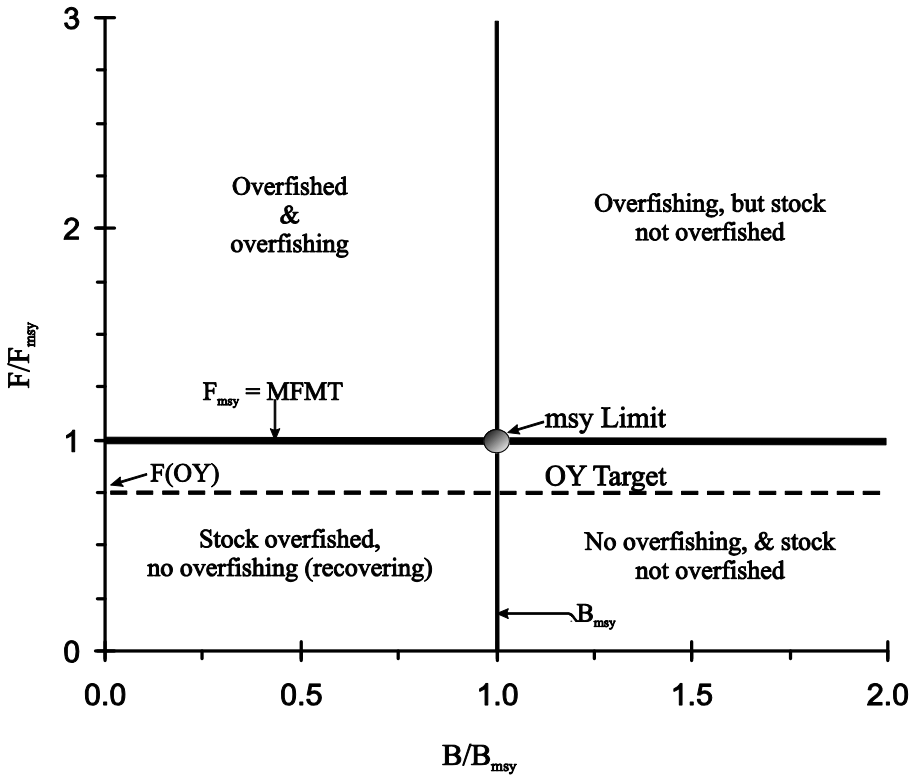


Figure 6.1 Conceptual diagram showing limit and target control rules. Target control rules specify desirable levels of fishing for sustainable stocks (for example F(OY) that produces optimal yield OY). Limit control rules define sustainability benchmarks or a cut-off above which there is an unacceptable risk of serious or irreversible harm to the resource and requires strong management intervention. If the maximum fishing mortality threshold (MFMT, equivalent to the F(MSY) limit in our analysis) is exceeded, then management actions in the form of reductions in F (or rebuilding plans) must be implemented to reverse the situation and move the stock to the lower right quadrant ($B/B_{msy} > 1$ and $F/F_{msy} < 1$). A more precautionary control rule, as suggested by Restrepo and Powers (1999), is to set the threshold MFMT 'safely below' the MSY limit (for example F(OY)= MFMT = 0.75 × F(MSY)).

6.2 Example Applications

Applications of sustainability benchmark analyses for red hind are shown in **Figs. 6.2-6.5**.

Spawning Potential Ratio (SPR)

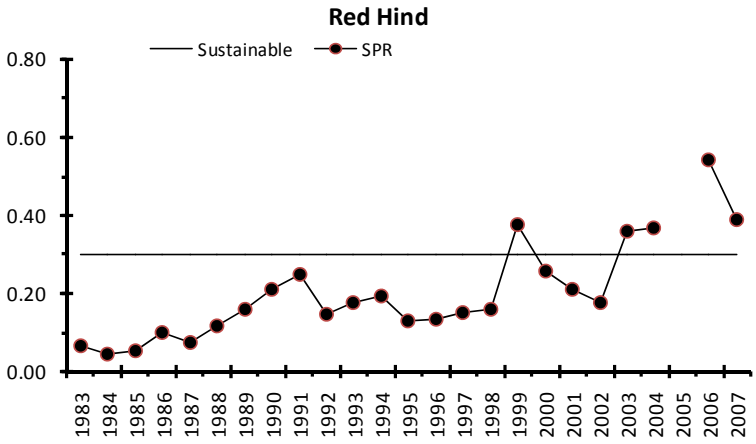


Figure 6.2.- Time series (1983-2008) of mean and 95% CI of spawning potential ratio (SPR) for red hind (Epinephelus guttatus) based on the Puerto Rico commercial fishery based on NOAA Trip Information Program (TIP) data. Solid line is the 30% SPR federal standard for sustainability.

Limit Control Rules

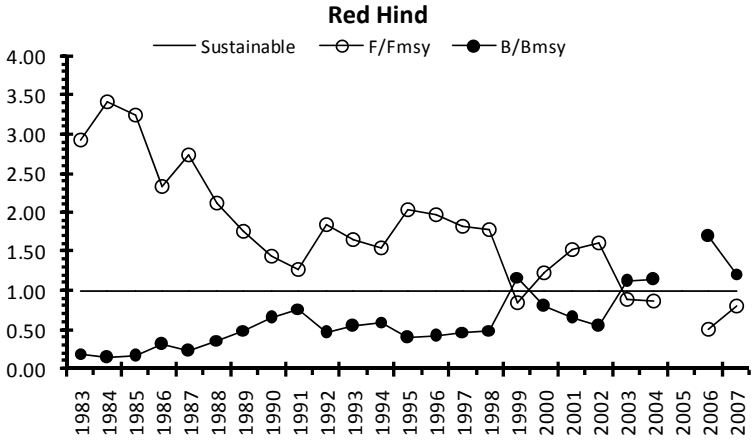


Figure 6.3.- Time series (1983-2008) of mean and 95% CI of F/Fmsy and B/Bmsy ratios for red hind (Epinephelus guttatus) based on the Puerto Rico commercial fishery based on NOAA Trip Information Program (TIP) data. Solid line is the assumed ratio where current conditions equal target consituons (here assumed to be at MSY).

Yield-per-Recruit (Size & Effort Strategies)

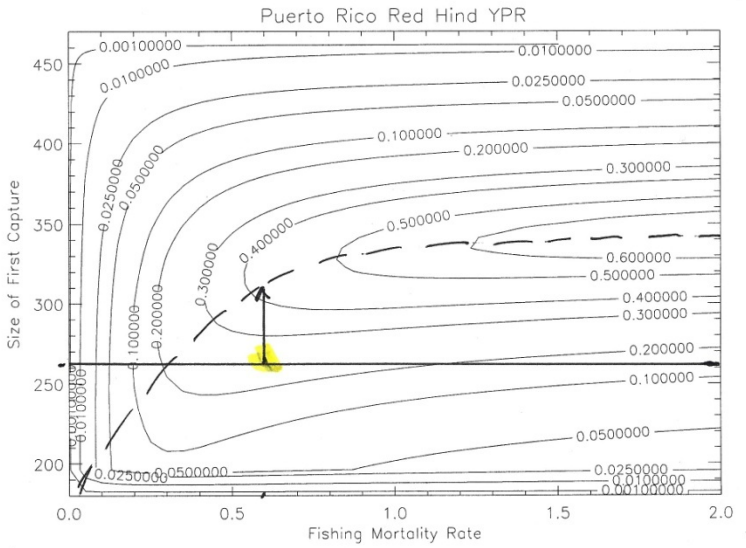


Figure 6.4 Yield-per-recruit in weight (Yw/R, kg) dependent on F for red hind from the Puerto Rican coral reef ecosystem.

Spawning Potential Rations (Sustainable Reproduction Strategies)

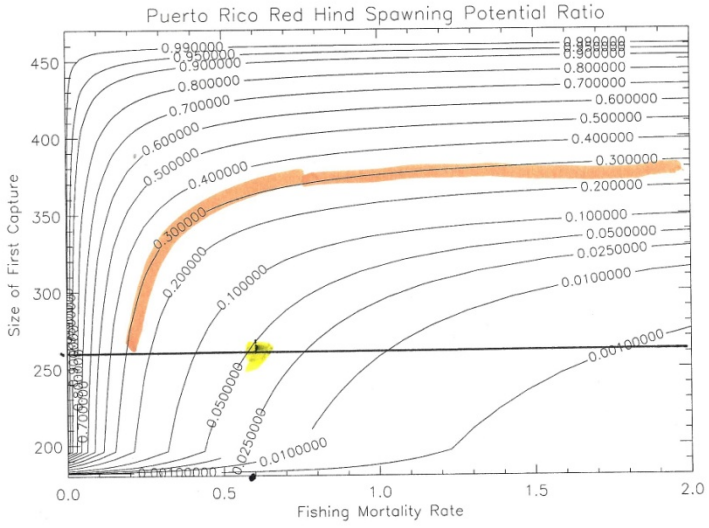
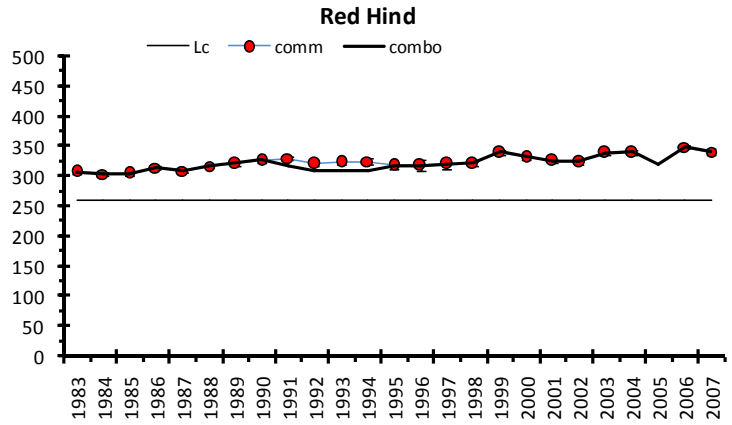


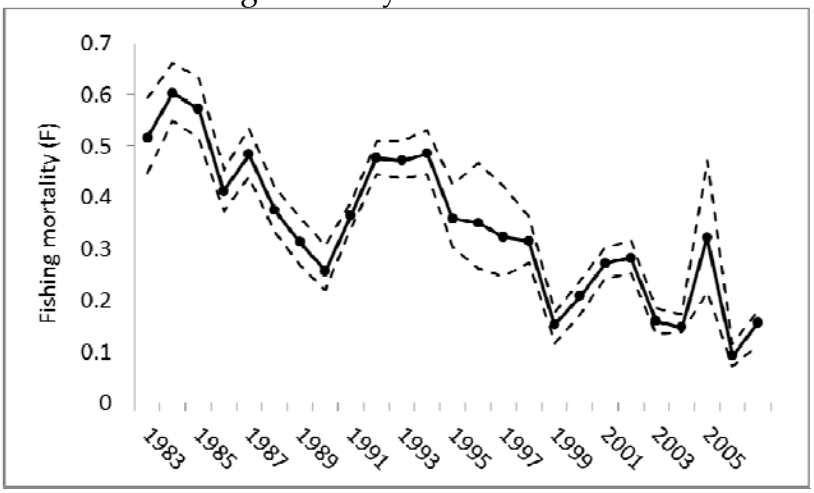
Figure 6.5 Spawning potential ratios (SPR) dependent on F for red hind from the Puerto Rican coral reef ecosystem.

6.3 MAST Computer Program Applications

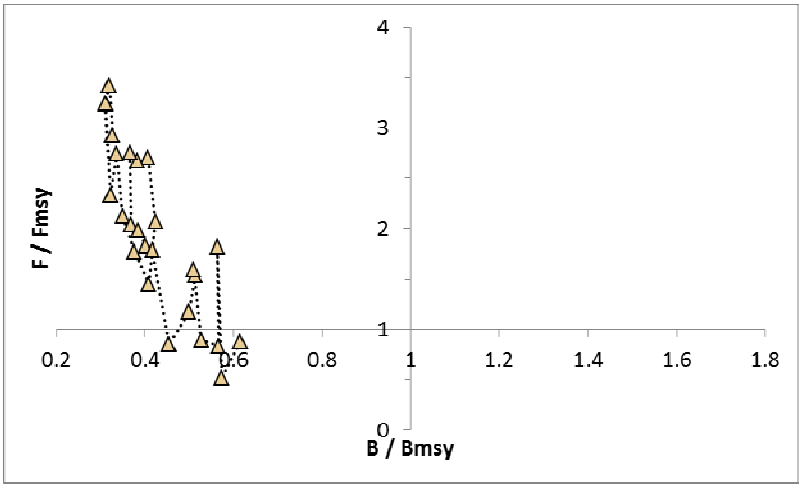
A user-friendly software package, Mortality and Assessment and Stock Simulation Tool (MAST), was developed to facilitate training of DNER personnel in applying sustainability benchmark analyses to Puerto Rico reef-fishes (**Appendix D**). Following are MAST output graphics from length-based sustainability analyses applied to five principal species: red hind, hogfish, yellowtail snapper, white grunt, and stoplight parrotfish.



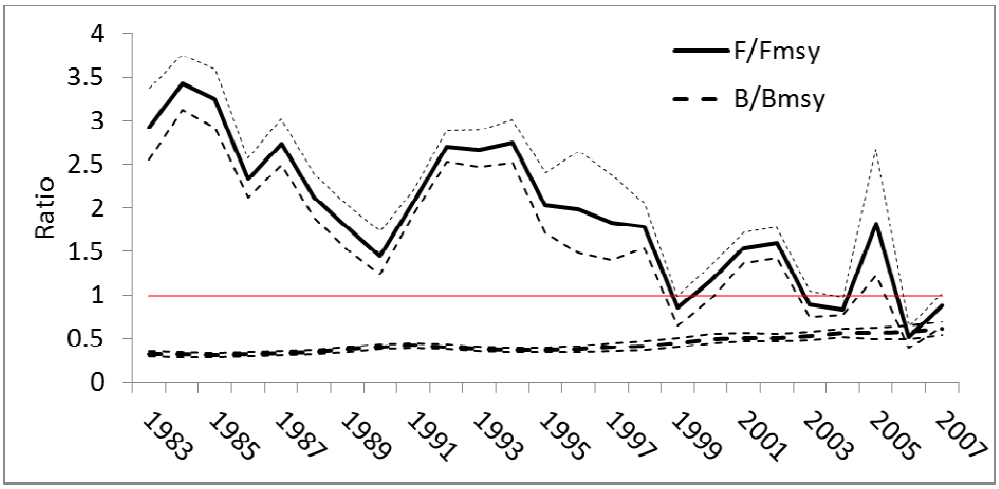
Estimated Fishing Mortality via LBAR - Red Hind



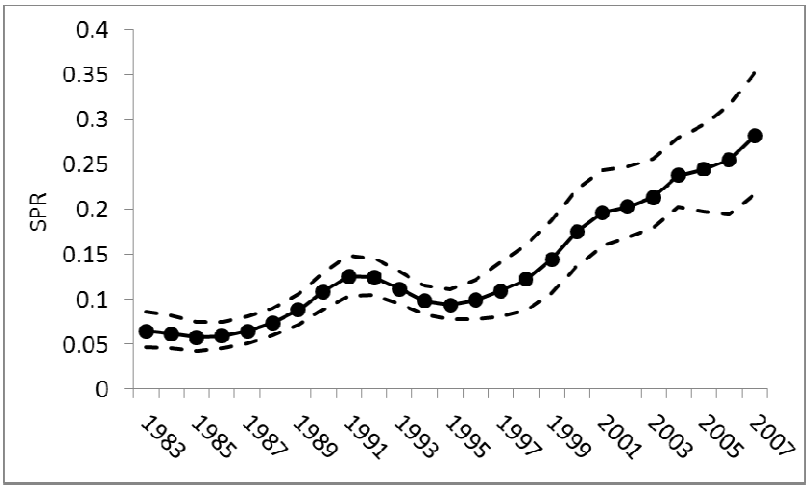
Limit Control Rule - Red Hind



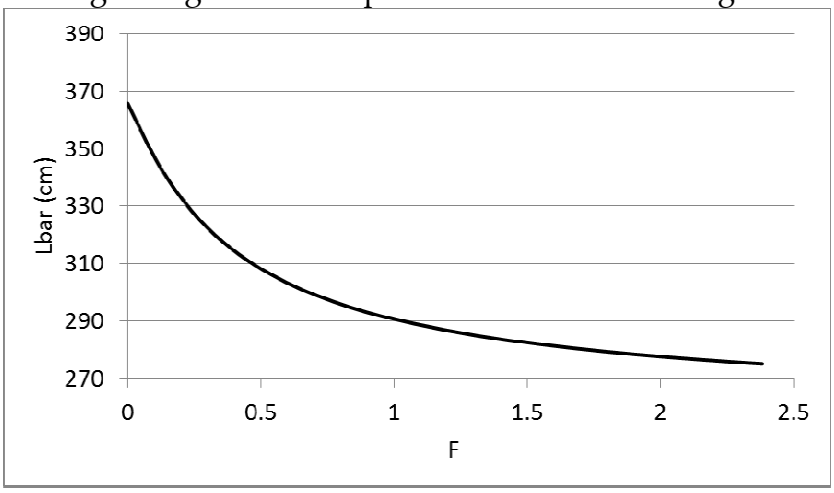
Limit Control Rule via Time Series - Red Hind



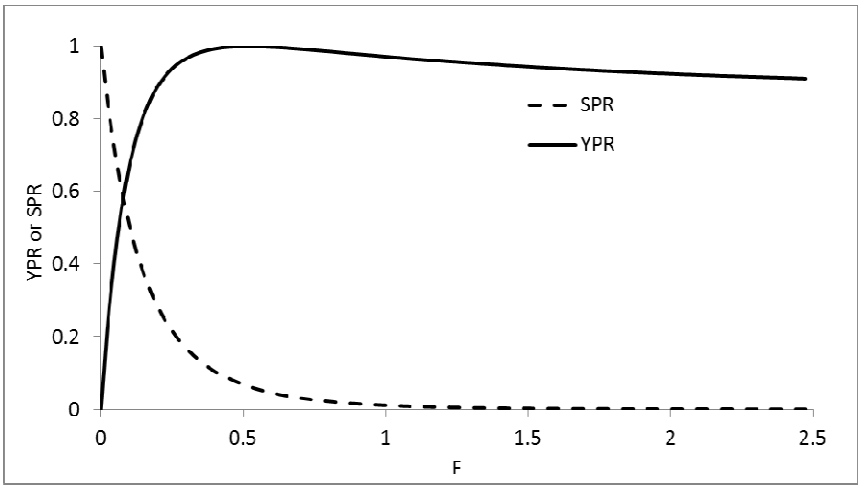
SPR over time - Red Hind



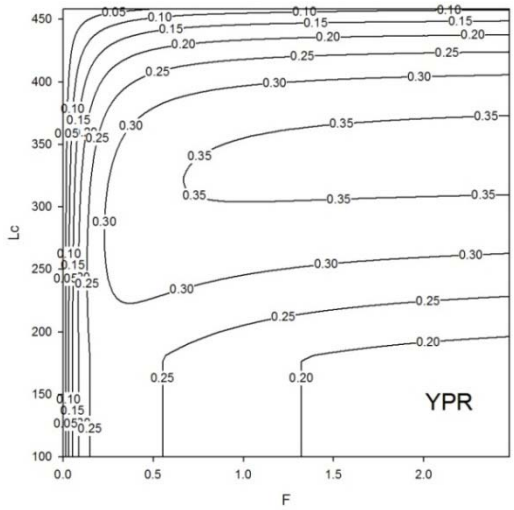
Average Length in the Exploitable Phase on Fishing Mortality Rate - Red Hind



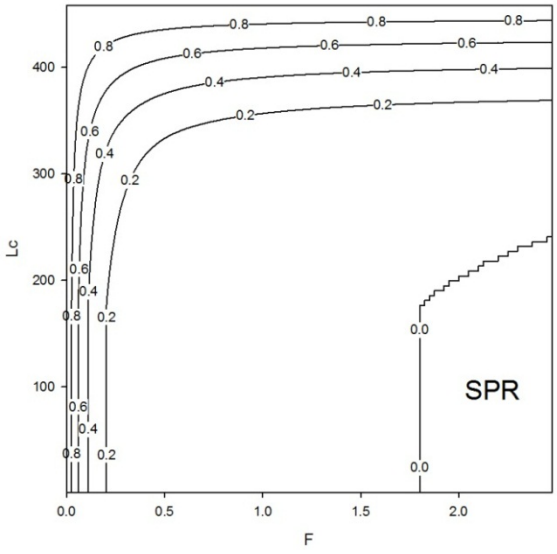
YPR and SPR on F - Red Hind

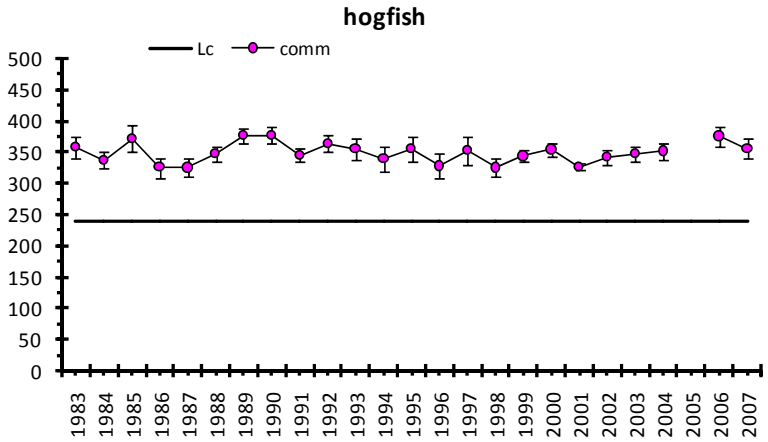


YPR - Red Hind

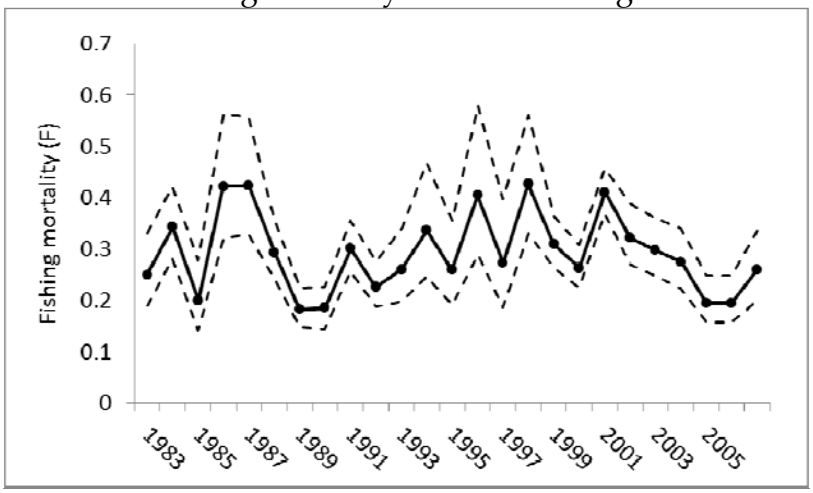


SPR –Red Hind

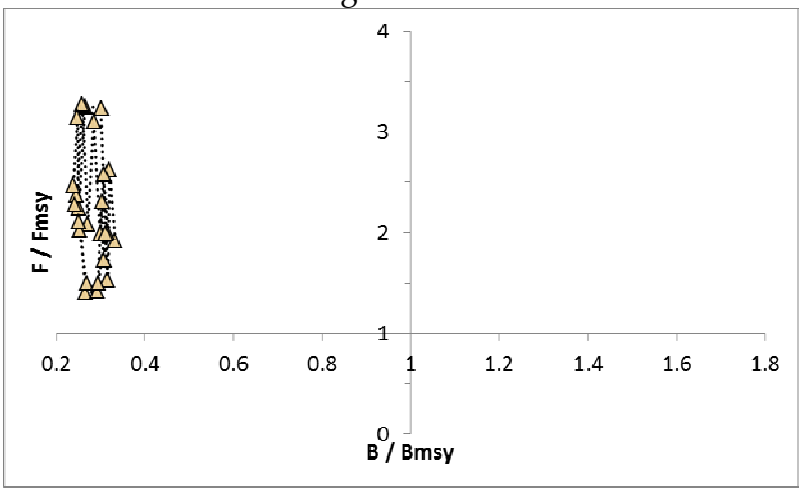




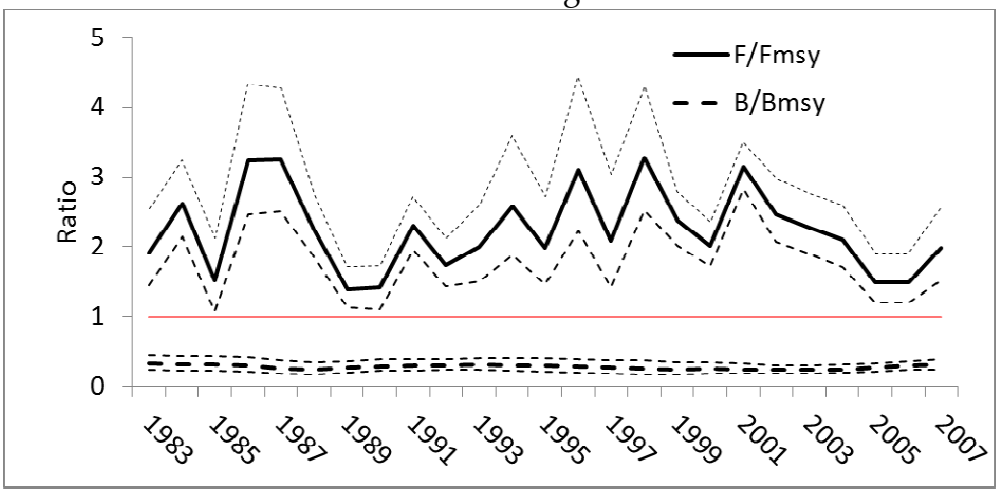
Estimated Fishing Mortality via LBAR - Hogfish



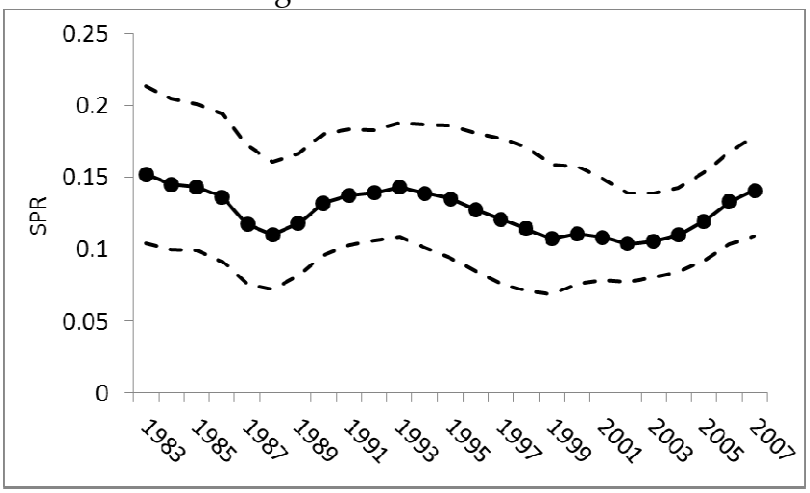
Limit Control Rule - Hogfish



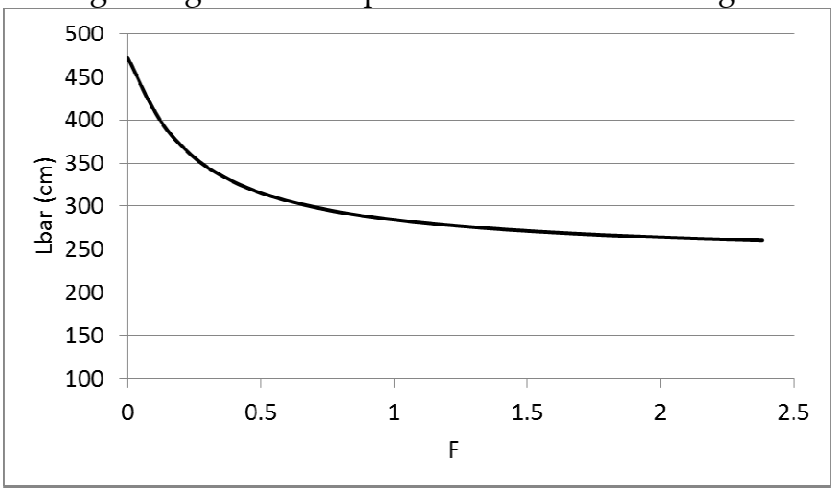
Limit Control Rule via Time Series - Hogfish



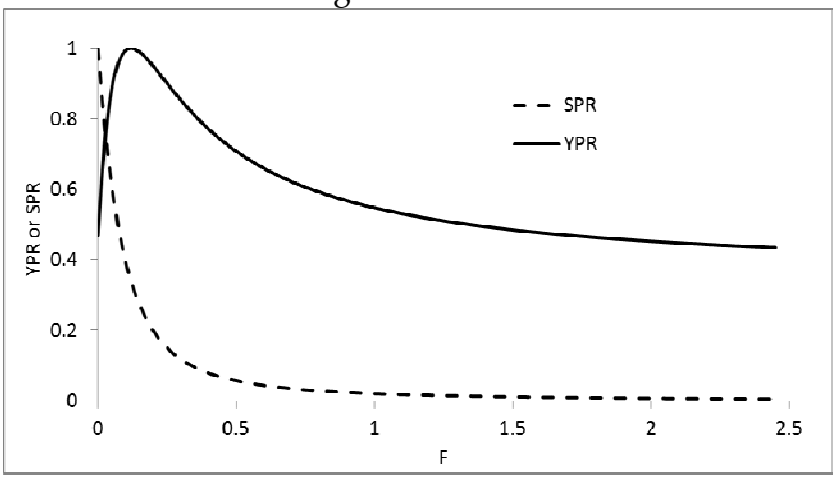
SPR over time - Hogfish



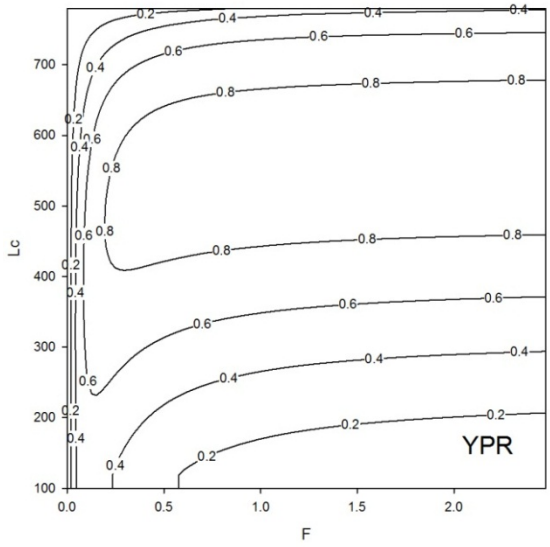
Average Length in the Exploitable Phase on Fishing Mortality Rate - Hogfish



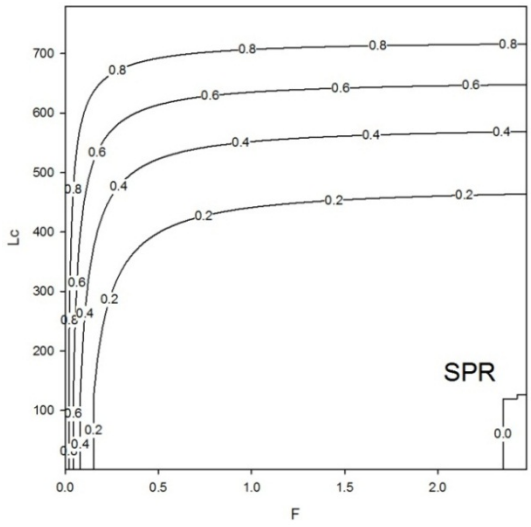
YPR and SPR on F - Hogfish

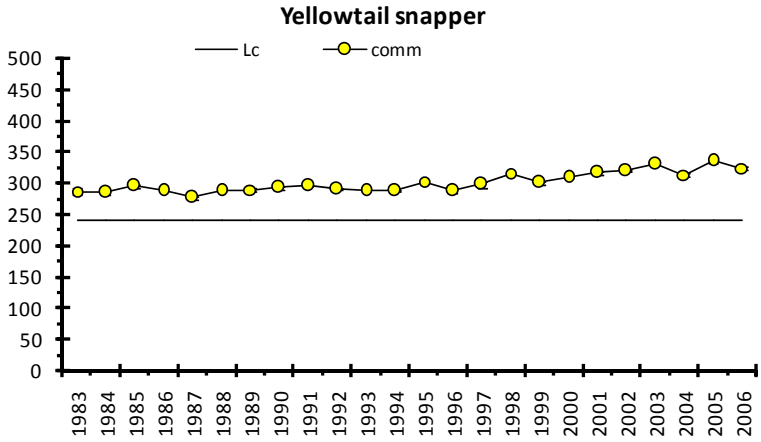


YPR - Hogfish

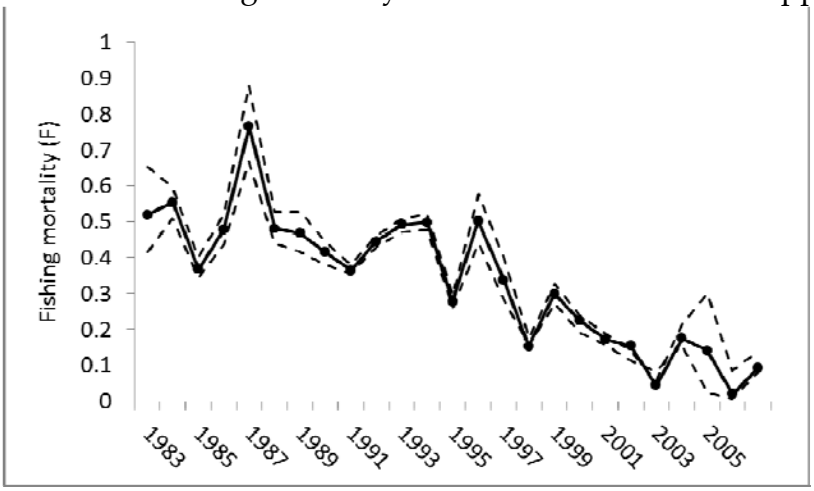


SPR - Hogfish

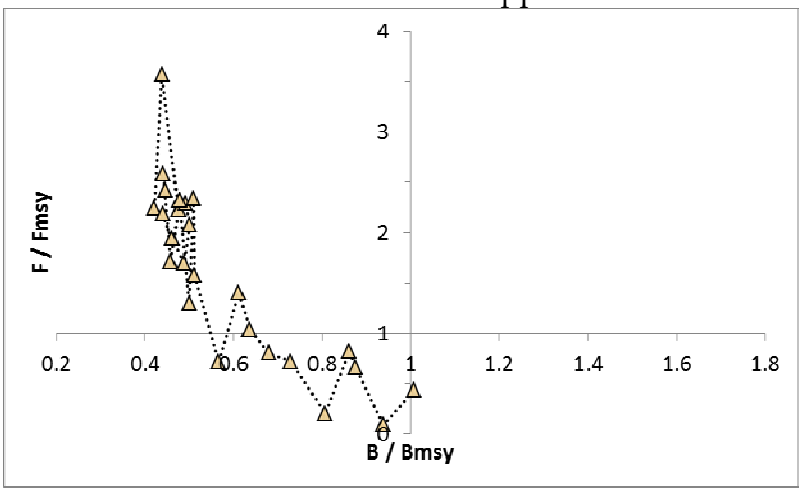




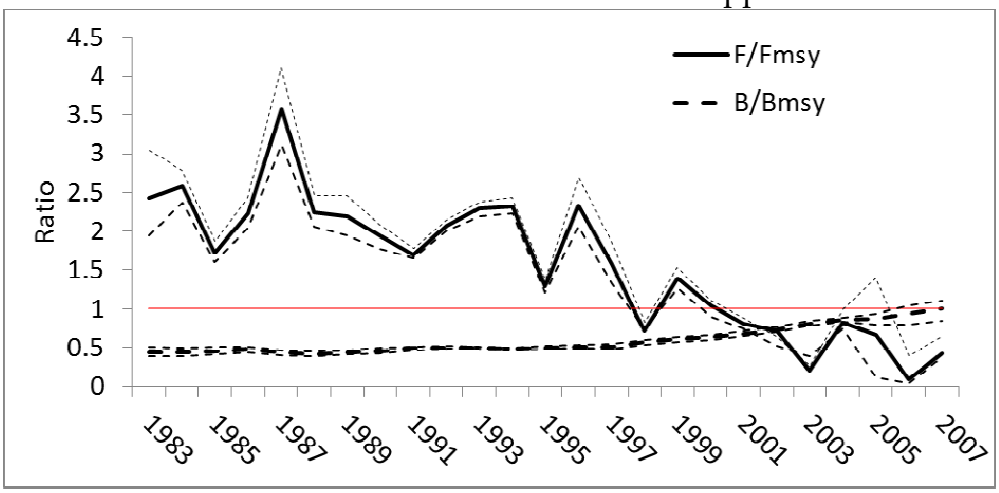
Estimated Fishing Mortality via LBAR – Yellowtail Snapper



Limit Control Rule - Yellowtail Snapper

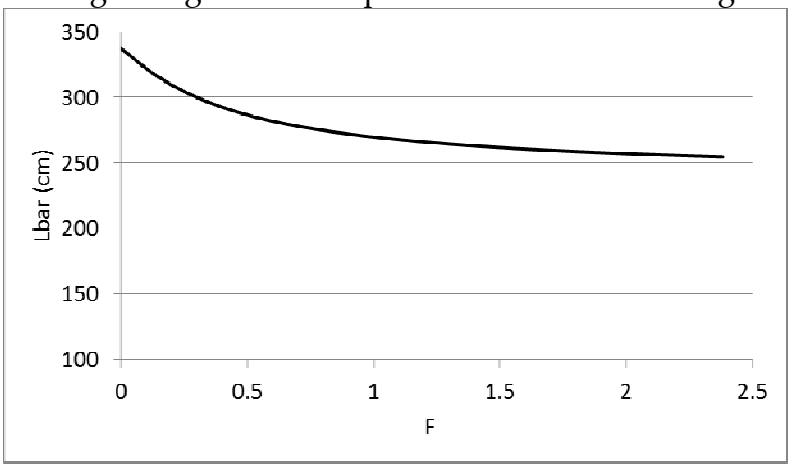


Limit Control Rule via Time Series - Yellowtail Snapper

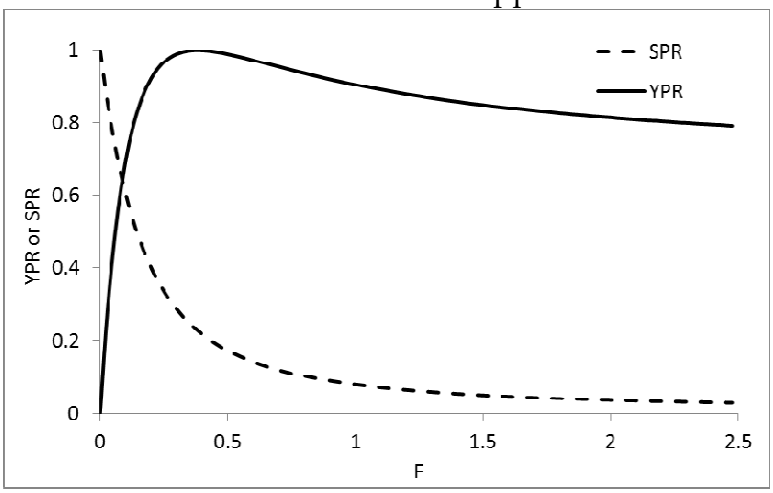


SPR over time - Yellowtail Snapper

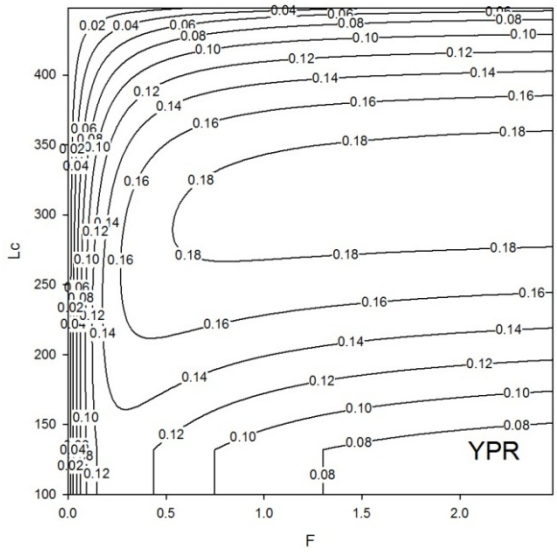
Average Length in the Exploitable Phase on Fishing Mortality Rate - Yellowtail Snapper



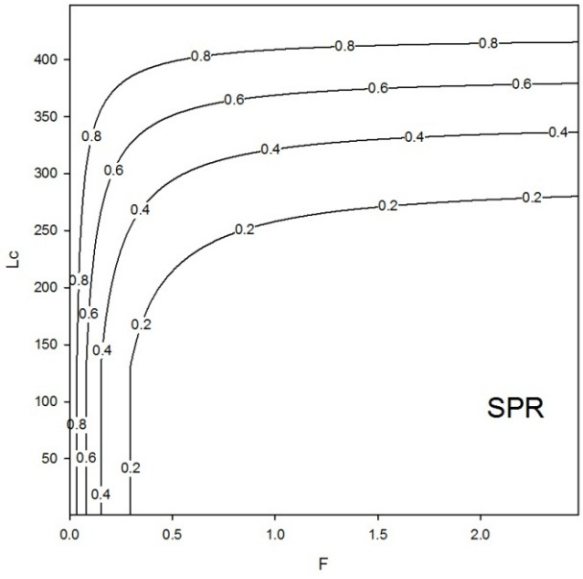
YPR and SPR on F - Yellowtail Snapper

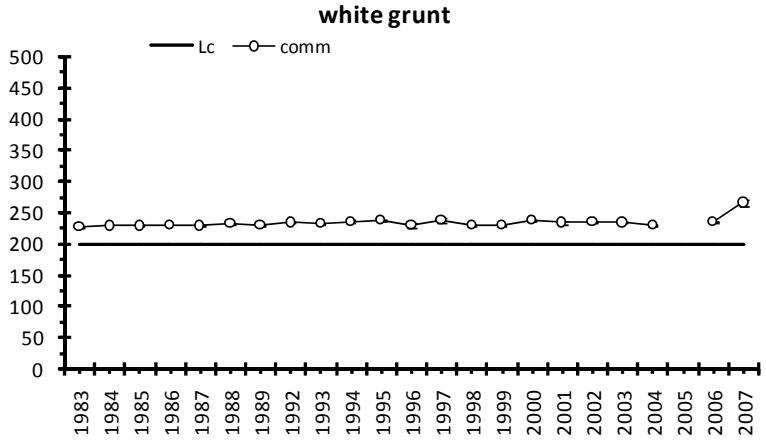


YPR - Yellowtail Snapper

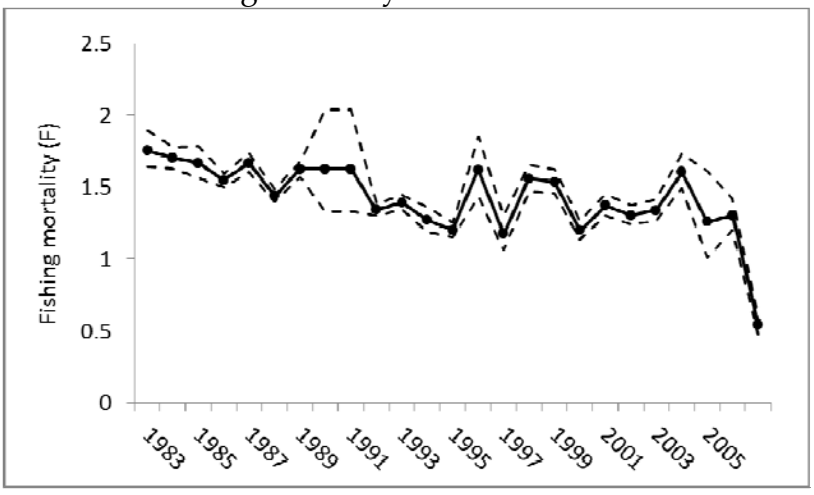


SPR - Yellowtail Snapper

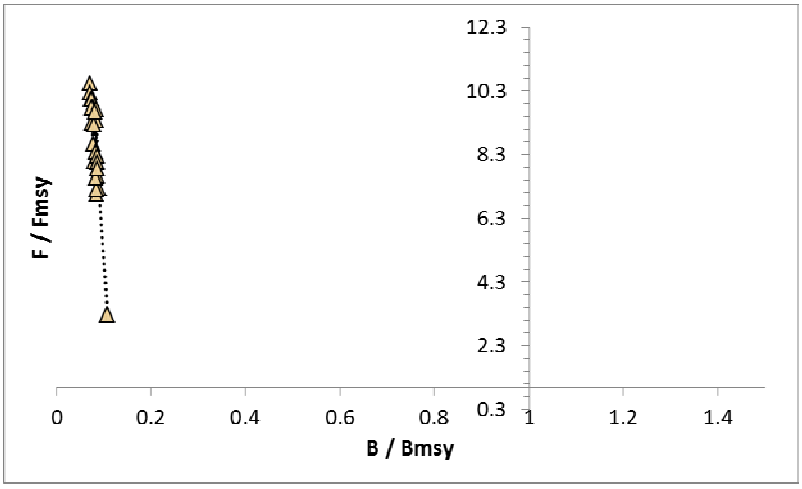




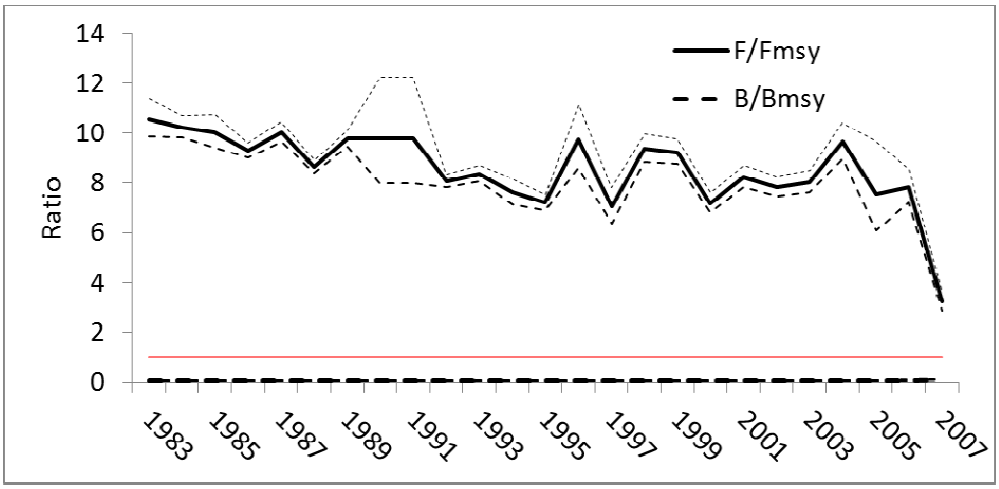
Estimated Fishing Mortality via LBAR – White Grunt



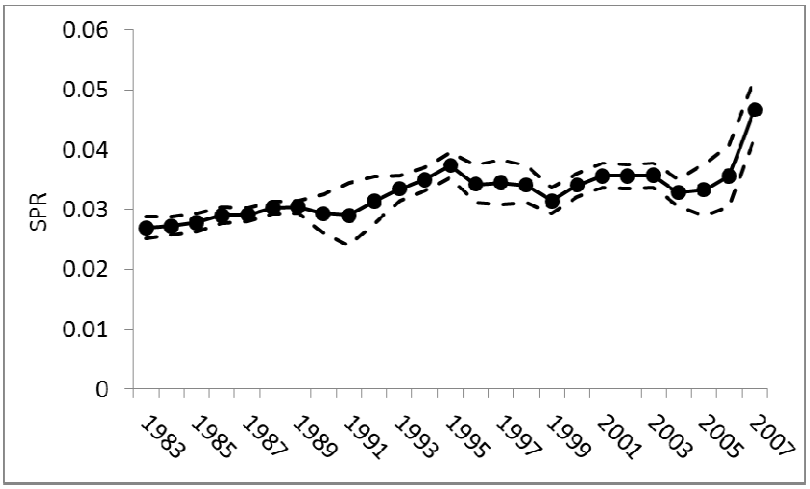
Limit Control Rule - White Grunt



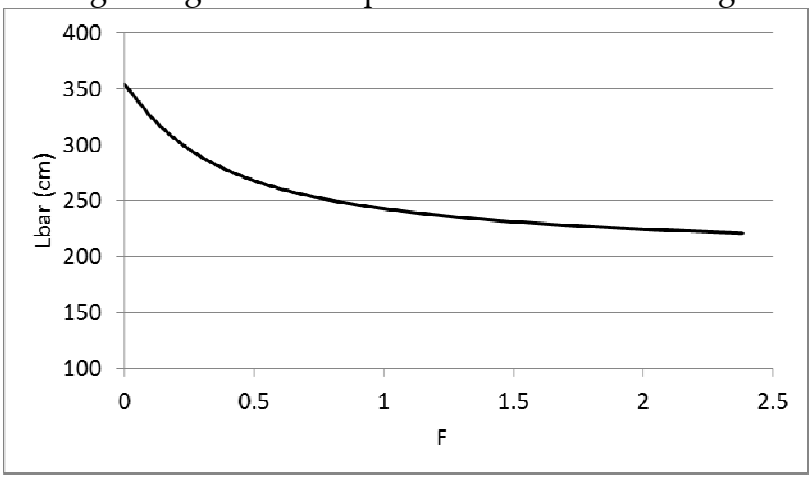
Limit Control Rule via Time Series - White Grunt



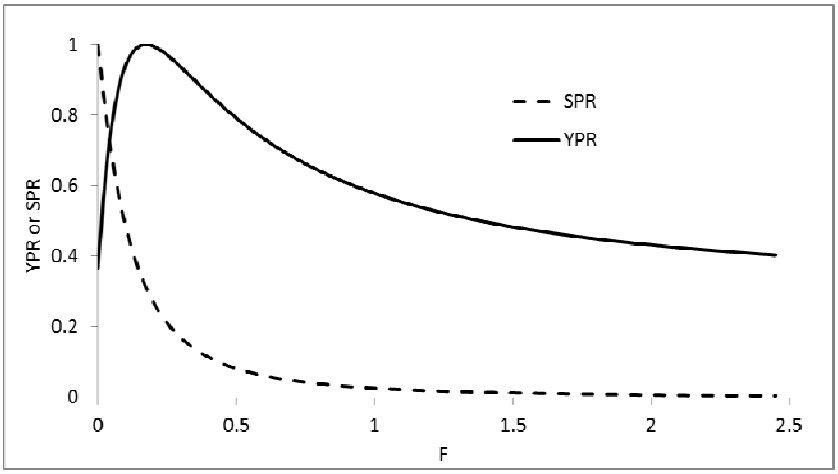
SPR over time - White Grunt



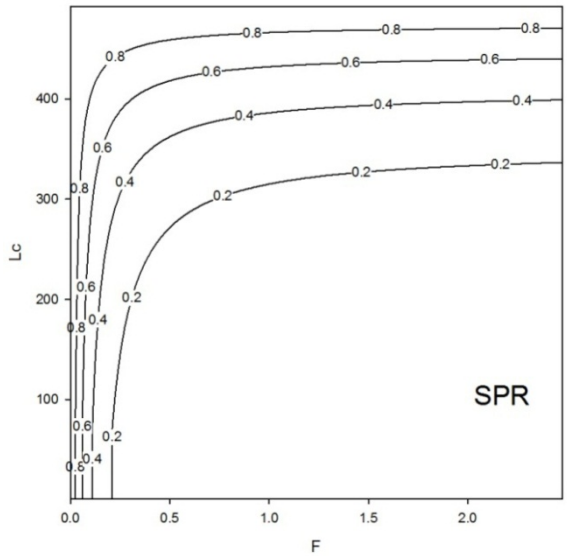
Average Length in the Exploitable Phase on Fishing Mortality Rate - White Grunt



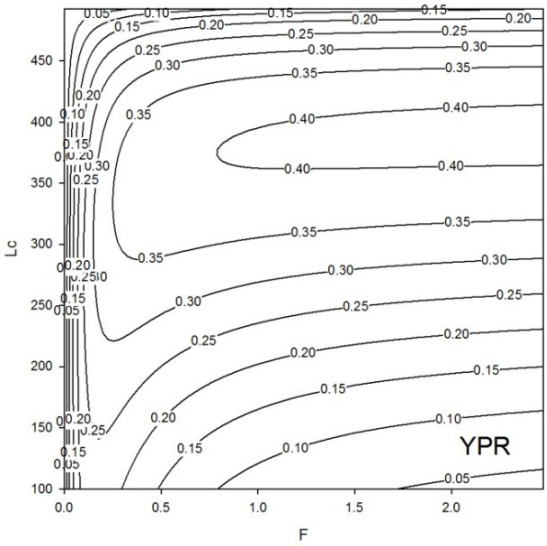
YPR and SPR on F - White Grunt

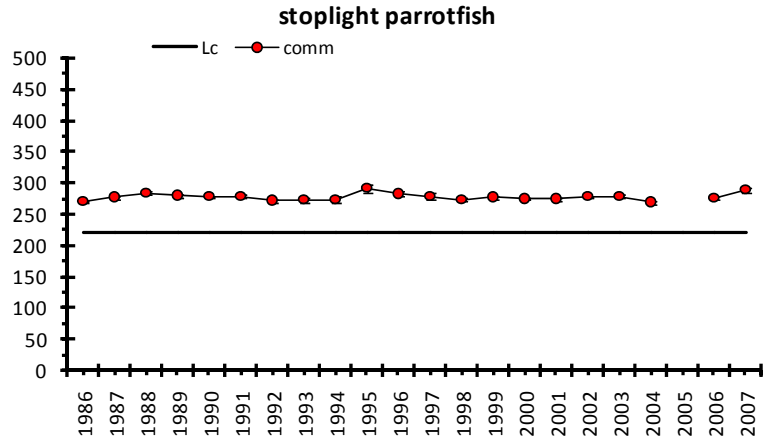


YPR - White Grunt

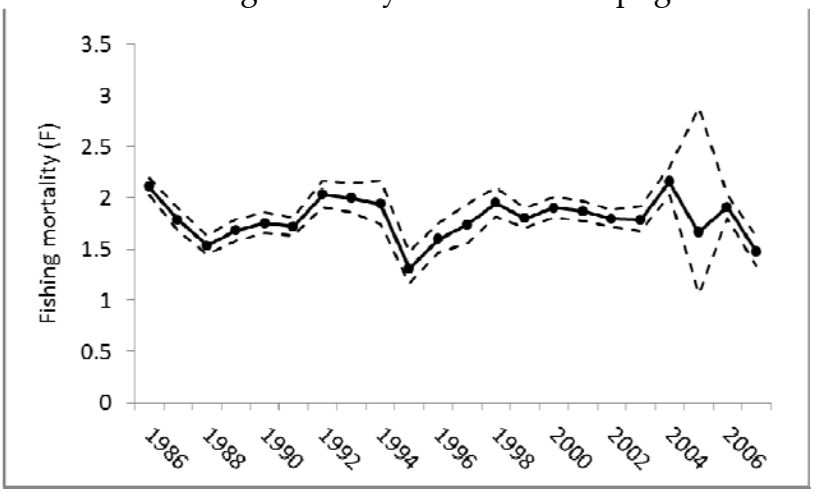


SPR - White Grunt

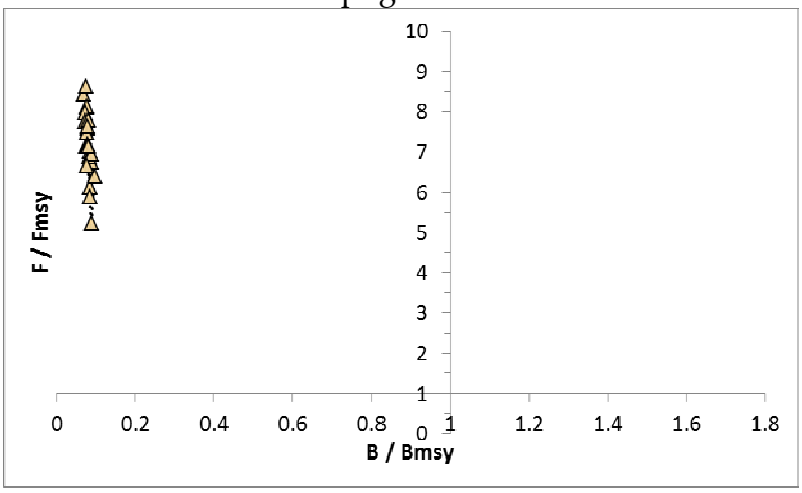




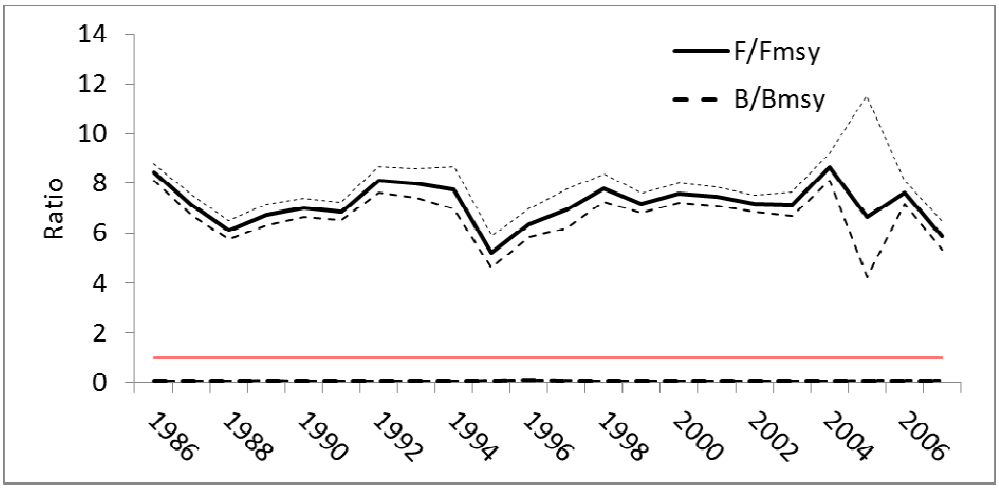
Estimated Fishing Mortality via LBAR - Stoplight Parrotfish



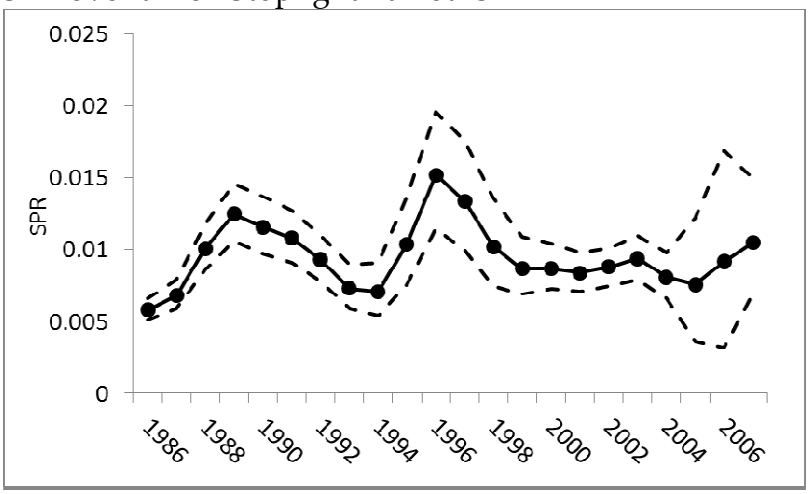
Limit Control Rule - Stoplight Parrotfish



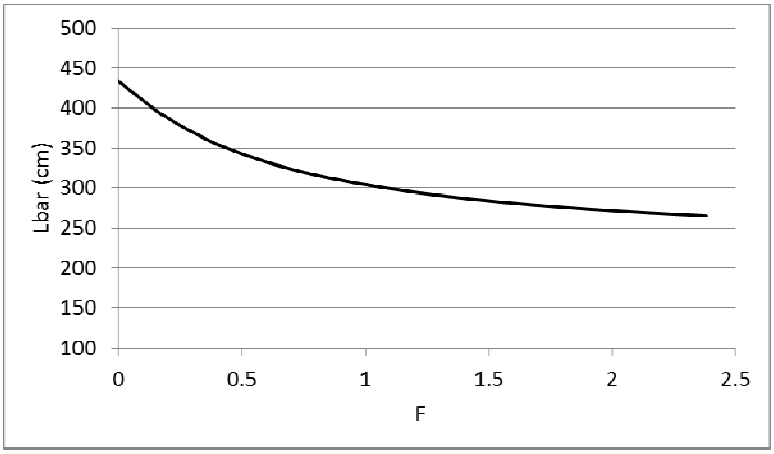
Limit Control Rule via Time Series - Stoplight Parrotfish



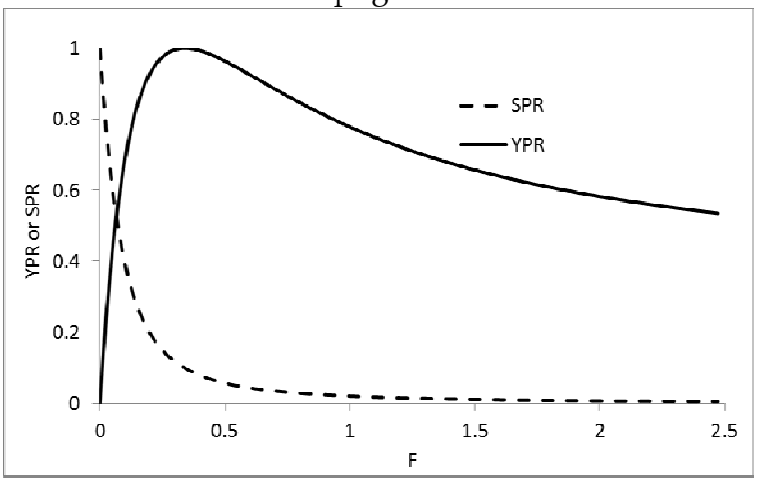
SPR over time - Stoplight Parrotfish



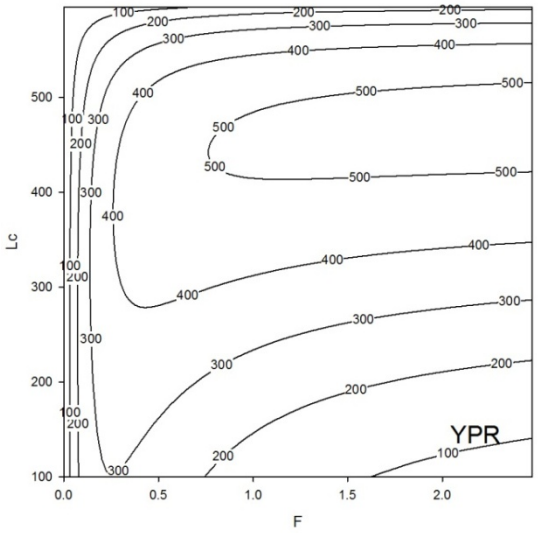
Average Length in the Exploitable Phase on Fishing Mortality Rate - Stoplight Parrotfish



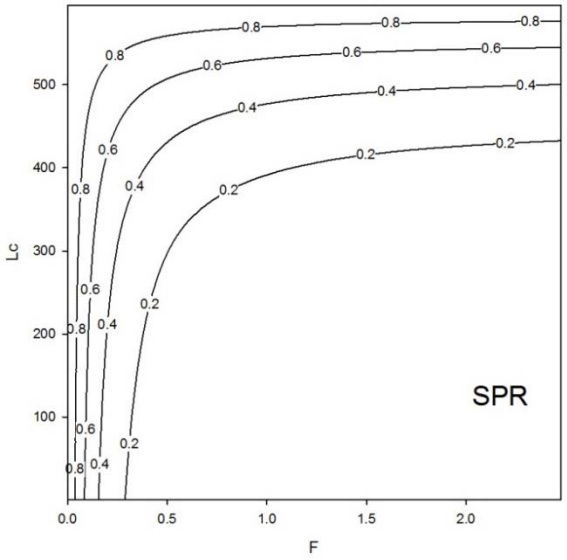
YPR and SPR on F - Stoplight Parrotfish



YPR - Stoplight Parrotfish



SPR – Stoplight Parrotfish



7.0 Discussion & Future Opportunities – Overarching Recommendations

The following figures (**Figs. 7.1-7.3**) will facilitate discussion of applications of length-based assessment methods to Puerto Rico reef-fishes and future collaborative research opportunities.

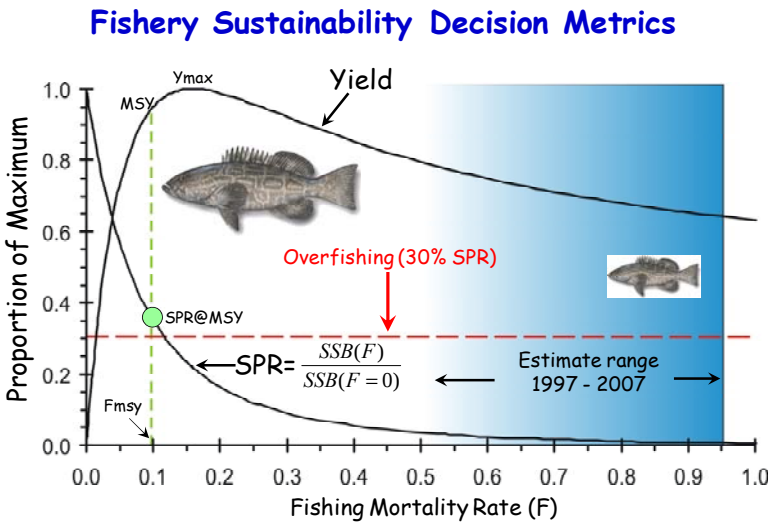


Fig. 7.1. YPR and SPR as a function of F.

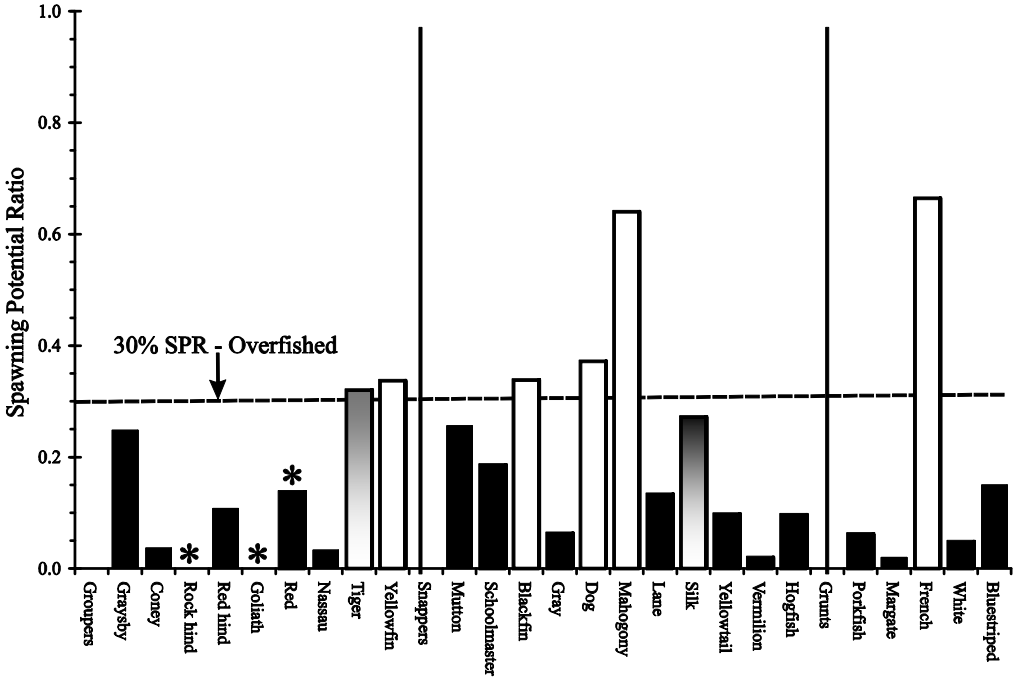


Figure 7.2. Comparative spawning potential ratio (SPR) analysis for 25 exploited reef fish species from the Puerto Rican coral reef ecosystem for the period 2000–2002. Dark bars indicate overfished stocks, open bars indicate stocks that are above the 30% SPR standard, and shaded bars indicate that stocks are within ±3% of the SPR standard. Asterisks denote species with unreliable estimated rates of fishing mortality.

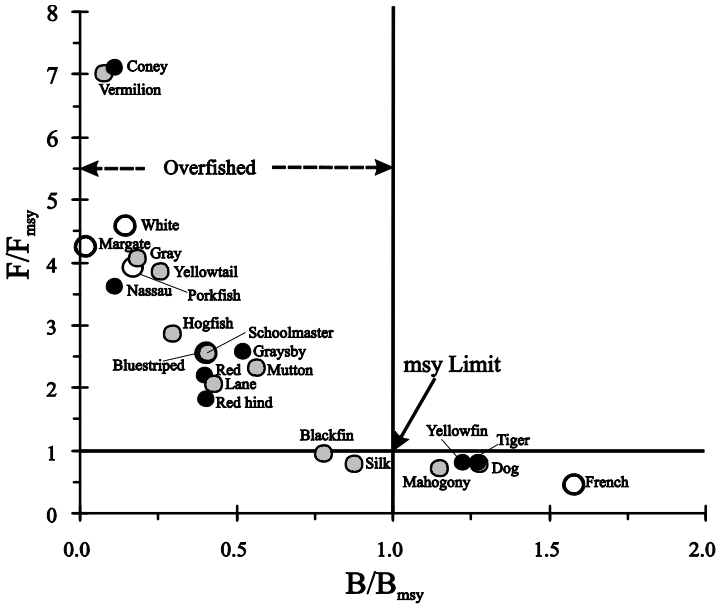


Figure 7.3. F/F_{msy} ratio versus B/B_{msy} ratio for the 25 species (groupers = dark circles, snappers = shaded circles and grunts = open circles) analysed for the years 2000–2002.

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Appendix A: Species observed in commercial and sport fleet sampling

sp_an	Family	Common	Latin	sp_nodc
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	8849010101
2	Acanthuridae	doctorfish	Acanthurus chirurgus	8849010102
3	Acanthuridae	blue tang	Acanthurus coeruleus	8849010103
4	Albulidae	bonefish	Albula vulpes	8739010101
5	Anguillidae	American eel	Anguilla rostrata	8741010101
6	Apogonidae	flamefish	Apogon maculatus	8835180107
7	Balistidae	gray triggerfish	Balistes capriscus	8860020201
8	Balistidae	queen triggerfish	Balistes vetula	8860020202
9	Balistidae	ocean triggerfish	Canthidermis sufflamen	8860020502
10	Balistidae	black durgon	Melichthys niger	8860020601
11	Balistidae	sargassum triggerfish	Xanthichthys ringens	8860020801
13	Belonidae	Atlantic needlefish	Strongylura marina	8803020201
14	Belonidae	timucu	Strongylura timucu	8803020203
15	Belonidae	Atlantic agujon	Tylosurus acus	8803020301
16	Bothidae	peacock flounder	Bothus lunatus	8857030601
18	Carangidae	African pompano	Alectis ciliaris	8835280201
18	Carangidae	African pompano	Alectis ciliaris	8835280202
19	Carangidae	yellow jack	Caranx bartholomaei	8835280301
20	Carangidae	blue runner	Caranx crysos	8835280306
21	Carangidae	crevalle jack	Caranx hippos	8835280303
22	Carangidae	horse-eye jack	Caranx latus	8835280304
23	Carangidae	black jack	Caranx lugubris	8835280307
24	Carangidae	bar jack	Caranx ruber	8835280308
25	Carangidae	Atlantic bumper	Chloroscombrus chrysurus	8835280401
26	Carangidae	mackerel scad	Decapterus macarellus	8835281201
27	Carangidae	round scad	Decapterus punctatus	8835281202
28	Carangidae	leatherjack	Oligoplites saurus	8835280501
29	Carangidae	bigeye scad	Selar crumenophthalmus	8835280601
31	Carangidae	Atlantic moonfish	Selene setapinnis	8835280705
31	Carangidae	Atlantic moonfish	Selene setapinnis	8835281001
32	Carangidae	lookdown	Selene vomer	8835280701
33	Carangidae	greater amberjack	Seriola dumerili	8835280801
34	Carangidae	lesser amberjack	Seriola fasciata	8835280802
35	Carangidae	almaco jack	Seriola rivoliana	8835280803
36	Carangidae	banded rudderfish	Seriola zonata	8835280804
38	Carangidae	Florida pompano	Trachinotus carolinus	8835280901
39	Carangidae	permit	Trachinotus falcatus	8835280902
40	Carangidae	palometa	Trachinotus goodei	8835280903
41	Carcharhinidae	silky shark	Carcharhinus falciformis	8708020506
42	Carcharhinidae	blacktip shark	Carcharhinus limbatus	8708020507
43	Carcharhinidae	dusky shark	Carcharhinus obscurus	8708020501
44	Carcharhinidae	reef shark	Carcharhinus perezii	8708020514
45	Carcharhinidae	sandbar shark	Carcharhinus plumbeus	8708020503
46	Carcharhinidae	smalltail shark	Carcharhinus porosus	8708020512
47	Carcharhinidae	tiger shark	Galeocerdo cuvieri	8708020201
48	Carcharhinidae	lemon shark	Negaprion brevirostris	8708020801
49	Carcharhinidae	blue shark	Prionace glauca	8708020601

51	Centrarchidae	warmouth	Lepomis gulosus	8835160503
52	Centrarchidae	bluegill	Lepomis macrochirus	8835160504
53	Centrarchidae	largemouth bass	Micropterus salmoides	8835160602
55	Centropomidae	swordspine snook	Centropomus ensiferus	8835010102
56	Centropomidae	smallscale fat snook	Centropomus parallelus	8835010103
57	Centropomidae	tarpon snook	Centropomus pectinatus	8835010104
58	Centropomidae	common snook	Centropomus undecimalis	8835010105
59	Chaetodontidae	foureye butterflyfish	Chaetodon capistratus	8835550103
60	Chaetodontidae	spotfin butterflyfish	Chaetodon ocellatus	8835550101
61	Chaetodontidae	banded butterflyfish	Chaetodon striatus	8835550108
63	Clupeidae	false pilchard	Harengula clupeola	8747010801
64	Clupeidae	redear sardine	Harengula humeralis	8747010802
65	Clupeidae	scaled sardine	Harengula jaguana	8747010803
65	Clupeidae	scaled sardine	Harengula jaguana	8747010804
66	Clupeidae	Atlantic thread herring	Opisthonema oglinum	8747010701
67	Clupeidae	Spanish sardine	Sardinella aurita	8747011003
68	Coryphaenidae	pompano dolphinfish	Coryphaena equiselis	8835290102
69	Coryphaenidae	dolphinfish	Coryphaena hippurus	8835290101
70	Dactyloscopidae	saddle stargazer	Platygillellus rubrocinctus	8840130102
71	Dasyatidae	southern stingray	Dasyatis americanus	8713050103
72	Diodontidae	balloonfish	Diodon holocanthus	8861030202
73	Diodontidae	porcupinefish	Diodon hystrix	8861030201
74	Echeneidae	sharksucker	Echeneis naucrates	8835270201
75	Elopidae	ladyfish	Elops saurus	8738010101
76	Engraulidae	striped anchovy	Anchoa hepsetus	8747020201
77	Engraulidae	dusky anchovy	Anchoa lyolepis	8747020205
78	Ephippidae	Atlantic spadefish	Chaetodipterus faber	8835520101
80	Fistulariidae	bluespotted cornetfish	Fistularia tabacaria	8819020101
82	Gerridae	Irish pompano	Diapterus auratus	8835390201
83	Gerridae	spotfin mojarra	Eucinostomus argenteus	8835390101
84	Gerridae	silver jenny	Eucinostomus gula	8835390102
85	Gerridae	bigeye mojarra	Eucinostomus havana	8835390108
86	Gerridae	slender mojarra	Eucinostomus jonesii	8835390106
87	Gerridae	mottled mojarra	Eucinostomus lefroyi	8835390104
88	Gerridae	flagfin mojarra	Eucinostomus melanopterus	8835390105
89	Gerridae	striped mojarra	Eugerres plumieri	8835390203
90	Gerridae	yellowfin mojarra	Gerres cinereus	8835390301
92	Ginglymostomatidae	nurse shark	Ginglymostoma cirratum	8707020101
94	Haemulidae	black margate	Anisostremus surinamensis	8835400304
95	Haemulidae	porkfish	Anisotremus virginicus	8835400306
96	Haemulidae	barred grunt	Conodon nobilis	8835400401
97	Haemulidae	margate	Haemulon album	8835400103
98	Haemulidae	tomtate	Haemulon aurolineatum	8835400101
99	Haemulidae	ceasar grunt	Haemulon carbonarium	8835400106
100	Haemulidae	smallmouth grunt	Haemulon chrysargyreum	8835400107
101	Haemulidae	French grunt	Haemulon flavolineatum	8835400108
102	Haemulidae	Spanish grunt	Haemulon macrostomum	8835400110
103	Haemulidae	sailors choice	Haemulon parra	8835400117
104	Haemulidae	white grunt	Haemulon plumierii	8835400102
105	Haemulidae	bluestriped grunt	Haemulon sciurus	8835400113

106	Haemulidae	striped grunt	Haemulon striatum	8835400116
107	Haemulidae	burro grunt	Pomadasys crocro	8835400502
108	Hemiramphidae	balao	Hemiramphus balao	8803010202
109	Hemiramphidae	ballyhoo	Hemiramphus brasiliensis	8803010201
111	Holocentridae	squirrelfish	Holocentrus adscensionis	8810080101
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	8810080103
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	8810080201
114	Holocentridae	longjaw squirrelfish	Neoniphon marianus	8810080105
115	Holocentridae	bigeye soldierfish	Ostichthys trachypoma	8810080301
116	Holocentridae	reef squirrelfish	Sargocentron coruscum	8810080104
117	Ictaluridae	white catfish	Ameiurus catus	8777020101
118	Ictaluridae	channel catfish	Ictalurus punctatus	8777020105
119	Istiophoridae	sailfish	Istiophorus platypterus	8850060101
120	Istiophoridae	blue marlin	Makaira nigricans	8850060201
121	Kyphosidae	yellow chub	Kyphosus incisor	8835510101
122	Kyphosidae	Bermuda chub	Kyphosus sectatrix	8835510102
123	Labridae	Spanish hogfish	Bodianus rufus	8839010302
124	Labridae	slippery dick	Halichoeres bivittatus	8839010702
125	Labridae	painted wrasse	Halichoeres caudalis	8839010703
126	Labridae	yellowhead wrasse	Halichoeres garnoti	8839010705
127	Labridae	clown wrasse	Halichoeres maculipinna	8839010706
128	Labridae	blackear wrasse	Halichoeres poeyi	8839010708
129	Labridae	puddingwife	Halichoeres radiatus	8839010709
130	Labridae	hogfish	Lachnolaimus maximus	8839010901
131	Labridae	pearly razorfish	Xyrichtys novacula	8839010802
132	Labrisomidae	mimic blenny	Labrisomus guppyi	8842090304
133	Labrisomidae	hairy blenny	Labrisomus nuchipinnis	8842090307
134	Lamnidae	shortfin mako	Isurus oxyrincus	8707040501
135	Lobotidae	Atlantic tripletail	Lobotes surinamensis	8835380101
136	Lutjanidae	black snapper	Apsilus dentatus	8835360201
137	Lutjanidae	queen snapper	Etelis oculatus	8835360301
138	Lutjanidae	mutton snapper	Lutjanus analis	8835360103
139	Lutjanidae	schoolmaster	Lutjanus apodus	8835360104
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	8835360106
141	Lutjanidae	red snapper	Lutjanus campechanus	8835360107
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	8835360101
143	Lutjanidae	gray snapper	Lutjanus griseus	8835360102
144	Lutjanidae	dog snapper	Lutjanus jocu	8835360109
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	8835360110
146	Lutjanidae	Caribbean red snapper	Lutjanus purpureus	8835360111
147	Lutjanidae	lane snapper	Lutjanus synagris	8835360112
148	Lutjanidae	silk snapper	Lutjanus vivanus	8835360113
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	8835360401
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	8835360701
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	8835360501
152	Malacanthidae	blackline tilefish	Caulolatilus cyanops	8835220102
153	Malacanthidae	sand tilefish	Malacanthus plumieri	8835220301
154	Megalopidae	tarpon	Megalops atlanticus	8738020201
155	Mobulidae	giant manta	Manta birostris	8713080101
156	Mobulidae	devil ray	Mobula hypostoma	8713080202

157	Monocanthidae	unicorn filefish	Aluterus monoceros	8860020103
158	Monocanthidae	orange filefish	Aluterus schoepfii	8860020101
159	Monocanthidae	scrawled filefish	Aluterus scriptus	8860020104
160	Monocanthidae	whitespotted filefish	Cantherhines macrocerus	8860020401
161	Monocanthidae	orangespotted filefish	Cantherhines pullus	8860020402
162	Mugilidae	mountain mullet	Agonostomus monticola	8836010401
163	Mugilidae	striped mullet	Mugil cephalus	8836010101
164	Mugilidae	white mullet	Mugil curema	8836010102
165	Mugilidae	liza	Mugil liza	8836010104
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	8835450101
167	Mullidae	red goatfish	Mullus auratus	8835450201
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	8835450301
170	Muraenidae	chain moray	Echidna catenata	8741050201
171	Muraenidae	viper moray	Enchelycore nigricans	8741050301
172	Muraenidae	green moray	Gymnothorax funebris	8741050401
173	Muraenidae	purplemouth moray	Gymnothorax vicinus	8741050408
175	Myliobatidae	spotted eagle ray	Aetobatus narinari	8713070101
176	Nomeidae	man-of-war fish	Nomeus gronovii	8851020301
177	Ogcocephalidae	shortnose batfish	Ogcocephalus nasutus	8787040103
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	8860030105
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	8860030202
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	8860030104
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	8860030201
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	8860030102
181	Ostraciidae	trunkfish	Lactophrys trigonus	8860030101
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	8860030103
183	Paralichthyidae	bay whiff	Citharichthys spilopterus	8857030110
185	Polymixiidae	beardfish	Polymixia lowei	8809010101
186	Polynemidae	Atlantic threadfin	Polydactylus octonemus	8838010101
187	Polynemidae	littlescale threadfin	Polydactylus oligodon	8838010104
188	Polynemidae	barbu	Polydactylus virginicus	8838010102
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	8835550301
190	Pomacanthidae	rock beauty	Holacanthus tricolor	8835550303
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	8835550401
192	Pomacanthidae	French angelfish	Pomacanthus paru	8835550402
193	Pomacentridae	sergeant major	Abudefduf saxatilis	8835620101
194	Pomacentridae	brown chromis	Chromis multilineata	8835620305
195	Priacanthidae	glasseye snapper	Heteropriacanthus cruentatus	8835170102
196	Priacanthidae	bigeye	Priacanthus arenatus	8835170101
197	Rachycentridae	cobia	Rachycentron canadum	8835260101
198	Scaridae	emerald parrotfish	Nicholsina usta	8839030301
199	Scaridae	midnight parrotfish	Scarus coelestinus	8839030102
200	Scaridae	blue parrotfish	Scarus coeruleus	8839030101
201	Scaridae	rainbow parrotfish	Scarus guacamaia	8839030104
202	Scaridae	striped parrotfish	Scarus iseri	8839030103
203	Scaridae	princess parrotfish	Scarus taeniopterus	8839030105
204	Scaridae	queen parrotfish	Scarus vetula	8839030106
205	Scaridae	greenblotch parrotfish	Sparisoma atomarium	8839030401
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	8839030402
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	8839030403

208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	8839030405
209	Scaridae	stoplight parrotfish	Sparisoma viride	8839030406
210	Sciaenidae	blue croaker	Bairdiella batabana	8835440304
211	Sciaenidae	striped croaker	Bairdiella sanctaeluciae	8835440305
212	Sciaenidae	jackknife-fish	Equetus lanceolatus	8835441202
213	Sciaenidae	spotted drum	Equetus punctatus	8835441205
214	Sciaenidae	banded drum	Larimus fasciatus	8835440501
215	Sciaenidae	Atlantic croaker	Micropogonias undulatus	8835440702
216	Sciaenidae	reef croaker	Odontoscion dentex	8835441301
218	Sciaenidae	star drum	Stellifer lanceolatus	8835441001
219	Sciaenidae	sand drum	Umbrina coroides	8835441101
220	Scombridae	wahoo	Acanthocybium solandri	8850030601
221	Scombridae	bullet mackerel	Auxis rochei	8850030701
222	Scombridae	little tunny	Euthynnus alletteratus	8850030102
223	Scombridae	skipjack tuna	Katsuwonus pelamis	8850030101
224	Scombridae	Atlantic bonito	Sarda sarda	8850030202
225	Scombridae	king mackerel	Scomberomorus cavalla	8850030501
226	Scombridae	Spanish mackerel	Scomberomorus maculatus	8850030502
227	Scombridae	cero	Scomberomorus regalis	8850030503
228	Scombridae	albacore	Thunnus alalunga	8850030401
229	Scombridae	yellowfin tuna	Thunnus albacares	8850030403
230	Scombridae	blackfin tuna	Thunnus atlanticus	8850030404
231	Scombridae	bigeye tuna	Thunnus obesus	8850030405
232	Scorpaenidae	spotted scorpionfish	Scorpaena plumieri	8826010614
233	Serranidae	graysby	Cephalopholis cruentata	8835020439
233	Serranidae	graysby	Cephalopholis cruentata	8835021801
234	Serranidae	coney	Cephalopholis fulva	8835020438
234	Serranidae	coney	Cephalopholis fulva	8835020802
235	Serranidae	marbled grouper	Dermatolepis inermis	8835020440
236	Serranidae	rock hind	Epinephelus adscensionis	8835020402
237	Serranidae	yellowedge grouper	Epinephelus flavolimbatus	8835020405
238	Serranidae	red hind	Epinephelus guttatus	8835020406
239	Serranidae	goliath grouper	Epinephelus itajara	8835020401
240	Serranidae	red grouper	Epinephelus morio	8835020408
241	Serranidae	misty grouper	Epinephelus mystacinus	8835020409
242	Serranidae	warsaw grouper	Epinephelus nigritus	8835020410
243	Serranidae	Nassau grouper	Epinephelus striatus	8835020412
244	Serranidae	black grouper	Mycteroperca bonaci	8835020502
245	Serranidae	yellowmouth grouper	Mycteroperca interstitialis	8835020504
246	Serranidae	gag	Mycteroperca microlepis	8835020501
247	Serranidae	tiger grouper	Mycteroperca tigris	8835020509
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	8835020506
249	Serranidae	Atlantic creolefish	Paranthias furcifer	8835021701
250	Serranidae	greater soapfish	Rypticus saponaceus	8835030207
251	Serranidae	tattler	Serranus phoebe	8835022308
252	Serranidae	tobaccofish	Serranus tabacarius	8835022310
253	Serranidae	chalk bass	Serranus tortugarum	8835022312
255	Sparidae	sheepshead	Archosargus probatocephalus	8835430301
256	Sparidae	sea bream	Archosargus rhomboidalis	8835430302
257	Sparidae	jolthead porgy	Calamus bajonado	8835430502

258	Sparidae	saucereye porgy	Calamus calamus	8835430503
259	Sparidae	sheepshead porgy	Calamus penna	8835430507
260	Sparidae	pluma porgy	Calamus pennatula	8835430515
261	Sparidae	littlehead porgy	Calamus proridens	8835430508
262	Sphyraenidae	great barracuda	Sphyraena barracuda	8837010104
263	Sphyraenidae	northern sennet	Sphyraena borealis	8837010102
264	Sphyraenidae	guaguanche	Sphyraena guachancho	8837010103
265	Sphyraenidae	southern sennet	Sphyraena picudilla	8837010105
267	Sphyrnidae	great hammerhead	Sphyrna mokarran	8708030104
268	Stromateidae	harvestfish	Peprilus paru	8851030106
269	Stromateidae	butterfish	Peprilus triacanthus	8851030103
270	Synodontidae	sand diver	Synodus intermedius	8762020102
271	Synodontidae	snakefish	Trachinocephalus myops	8762020401
272	Tetraodontidae	smooth puffer	Lagocephalus laevigatus	8861010101
273	Tetraodontidae	least puffer	Sphoeroides parvus	8861010210
274	Tetraodontidae	bandtail puffer	Sphoeroides spengleri	8861010211
275	Tetraodontidae	checkered puffer	Sphoeroides testudineus	8861010202
276	Triakidae	smooth dogfish	Mustelus canis	8708020401
277	Triakidae	Florida smoothhound	Mustelus norrisi	8708020403
278	Trichiuridae	Atlantic cutlassfish	Trichiurus lepturus	8850020201
279	Urolophidae	yellow stingray	Urobatis jamaicensis	8713050301
280	Xiphiidae	swordfish	Xiphias gladius	8850040101
701	Acanthuridae	surgeonfishes	Acanthuridae spp	8849010000
702	Albulidae	bonefishes	Albulidae spp	8739010000
703	Balistidae	triggerfishes	Balistidae	8860020000
705	Carcharhinidae	requiem sharks	Carcharhinidae spp	8708020000
706	Centropomidae	snooks	Centropomidae spp	8835010000
707	Clupeidae	herrings	Clupeidae spp	8747010000
708	Coryphaenidae	dolphins	Coryphaenidae spp	8835290000
709	Diodontidae	porcupinefishes	Diodontidae spp	8861030000
710	Ephippidae	spadefishes	Ephippidae spp	8835520000
711	Gerridae	mojarras	Gerridae spp	8835390000
712	Ginglymostomatidae	nurse sharks	Ginglymostomatidae spp	8707020000
713	Haemulidae	grunts	Haemulidae spp	8835400000
714	Hexanchidae	cow sharks	Hexanchidae spp	8705020000
715	Holocentridae	squirrelfishes	Holocentridae spp	8810080000
716	Istiophoridae	billfishes	Istiophoridae spp	8850060000
717	Kyphosidae	sea chubs	Kyphosidae spp	8835510000
718	Labridae	wrasses	Labridae spp	8839010000
719	Lamnidae	mackerel sharks	Lamnidae spp	8707040000
720	Lutjanidae	snappers	Lutjanidae spp	8835360000
721	minnows	Minnow, bait	minnows	8717000000
722	Mugilidae	mullets	Mugilidae spp	8836010000
723	Mullidae	goatfishes	Mullidae spp	8835450000
724	Ostraciidae	boxfishes	Ostraciidae spp	8860030000
725	Pomacanthidae	angelfishes	Pomacanthidae spp	8835550000
726	Priacanthidae	bigeyes	Priacanthidae spp	8835170000
727	Rajiformes	Ray, other	Rajiformes spp	8713000000
728	Rhincodontidae	whale sharks	Rhincodontidae spp	8707010000
729	Scaridae	parrotfishes	Scaridae spp	8839030000

730	Sciaenidae	drums	Sciaenidae spp	8835440000
731	Scombridae	mackerels & tunas	Scombridae spp	8850030000
732	Serranidae	seabasses	Serranidae spp	8835020000
733	Sparidae	porgies	Sparidae spp	8835430000
734	Sphyraenidae	barracudas	Sphyraenidae spp	8837010000
735	Syngnathidae	pipefishes	Syngnathidae spp	8820020000
736	Trichiuridae	cutlassfishes	Trichiuridae spp	8850020000
901	crustacea	Crustaceans, mixed	crustacea spp	6100000000
907	crustacea	Caribbean spiny lobster	Panulirus argus	6182010101
908	crustacea	spotted lobster	Panulirus guttatus	6182010104
910	mollusca	queen conch	Strombus gigas	5103580103

Appendix B: Species Length Composition Sample Sizes by Data Source

sp_an	family	common	latin	year	TIP	MRF	SEA	BIO	ALL	time
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1983	0	0	0	0	0	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1984	0	0	0	0	0	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1985	0	0	0	0	0	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1986	6	0	0	0	6	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1987	3	0	0	0	3	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1988	2	0	0	0	2	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1989	0	0	0	0	0	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1990	1	0	0	0	1	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1991	0	0	0	0	0	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1992	3	0	0	0	3	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1993	0	0	3	0	3	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1994	3	0	2	0	5	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1995	0	0	0	0	0	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1996	7	0	0	0	7	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1997	1	0	0	0	1	-9
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1998	17	0	0	0	17	1998-99
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_1999	20	0	0	0	20	1998-99
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2000	22	1	0	0	23	2000-01
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2001	6	0	13	1	20	2000-01
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2002	11	0	0	12	23	2002-03
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2003	14	0	0	3	17	2002-03
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2004	7	0	0	3	10	2004-06
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2005	0	0	1	13	14	2004-06
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2006	0	0	0	14	14	2004-06
1	Acanthuridae	ocean surgeon	Acanthurus bahianus	_2007	0	0	0	4	4	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1983	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1984	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1985	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1986	20	0	0	0	20	1986-88
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1987	0	0	0	0	0	1986-88
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1988	10	0	0	0	10	1986-88
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1989	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1990	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1991	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1992	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1993	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1994	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1995	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1996	8	0	0	0	8	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1997	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1998	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_1999	0	0	0	0	0	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2000	0	2	0	0	2	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2001	0	0	0	2	2	-9
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2002	0	0	0	58	58	2002
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2003	0	0	0	36	36	2003
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2004	0	0	0	16	16	2004-05
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2005	0	0	4	14	18	2004-05
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2006	41	0	0	9	50	2006
2	Acanthuridae	doctorfish	Acanthurus chirurgus	_2007	0	0	0	46	46	2007
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1983	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1984	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1985	1	0	0	0	1	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1986	2	0	0	0	2	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1987	5	0	0	0	5	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1988	4	0	0	0	4	-9

3	Acanthuridae	blue tang	Acanthurus coeruleus	_1989	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1990	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1991	3	0	1	0	4	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1992	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1993	0	0	3	0	3	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1994	0	0	2	0	2	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1995	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1996	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1997	0	0	0	0	0	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1998	0	0	2	0	2	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_1999	0	0	2	0	2	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2000	1	0	2	4	7	-9
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2001	0	1	0	51	52	2001
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2002	0	0	0	36	36	2002
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2003	0	1	0	75	76	2003
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2004	0	0	0	20	20	2004-05
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2005	0	0	5	54	59	2004-05
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2006	77	0	2	39	118	2006
3	Acanthuridae	blue tang	Acanthurus coeruleus	_2007	0	0	0	67	67	2007
7	Balistidae	gray triggerfish	Balistes capriscus	_1983	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1984	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1985	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1986	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1987	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1988	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1989	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1990	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1991	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1992	2	0	0	0	2	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1993	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1994	0	0	1	0	1	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1995	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1996	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1997	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1998	4	0	0	0	4	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_1999	10	0	0	0	10	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_2000	0	11	0	0	11	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_2001	83	1	0	0	84	2001
7	Balistidae	gray triggerfish	Balistes capriscus	_2002	0	0	0	0	0	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_2003	0	13	0	0	13	2003-04
7	Balistidae	gray triggerfish	Balistes capriscus	_2004	20	4	0	0	24	2003-04
7	Balistidae	gray triggerfish	Balistes capriscus	_2005	0	0	1	0	1	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_2006	0	0	2	0	2	-9
7	Balistidae	gray triggerfish	Balistes capriscus	_2007	0	0	0	0	0	-9
8	Balistidae	queen triggerfish	Balistes vetula	_1983	207	0	0	0	207	1983
8	Balistidae	queen triggerfish	Balistes vetula	_1984	580	0	0	0	580	1984
8	Balistidae	queen triggerfish	Balistes vetula	_1985	271	0	0	0	271	1985
8	Balistidae	queen triggerfish	Balistes vetula	_1986	520	0	0	0	520	1986
8	Balistidae	queen triggerfish	Balistes vetula	_1987	368	0	0	0	368	1987
8	Balistidae	queen triggerfish	Balistes vetula	_1988	318	0	0	0	318	1988
8	Balistidae	queen triggerfish	Balistes vetula	_1989	185	0	0	0	185	1989
8	Balistidae	queen triggerfish	Balistes vetula	_1990	104	0	0	0	104	1990
8	Balistidae	queen triggerfish	Balistes vetula	_1991	317	0	26	0	343	1991
8	Balistidae	queen triggerfish	Balistes vetula	_1992	255	0	47	0	302	1992
8	Balistidae	queen triggerfish	Balistes vetula	_1993	171	0	55	0	226	1993
8	Balistidae	queen triggerfish	Balistes vetula	_1994	99	0	19	0	118	1994
8	Balistidae	queen triggerfish	Balistes vetula	_1995	114	0	4	0	118	1995
8	Balistidae	queen triggerfish	Balistes vetula	_1996	47	0	0	0	47	1996
8	Balistidae	queen triggerfish	Balistes vetula	_1997	44	0	1	0	45	1997

8	Balistidae	queen triggerfish	Balistes vetula	_1998	185	0	18	0	203	1998
8	Balistidae	queen triggerfish	Balistes vetula	_1999	230	0	29	0	259	1999
8	Balistidae	queen triggerfish	Balistes vetula	_2000	186	6	9	0	201	2000
8	Balistidae	queen triggerfish	Balistes vetula	_2001	160	16	23	1	200	2001
8	Balistidae	queen triggerfish	Balistes vetula	_2002	212	2	0	3	217	2002
8	Balistidae	queen triggerfish	Balistes vetula	_2003	218	4	0	1	223	2003
8	Balistidae	queen triggerfish	Balistes vetula	_2004	220	2	1	0	223	2004
8	Balistidae	queen triggerfish	Balistes vetula	_2005	0	4	9	1	14	2005-06
8	Balistidae	queen triggerfish	Balistes vetula	_2006	319	2	0	2	323	2005-06
8	Balistidae	queen triggerfish	Balistes vetula	_2007	128	3	0	3	134	2007
10	Balistidae	black durgon	Melichthys niger	_1983	0	0	0	0	0	-9
10	Balistidae	black durgon	Melichthys niger	_1984	1	0	0	0	1	-9
10	Balistidae	black durgon	Melichthys niger	_1985	0	0	0	0	0	-9
10	Balistidae	black durgon	Melichthys niger	_1986	0	0	0	0	0	-9
10	Balistidae	black durgon	Melichthys niger	_1987	9	0	0	0	9	-9
10	Balistidae	black durgon	Melichthys niger	_1988	0	0	0	0	0	-9
10	Balistidae	black durgon	Melichthys niger	_1989	0	0	0	0	0	-9
10	Balistidae	black durgon	Melichthys niger	_1990	0	0	0	0	0	-9
10	Balistidae	black durgon	Melichthys niger	_1991	0	0	4	0	4	-9
10	Balistidae	black durgon	Melichthys niger	_1992	8	0	29	0	37	1992
10	Balistidae	black durgon	Melichthys niger	_1993	1	0	25	0	26	1993-94
10	Balistidae	black durgon	Melichthys niger	_1994	0	0	15	0	15	1993-94
10	Balistidae	black durgon	Melichthys niger	_1995	9	0	0	0	9	-9
10	Balistidae	black durgon	Melichthys niger	_1996	1	0	0	0	1	-9
10	Balistidae	black durgon	Melichthys niger	_1997	0	0	12	0	12	1997-99
10	Balistidae	black durgon	Melichthys niger	_1998	0	0	9	0	9	1997-99
10	Balistidae	black durgon	Melichthys niger	_1999	0	0	17	0	17	1997-99
10	Balistidae	black durgon	Melichthys niger	_2000	20	5	25	0	50	2000
10	Balistidae	black durgon	Melichthys niger	_2001	0	52	58	1	111	2001
10	Balistidae	black durgon	Melichthys niger	_2002	12	11	0	12	35	2002
10	Balistidae	black durgon	Melichthys niger	_2003	0	41	0	26	67	2003
10	Balistidae	black durgon	Melichthys niger	_2004	0	2	1	14	17	2004-05
10	Balistidae	black durgon	Melichthys niger	_2005	0	20	39	20	79	2004-05
10	Balistidae	black durgon	Melichthys niger	_2006	4	2	1	21	28	2006-07
10	Balistidae	black durgon	Melichthys niger	_2007	0	2	0	34	36	2006-07
94	Haemulidae	black margate	Anisostremus surinamensis	_1983	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1984	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1985	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1986	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1987	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1988	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1989	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1990	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1991	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1992	9	0	0	0	9	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1993	6	0	0	0	6	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1994	2	0	0	0	2	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1995	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1996	1	0	0	0	1	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1997	1	0	0	0	1	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1998	4	0	0	0	4	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_1999	9	0	0	0	9	1999-01
94	Haemulidae	black margate	Anisostremus surinamensis	_2000	10	4	0	0	14	1999-01
94	Haemulidae	black margate	Anisostremus surinamensis	_2001	7	3	0	0	10	1999-01
94	Haemulidae	black margate	Anisostremus surinamensis	_2002	2	3	0	0	5	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_2003	3	13	0	0	16	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_2004	2	0	0	0	2	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_2005	0	0	0	0	0	-9
94	Haemulidae	black margate	Anisostremus surinamensis	_2006	7	0	0	0	7	-9

94	Haemulidae	black margate	Anisostremus surinamensis	_2007	0	0	0	0	0	-9
95	Haemulidae	porkfish	Anisotremus virginicus	_1983	6	0	0	0	6	-9
95	Haemulidae	porkfish	Anisotremus virginicus	_1984	0	0	0	0	0	-9
95	Haemulidae	porkfish	Anisotremus virginicus	_1985	0	0	0	0	0	-9
95	Haemulidae	porkfish	Anisotremus virginicus	_1986	58	0	0	0	58	1986
95	Haemulidae	porkfish	Anisotremus virginicus	_1987	47	0	0	0	47	1987
95	Haemulidae	porkfish	Anisotremus virginicus	_1988	138	0	0	0	138	1988
95	Haemulidae	porkfish	Anisotremus virginicus	_1989	97	0	0	0	97	1989
95	Haemulidae	porkfish	Anisotremus virginicus	_1990	61	0	0	0	61	1990
95	Haemulidae	porkfish	Anisotremus virginicus	_1991	33	0	0	0	33	1991
95	Haemulidae	porkfish	Anisotremus virginicus	_1992	28	0	0	0	28	1992-93
95	Haemulidae	porkfish	Anisotremus virginicus	_1993	22	0	0	0	22	1992-93
95	Haemulidae	porkfish	Anisotremus virginicus	_1994	7	0	0	0	7	1994-96
95	Haemulidae	porkfish	Anisotremus virginicus	_1995	20	0	0	0	20	1994-96
95	Haemulidae	porkfish	Anisotremus virginicus	_1996	10	0	0	0	10	1994-96
95	Haemulidae	porkfish	Anisotremus virginicus	_1997	7	0	0	0	7	1997-98
95	Haemulidae	porkfish	Anisotremus virginicus	_1998	42	0	0	0	42	1997-98
95	Haemulidae	porkfish	Anisotremus virginicus	_1999	31	0	0	0	31	1999
95	Haemulidae	porkfish	Anisotremus virginicus	_2000	75	1	0	1	77	2000
95	Haemulidae	porkfish	Anisotremus virginicus	_2001	76	1	0	0	77	2001
95	Haemulidae	porkfish	Anisotremus virginicus	_2002	62	1	0	1	64	2002
95	Haemulidae	porkfish	Anisotremus virginicus	_2003	38	2	0	6	46	2003
95	Haemulidae	porkfish	Anisotremus virginicus	_2004	30	0	0	1	31	2004
95	Haemulidae	porkfish	Anisotremus virginicus	_2005	0	1	1	2	4	2005-07
95	Haemulidae	porkfish	Anisotremus virginicus	_2006	33	0	0	2	35	2005-07
95	Haemulidae	porkfish	Anisotremus virginicus	_2007	22	0	0	5	27	2005-07
97	Haemulidae	margate	Haemulon album	_1983	1	0	0	0	1	-9
97	Haemulidae	margate	Haemulon album	_1984	28	0	0	0	28	1984-85
97	Haemulidae	margate	Haemulon album	_1985	31	0	0	0	31	1984-85
97	Haemulidae	margate	Haemulon album	_1986	21	0	0	0	21	1986-87
97	Haemulidae	margate	Haemulon album	_1987	9	0	0	0	9	1986-87
97	Haemulidae	margate	Haemulon album	_1988	12	0	0	0	12	-9
97	Haemulidae	margate	Haemulon album	_1989	16	0	0	0	16	-9
97	Haemulidae	margate	Haemulon album	_1990	0	0	0	0	0	-9
97	Haemulidae	margate	Haemulon album	_1991	0	0	0	0	0	-9
97	Haemulidae	margate	Haemulon album	_1992	6	0	0	0	6	-9
97	Haemulidae	margate	Haemulon album	_1993	15	0	0	0	15	-9
97	Haemulidae	margate	Haemulon album	_1994	4	0	0	0	4	-9
97	Haemulidae	margate	Haemulon album	_1995	3	0	0	0	3	-9
97	Haemulidae	margate	Haemulon album	_1996	3	0	0	0	3	-9
97	Haemulidae	margate	Haemulon album	_1997	2	0	0	0	2	-9
97	Haemulidae	margate	Haemulon album	_1998	6	0	0	0	6	-9
97	Haemulidae	margate	Haemulon album	_1999	11	0	0	0	11	1999-01
97	Haemulidae	margate	Haemulon album	_2000	9	0	0	0	9	1999-01
97	Haemulidae	margate	Haemulon album	_2001	34	0	1	0	35	1999-01
97	Haemulidae	margate	Haemulon album	_2002	7	0	0	0	7	-9
97	Haemulidae	margate	Haemulon album	_2003	9	0	0	0	9	-9
97	Haemulidae	margate	Haemulon album	_2004	3	0	0	0	3	-9
97	Haemulidae	margate	Haemulon album	_2005	0	0	0	0	0	-9
97	Haemulidae	margate	Haemulon album	_2006	0	0	0	0	0	-9
97	Haemulidae	margate	Haemulon album	_2007	10	0	0	0	10	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_1983	0	0	0	0	0	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_1984	3	0	0	0	3	1984-86
98	Haemulidae	tomtate	Haemulon aurolineatum	_1985	20	0	0	0	20	1984-86
98	Haemulidae	tomtate	Haemulon aurolineatum	_1986	21	0	0	0	21	1984-86
98	Haemulidae	tomtate	Haemulon aurolineatum	_1987	10	0	0	0	10	1987-88
98	Haemulidae	tomtate	Haemulon aurolineatum	_1988	60	0	0	0	60	1987-88
98	Haemulidae	tomtate	Haemulon aurolineatum	_1989	38	0	0	0	38	1989
98	Haemulidae	tomtate	Haemulon aurolineatum	_1990	0	0	0	0	0	-9

98	Haemulidae	tomtate	Haemulon aurolineatum	_1991	0	0	0	0	0	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_1992	77	0	2	0	79	1992
98	Haemulidae	tomtate	Haemulon aurolineatum	_1993	46	0	2	0	48	1993
98	Haemulidae	tomtate	Haemulon aurolineatum	_1994	8	0	0	0	8	1994-95
98	Haemulidae	tomtate	Haemulon aurolineatum	_1995	20	0	7	0	27	1994-95
98	Haemulidae	tomtate	Haemulon aurolineatum	_1996	0	0	0	0	0	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_1997	0	0	2	0	2	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_1998	0	0	0	0	0	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_1999	0	0	1	0	1	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_2000	0	1	0	1	2	-9
98	Haemulidae	tomtate	Haemulon aurolineatum	_2001	0	0	0	2	2	2001-03
98	Haemulidae	tomtate	Haemulon aurolineatum	_2002	8	0	0	4	12	2001-03
98	Haemulidae	tomtate	Haemulon aurolineatum	_2003	0	2	0	67	69	2001-03
98	Haemulidae	tomtate	Haemulon aurolineatum	_2004	0	7	0	14	21	2004-06
98	Haemulidae	tomtate	Haemulon aurolineatum	_2005	0	0	2	4	6	2004-06
98	Haemulidae	tomtate	Haemulon aurolineatum	_2006	3	2	1	5	11	2004-06
98	Haemulidae	tomtate	Haemulon aurolineatum	_2007	0	0	0	5	5	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1983	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1984	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1985	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1986	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1987	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1988	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1989	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1990	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1991	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1992	168	0	0	0	168	1992
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1993	110	0	0	0	110	1993
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1994	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1995	14	0	0	0	14	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1996	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1997	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1998	5	0	0	0	5	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_1999	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2000	14	1	0	0	15	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2001	7	6	0	0	13	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2002	0	0	0	0	0	-9
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2003	4	1	0	0	5	2003-04
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2004	30	0	0	0	30	2003-04
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2005	0	1	0	0	1	2005-06
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2006	29	0	0	0	29	2005-06
99	Haemulidae	ceasar grunt	Haemulon carbonarium	_2007	0	0	0	0	0	-9
101	Haemulidae	French grunt	Haemulon flavolineatum	_1983	194	0	0	0	194	1983
101	Haemulidae	French grunt	Haemulon flavolineatum	_1984	235	0	0	0	235	1984
101	Haemulidae	French grunt	Haemulon flavolineatum	_1985	50	0	0	0	50	1985
101	Haemulidae	French grunt	Haemulon flavolineatum	_1986	245	0	0	0	245	1986
101	Haemulidae	French grunt	Haemulon flavolineatum	_1987	75	0	0	0	75	1987
101	Haemulidae	French grunt	Haemulon flavolineatum	_1988	43	0	0	0	43	1988
101	Haemulidae	French grunt	Haemulon flavolineatum	_1989	8	0	0	0	8	-9
101	Haemulidae	French grunt	Haemulon flavolineatum	_1990	0	0	0	0	0	-9
101	Haemulidae	French grunt	Haemulon flavolineatum	_1991	0	0	0	0	0	-9
101	Haemulidae	French grunt	Haemulon flavolineatum	_1992	9	0	0	0	9	1992-94
101	Haemulidae	French grunt	Haemulon flavolineatum	_1993	16	0	0	0	16	1992-94
101	Haemulidae	French grunt	Haemulon flavolineatum	_1994	8	0	0	0	8	1992-94
101	Haemulidae	French grunt	Haemulon flavolineatum	_1995	50	0	0	0	50	1995
101	Haemulidae	French grunt	Haemulon flavolineatum	_1996	13	0	0	0	13	1996-98
101	Haemulidae	French grunt	Haemulon flavolineatum	_1997	11	0	0	0	11	1996-98
101	Haemulidae	French grunt	Haemulon flavolineatum	_1998	30	0	0	0	30	1996-98
101	Haemulidae	French grunt	Haemulon flavolineatum	_1999	94	0	0	0	94	1999

101	Haemulidae	French grunt	Haemulon flavolineatum	_2000	94	2	0	0	96	2000
101	Haemulidae	French grunt	Haemulon flavolineatum	_2001	51	0	0	0	51	2001
101	Haemulidae	French grunt	Haemulon flavolineatum	_2002	37	1	0	0	38	2002
101	Haemulidae	French grunt	Haemulon flavolineatum	_2003	47	1	0	1	49	2003
101	Haemulidae	French grunt	Haemulon flavolineatum	_2004	29	1	0	0	30	2004
101	Haemulidae	French grunt	Haemulon flavolineatum	_2005	0	0	4	0	4	2005-07
101	Haemulidae	French grunt	Haemulon flavolineatum	_2006	24	0	0	0	24	2005-07
101	Haemulidae	French grunt	Haemulon flavolineatum	_2007	3	0	0	0	3	2005-07
103	Haemulidae	sailors choice	Haemulon parra	_1983	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1984	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1985	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1986	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1987	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1988	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1989	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1990	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1991	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1992	1	0	0	0	1	-9
103	Haemulidae	sailors choice	Haemulon parra	_1993	2	0	0	0	2	-9
103	Haemulidae	sailors choice	Haemulon parra	_1994	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1995	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1996	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1997	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_1998	5	0	0	0	5	1998-00
103	Haemulidae	sailors choice	Haemulon parra	_1999	21	0	0	0	21	1998-00
103	Haemulidae	sailors choice	Haemulon parra	_2000	16	2	0	0	18	1998-00
103	Haemulidae	sailors choice	Haemulon parra	_2001	15	0	0	0	15	2001-02
103	Haemulidae	sailors choice	Haemulon parra	_2002	46	0	0	0	46	2001-02
103	Haemulidae	sailors choice	Haemulon parra	_2003	19	6	0	0	25	2003-04
103	Haemulidae	sailors choice	Haemulon parra	_2004	9	1	0	0	10	2003-04
103	Haemulidae	sailors choice	Haemulon parra	_2005	0	0	0	0	0	-9
103	Haemulidae	sailors choice	Haemulon parra	_2006	17	0	0	0	17	-9
103	Haemulidae	sailors choice	Haemulon parra	_2007	2	1	0	0	3	-9
104	Haemulidae	white grunt	Haemulon plumierii	_1983	752	0	0	0	752	1983
104	Haemulidae	white grunt	Haemulon plumierii	_1984	1991	0	0	0	1991	1984
104	Haemulidae	white grunt	Haemulon plumierii	_1985	1138	0	0	0	1138	1985
104	Haemulidae	white grunt	Haemulon plumierii	_1986	3482	0	0	0	3482	1986
104	Haemulidae	white grunt	Haemulon plumierii	_1987	1946	0	0	0	1946	1987
104	Haemulidae	white grunt	Haemulon plumierii	_1988	2478	0	0	0	2478	1988
104	Haemulidae	white grunt	Haemulon plumierii	_1989	2581	0	0	0	2581	1989
104	Haemulidae	white grunt	Haemulon plumierii	_1990	0	0	0	0	0	-9
104	Haemulidae	white grunt	Haemulon plumierii	_1991	0	0	0	0	0	-9
104	Haemulidae	white grunt	Haemulon plumierii	_1992	2701	0	8	0	2709	1992
104	Haemulidae	white grunt	Haemulon plumierii	_1993	1838	0	19	0	1857	1993
104	Haemulidae	white grunt	Haemulon plumierii	_1994	669	0	14	0	683	1994
104	Haemulidae	white grunt	Haemulon plumierii	_1995	1391	0	5	0	1396	1995
104	Haemulidae	white grunt	Haemulon plumierii	_1996	218	0	0	0	218	1996
104	Haemulidae	white grunt	Haemulon plumierii	_1997	249	0	3	0	252	1997
104	Haemulidae	white grunt	Haemulon plumierii	_1998	921	0	10	0	931	1998
104	Haemulidae	white grunt	Haemulon plumierii	_1999	1159	0	5	0	1164	1999
104	Haemulidae	white grunt	Haemulon plumierii	_2000	1363	10	8	0	1381	2000
104	Haemulidae	white grunt	Haemulon plumierii	_2001	1359	14	14	0	1387	2001
104	Haemulidae	white grunt	Haemulon plumierii	_2002	1554	8	0	3	1565	2002
104	Haemulidae	white grunt	Haemulon plumierii	_2003	1240	9	0	9	1258	2003
104	Haemulidae	white grunt	Haemulon plumierii	_2004	789	5	2	1	797	2004
104	Haemulidae	white grunt	Haemulon plumierii	_2005	0	3	33	3	39	2005
104	Haemulidae	white grunt	Haemulon plumierii	_2006	669	3	2	9	683	2006
104	Haemulidae	white grunt	Haemulon plumierii	_2007	263	2	0	7	272	2007
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1983	0	0	0	0	0	-9

105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1984	26	0	0	0	26	1984-85
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1985	239	0	0	0	239	1984-85
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1986	617	0	0	0	617	1986
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1987	343	0	0	0	343	1987
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1988	638	0	0	0	638	1988
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1989	278	0	0	0	278	1989
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1990	0	0	0	0	0	-9
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1991	0	0	0	0	0	-9
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1992	61	0	0	0	61	1992
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1993	75	0	0	0	75	1993
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1994	79	0	0	0	79	1994
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1995	99	0	0	0	99	1995
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1996	53	0	0	0	53	1996
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1997	25	0	0	0	25	1997-98
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1998	193	0	0	0	193	1997-98
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_1999	252	0	0	0	252	1999
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2000	242	9	0	0	251	2000
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2001	541	6	0	1	548	2001
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2002	305	0	0	36	341	2002
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2003	294	2	0	16	312	2003
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2004	318	0	0	6	324	2004
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2005	0	0	0	5	5	2005-06
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2006	386	0	0	8	394	2005-06
105	Haemulidae	bluestriped grunt	Haemulon sciurus	_2007	112	2	0	16	130	2007
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1983	0	0	0	0	0	-9
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1984	0	0	0	0	0	-9
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1985	0	0	0	0	0	-9
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1986	21	0	0	0	21	1986-87
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1987	10	0	0	0	10	1986-87
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1988	35	0	0	0	35	1988
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1989	3	0	0	0	3	1989-91
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1990	14	0	0	0	14	1989-91
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1991	308	0	40	0	348	1989-91
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1992	442	0	86	0	528	1992
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1993	152	0	99	0	251	1993
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1994	50	0	70	0	120	1994
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1995	70	0	33	0	103	1995
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1996	11	0	0	0	11	1996-97
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1997	0	0	24	0	24	1996-97
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1998	3	0	20	0	23	1998-99
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_1999	49	0	39	0	88	1998-99
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2000	75	6	26	5	112	2000
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2001	69	8	11	1	89	2001
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2002	28	3	0	10	41	2002
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2003	14	7	0	7	28	2003-04
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2004	16	7	11	5	39	2003-04
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2005	0	1	39	4	44	2005
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2006	43	0	33	11	87	2006-07
111	Holocentridae	squirrelfish	Holocentrus adscensionis	_2007	2	1	0	3	6	2006-07
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1983	0	0	0	0	0	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1984	0	0	0	0	0	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1985	0	0	0	0	0	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1986	0	0	0	0	0	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1987	0	0	0	0	0	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1988	1	0	0	0	1	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1989	8	0	0	0	8	-9
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1990	1	0	0	0	1	1990-92
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1991	19	0	2	0	21	1990-92
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1992	72	0	21	0	93	1990-92

112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1993	31	0	34	0	65	1993
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1994	0	0	33	0	33	1994
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1995	2	0	15	0	17	1995-97
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1996	0	0	0	0	0	1995-97
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1997	3	0	22	0	25	1995-97
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1998	0	0	17	0	17	1998-99
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_1999	0	0	30	0	30	1998-99
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2000	1	1	20	3	25	2000-01
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2001	0	0	36	8	44	2000-01
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2002	0	0	0	24	24	2002-03
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2003	0	4	0	11	15	2002-03
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2004	0	0	6	23	29	2004-05
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2005	0	0	23	21	44	2004-05
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2006	0	0	4	19	23	2006-07
112	Holocentridae	longspine squirrelfish	Holocentrus rufus	_2007	0	0	0	11	11	2006-07
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1983	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1984	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1985	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1986	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1987	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1988	2	0	0	0	2	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1989	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1990	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1991	1	0	0	0	1	1991-92
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1992	38	0	0	0	38	1991-92
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1993	18	0	0	0	18	1993-95
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1994	4	0	0	0	4	1993-95
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1995	7	0	1	0	8	1993-95
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1996	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1997	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1998	0	0	1	0	1	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_1999	1	0	2	0	3	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2000	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2001	0	0	0	0	0	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2002	0	0	0	2	2	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2003	0	0	0	2	2	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2004	0	0	0	1	1	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2005	0	0	0	1	1	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2006	1	0	0	1	2	-9
113	Holocentridae	blackbar soldierfish	Myripristis jacobus	_2007	0	0	0	7	7	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1983	0	0	0	0	0	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1984	1	0	0	0	1	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1985	0	0	0	0	0	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1986	18	0	0	0	18	1986-88
123	Labridae	Spanish hogfish	Bodianus rufus	_1987	3	0	0	0	3	1986-88
123	Labridae	Spanish hogfish	Bodianus rufus	_1988	11	0	0	0	11	1986-88
123	Labridae	Spanish hogfish	Bodianus rufus	_1989	7	0	0	0	7	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1990	8	0	0	0	8	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1991	12	0	0	0	12	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1992	8	0	0	0	8	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1993	5	0	0	0	5	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1994	5	0	0	0	5	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1995	2	0	0	0	2	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1996	2	0	0	0	2	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1997	1	0	0	0	1	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1998	0	0	0	0	0	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_1999	6	0	0	0	6	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2000	7	0	0	0	7	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2001	6	2	0	1	9	-9

123	Labridae	Spanish hogfish	Bodianus rufus	_2002	3	2	0	0	5	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2003	2	0	0	1	3	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2004	9	0	0	0	9	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2005	0	0	0	1	1	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2006	8	0	0	0	8	-9
123	Labridae	Spanish hogfish	Bodianus rufus	_2007	0	0	0	1	1	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1983	0	0	0	0	0	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1984	1	0	0	0	1	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1985	1	0	0	0	1	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1986	3	0	0	0	3	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1987	2	0	0	0	2	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1988	16	0	0	0	16	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1989	11	0	0	0	11	1989-91
129	Labridae	puddingwife	Halichoeres radiatus	_1990	1	0	0	0	1	1989-91
129	Labridae	puddingwife	Halichoeres radiatus	_1991	28	0	0	0	28	1989-91
129	Labridae	puddingwife	Halichoeres radiatus	_1992	19	0	0	0	19	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1993	6	0	1	0	7	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1994	3	0	0	0	3	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1995	2	0	0	0	2	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1996	0	0	0	0	0	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1997	0	0	0	0	0	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1998	0	0	0	0	0	-9
129	Labridae	puddingwife	Halichoeres radiatus	_1999	1	0	0	0	1	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2000	0	2	1	0	3	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2001	0	10	3	0	13	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2002	0	1	0	0	1	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2003	0	15	0	0	15	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2004	0	2	0	0	2	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2005	0	2	0	1	3	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2006	3	0	0	0	3	-9
129	Labridae	puddingwife	Halichoeres radiatus	_2007	1	0	0	0	1	-9
130	Labridae	hogfish	Lachnolaimus maximus	_1983	84	0	0	0	84	1983
130	Labridae	hogfish	Lachnolaimus maximus	_1984	189	0	0	0	189	1984
130	Labridae	hogfish	Lachnolaimus maximus	_1985	76	0	0	0	76	1985
130	Labridae	hogfish	Lachnolaimus maximus	_1986	100	0	0	0	100	1986
130	Labridae	hogfish	Lachnolaimus maximus	_1987	118	0	0	0	118	1987
130	Labridae	hogfish	Lachnolaimus maximus	_1988	180	0	0	0	180	1988
130	Labridae	hogfish	Lachnolaimus maximus	_1989	222	0	0	0	222	1989
130	Labridae	hogfish	Lachnolaimus maximus	_1990	198	0	0	0	198	1990
130	Labridae	hogfish	Lachnolaimus maximus	_1991	237	0	0	0	237	1991
130	Labridae	hogfish	Lachnolaimus maximus	_1992	185	0	0	0	185	1992
130	Labridae	hogfish	Lachnolaimus maximus	_1993	104	0	0	0	104	1993
130	Labridae	hogfish	Lachnolaimus maximus	_1994	77	0	0	0	77	1994
130	Labridae	hogfish	Lachnolaimus maximus	_1995	76	0	0	0	76	1995
130	Labridae	hogfish	Lachnolaimus maximus	_1996	63	0	0	0	63	1996
130	Labridae	hogfish	Lachnolaimus maximus	_1997	46	0	0	0	46	1997
130	Labridae	hogfish	Lachnolaimus maximus	_1998	113	0	0	0	113	1998
130	Labridae	hogfish	Lachnolaimus maximus	_1999	245	0	0	0	245	1999
130	Labridae	hogfish	Lachnolaimus maximus	_2000	217	0	0	0	217	2000
130	Labridae	hogfish	Lachnolaimus maximus	_2001	421	3	0	0	424	2001
130	Labridae	hogfish	Lachnolaimus maximus	_2002	175	0	0	1	176	2002
130	Labridae	hogfish	Lachnolaimus maximus	_2003	182	2	0	3	187	2003
130	Labridae	hogfish	Lachnolaimus maximus	_2004	147	0	0	2	149	2004
130	Labridae	hogfish	Lachnolaimus maximus	_2005	0	0	0	2	2	2005-06
130	Labridae	hogfish	Lachnolaimus maximus	_2006	166	0	0	5	171	2005-06
130	Labridae	hogfish	Lachnolaimus maximus	_2007	92	1	0	7	100	2007
137	Lutjanidae	queen snapper	Etelis oculatus	_1983	9	0	0	0	9	-9
137	Lutjanidae	queen snapper	Etelis oculatus	_1984	0	0	0	0	0	-9
137	Lutjanidae	queen snapper	Etelis oculatus	_1985	1	0	0	0	1	1985-86

137	Lutjanidae	queen snapper	Etelis oculatus	_1986	49	0	0	0	49	1985-86
137	Lutjanidae	queen snapper	Etelis oculatus	_1987	105	0	0	0	105	1987
137	Lutjanidae	queen snapper	Etelis oculatus	_1988	120	0	0	0	120	1988
137	Lutjanidae	queen snapper	Etelis oculatus	_1989	541	0	0	0	541	1989
137	Lutjanidae	queen snapper	Etelis oculatus	_1990	278	0	0	0	278	1990
137	Lutjanidae	queen snapper	Etelis oculatus	_1991	315	0	0	0	315	1991
137	Lutjanidae	queen snapper	Etelis oculatus	_1992	98	0	0	0	98	1992
137	Lutjanidae	queen snapper	Etelis oculatus	_1993	46	0	0	0	46	1993
137	Lutjanidae	queen snapper	Etelis oculatus	_1994	2	0	1	0	3	1994-96
137	Lutjanidae	queen snapper	Etelis oculatus	_1995	3	0	0	0	3	1994-96
137	Lutjanidae	queen snapper	Etelis oculatus	_1996	96	0	0	0	96	1994-96
137	Lutjanidae	queen snapper	Etelis oculatus	_1997	4	0	0	0	4	1997-98
137	Lutjanidae	queen snapper	Etelis oculatus	_1998	52	0	0	0	52	1997-98
137	Lutjanidae	queen snapper	Etelis oculatus	_1999	111	0	0	0	111	1999
137	Lutjanidae	queen snapper	Etelis oculatus	_2000	193	2	0	0	195	2000
137	Lutjanidae	queen snapper	Etelis oculatus	_2001	160	14	0	0	174	2001
137	Lutjanidae	queen snapper	Etelis oculatus	_2002	214	19	0	0	233	2002
137	Lutjanidae	queen snapper	Etelis oculatus	_2003	288	12	0	0	300	2003
137	Lutjanidae	queen snapper	Etelis oculatus	_2004	411	8	0	0	419	2004
137	Lutjanidae	queen snapper	Etelis oculatus	_2005	0	17	0	0	17	2005-06
137	Lutjanidae	queen snapper	Etelis oculatus	_2006	610	2	0	0	612	2005-06
137	Lutjanidae	queen snapper	Etelis oculatus	_2007	163	9	0	0	172	2007
138	Lutjanidae	mutton snapper	Lutjanus analis	_1983	51	0	0	0	51	1983
138	Lutjanidae	mutton snapper	Lutjanus analis	_1984	211	0	0	0	211	1984
138	Lutjanidae	mutton snapper	Lutjanus analis	_1985	90	0	0	0	90	1985
138	Lutjanidae	mutton snapper	Lutjanus analis	_1986	199	0	0	0	199	1986
138	Lutjanidae	mutton snapper	Lutjanus analis	_1987	47	0	0	0	47	1987
138	Lutjanidae	mutton snapper	Lutjanus analis	_1988	143	0	0	0	143	1988
138	Lutjanidae	mutton snapper	Lutjanus analis	_1989	140	0	0	0	140	1989
138	Lutjanidae	mutton snapper	Lutjanus analis	_1990	195	0	0	0	195	1990
138	Lutjanidae	mutton snapper	Lutjanus analis	_1991	386	0	0	0	386	1991
138	Lutjanidae	mutton snapper	Lutjanus analis	_1992	367	0	0	0	367	1992
138	Lutjanidae	mutton snapper	Lutjanus analis	_1993	167	0	1	0	168	1993
138	Lutjanidae	mutton snapper	Lutjanus analis	_1994	205	0	1	0	206	1994
138	Lutjanidae	mutton snapper	Lutjanus analis	_1995	108	0	0	0	108	1995
138	Lutjanidae	mutton snapper	Lutjanus analis	_1996	21	0	0	0	21	1996-97
138	Lutjanidae	mutton snapper	Lutjanus analis	_1997	39	0	0	0	39	1996-97
138	Lutjanidae	mutton snapper	Lutjanus analis	_1998	187	0	0	0	187	1998
138	Lutjanidae	mutton snapper	Lutjanus analis	_1999	214	0	0	0	214	1999
138	Lutjanidae	mutton snapper	Lutjanus analis	_2000	267	11	0	0	278	2000
138	Lutjanidae	mutton snapper	Lutjanus analis	_2001	238	8	0	0	246	2001
138	Lutjanidae	mutton snapper	Lutjanus analis	_2002	399	8	0	0	407	2002
138	Lutjanidae	mutton snapper	Lutjanus analis	_2003	521	23	0	1	545	2003
138	Lutjanidae	mutton snapper	Lutjanus analis	_2004	331	24	0	1	356	2004
138	Lutjanidae	mutton snapper	Lutjanus analis	_2005	0	16	0	0	16	2005-06
138	Lutjanidae	mutton snapper	Lutjanus analis	_2006	496	9	0	0	505	2005-06
138	Lutjanidae	mutton snapper	Lutjanus analis	_2007	328	18	0	0	346	2007
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1983	24	0	0	0	24	1983-84
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1984	86	0	0	0	86	1983-84
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1985	192	0	0	0	192	1985
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1986	183	0	0	0	183	1986
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1987	103	0	0	0	103	1987
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1988	156	0	0	0	156	1988
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1989	146	0	0	0	146	1989
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1990	185	0	0	0	185	1990
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1991	353	0	1	0	354	1991
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1992	250	0	19	0	269	1992
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1993	138	0	0	0	138	1993
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1994	176	0	1	0	177	1994

139	Lutjanidae	schoolmaster	Lutjanus apodus	_1995	203	0	1	0	204	1995
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1996	41	0	0	0	41	1996
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1997	34	0	1	0	35	1997
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1998	188	0	0	0	188	1998
139	Lutjanidae	schoolmaster	Lutjanus apodus	_1999	334	0	1	0	335	1999
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2000	196	6	0	5	207	2000
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2001	127	10	1	29	167	2001
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2002	153	1	0	47	201	2002
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2003	123	18	0	17	158	2003
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2004	117	5	0	10	132	2004
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2005	0	8	0	20	28	2005-06
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2006	152	6	0	21	179	2005-06
139	Lutjanidae	schoolmaster	Lutjanus apodus	_2007	61	5	0	8	74	2007
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1983	12	0	0	0	12	1983-85
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1984	8	0	0	0	8	1983-85
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1985	39	0	0	0	39	1983-85
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1986	110	0	0	0	110	1986
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1987	38	0	0	0	38	1987
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1988	65	0	0	0	65	1988
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1989	99	0	0	0	99	1989
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1990	116	0	0	0	116	1990
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1991	404	0	0	0	404	1991
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1992	135	0	5	0	140	1992
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1993	89	0	46	0	135	1993
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1994	58	0	54	0	112	1994
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1995	16	0	9	0	25	1995-96
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1996	37	0	0	0	37	1995-96
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1997	0	0	27	0	27	1997-98
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1998	62	0	9	0	71	1997-98
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_1999	57	0	9	0	66	1999
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2000	118	4	13	0	135	2000
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2001	110	7	0	0	117	2001
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2002	56	0	0	0	56	2002
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2003	111	23	0	0	134	2003
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2004	241	2	0	0	243	2004
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2005	0	2	5	0	7	2005-06
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2006	139	0	1	0	140	2005-06
140	Lutjanidae	blackfin snapper	Lutjanus buccanella	_2007	180	2	0	0	182	2007
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1983	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1984	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1985	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1986	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1987	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1988	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1989	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1990	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1991	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1992	70	0	0	0	70	1992
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1993	49	0	0	0	49	1993
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1994	26	0	0	0	26	1994-95
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1995	50	0	0	0	50	1994-95
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1996	9	0	0	0	9	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1997	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1998	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_1999	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2000	0	2	0	0	2	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2001	1	2	0	0	3	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2002	1	0	0	0	1	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2003	2	1	0	1	4	-9

142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2004	3	0	0	0	3	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2005	0	0	0	0	0	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2006	3	1	0	0	4	-9
142	Lutjanidae	cubera snapper	Lutjanus cyanopterus	_2007	15	1	0	0	16	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1983	1	0	0	0	1	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1984	12	0	0	0	12	1984-86
143	Lutjanidae	gray snapper	Lutjanus griseus	_1985	5	0	0	0	5	1984-86
143	Lutjanidae	gray snapper	Lutjanus griseus	_1986	20	0	0	0	20	1984-86
143	Lutjanidae	gray snapper	Lutjanus griseus	_1987	12	0	0	0	12	1987-88
143	Lutjanidae	gray snapper	Lutjanus griseus	_1988	125	0	0	0	125	1987-88
143	Lutjanidae	gray snapper	Lutjanus griseus	_1989	37	0	0	0	37	1988
143	Lutjanidae	gray snapper	Lutjanus griseus	_1990	9	0	0	0	9	1989-90
143	Lutjanidae	gray snapper	Lutjanus griseus	_1991	40	0	0	0	40	1989-90
143	Lutjanidae	gray snapper	Lutjanus griseus	_1992	9	0	0	0	9	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1993	0	0	0	0	0	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1994	60	0	0	0	60	1994
143	Lutjanidae	gray snapper	Lutjanus griseus	_1995	6	0	0	0	6	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1996	0	0	0	0	0	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1997	0	0	0	0	0	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_1998	37	0	0	0	37	1998
143	Lutjanidae	gray snapper	Lutjanus griseus	_1999	5	0	0	0	5	-9
143	Lutjanidae	gray snapper	Lutjanus griseus	_2000	11	2	0	0	13	2000-02
143	Lutjanidae	gray snapper	Lutjanus griseus	_2001	8	1	0	1	10	2000-02
143	Lutjanidae	gray snapper	Lutjanus griseus	_2002	8	1	0	5	14	2000-02
143	Lutjanidae	gray snapper	Lutjanus griseus	_2003	2	4	0	5	11	2003-05
143	Lutjanidae	gray snapper	Lutjanus griseus	_2004	7	0	0	4	11	2003-05
143	Lutjanidae	gray snapper	Lutjanus griseus	_2005	0	0	0	12	12	2003-05
143	Lutjanidae	gray snapper	Lutjanus griseus	_2006	16	4	0	10	30	2006
143	Lutjanidae	gray snapper	Lutjanus griseus	_2007	62	10	0	2	74	2007
144	Lutjanidae	dog snapper	Lutjanus jocu	_1983	4	0	0	0	4	1983-85
144	Lutjanidae	dog snapper	Lutjanus jocu	_1984	19	0	0	0	19	1983-85
144	Lutjanidae	dog snapper	Lutjanus jocu	_1985	35	0	0	0	35	1983-85
144	Lutjanidae	dog snapper	Lutjanus jocu	_1986	76	0	0	0	76	1986
144	Lutjanidae	dog snapper	Lutjanus jocu	_1987	30	0	0	0	30	1987
144	Lutjanidae	dog snapper	Lutjanus jocu	_1988	110	0	0	0	110	1988
144	Lutjanidae	dog snapper	Lutjanus jocu	_1989	31	0	0	0	31	1989
144	Lutjanidae	dog snapper	Lutjanus jocu	_1990	36	0	0	0	36	1990
144	Lutjanidae	dog snapper	Lutjanus jocu	_1991	88	0	0	0	88	1991
144	Lutjanidae	dog snapper	Lutjanus jocu	_1992	76	0	0	0	76	1992
144	Lutjanidae	dog snapper	Lutjanus jocu	_1993	54	0	0	0	54	1993
144	Lutjanidae	dog snapper	Lutjanus jocu	_1994	40	0	0	0	40	1994
144	Lutjanidae	dog snapper	Lutjanus jocu	_1995	42	0	0	0	42	1995
144	Lutjanidae	dog snapper	Lutjanus jocu	_1996	5	0	0	0	5	1996-98
144	Lutjanidae	dog snapper	Lutjanus jocu	_1997	3	0	0	0	3	1996-98
144	Lutjanidae	dog snapper	Lutjanus jocu	_1998	23	0	0	0	23	1996-98
144	Lutjanidae	dog snapper	Lutjanus jocu	_1999	62	0	0	0	62	1999
144	Lutjanidae	dog snapper	Lutjanus jocu	_2000	41	5	0	0	46	2000
144	Lutjanidae	dog snapper	Lutjanus jocu	_2001	55	15	0	0	70	2001
144	Lutjanidae	dog snapper	Lutjanus jocu	_2002	58	1	0	0	59	2002
144	Lutjanidae	dog snapper	Lutjanus jocu	_2003	57	5	0	2	64	2003
144	Lutjanidae	dog snapper	Lutjanus jocu	_2004	48	1	0	0	49	2004
144	Lutjanidae	dog snapper	Lutjanus jocu	_2005	0	3	0	1	4	2005-06
144	Lutjanidae	dog snapper	Lutjanus jocu	_2006	73	0	1	1	75	2005-06
144	Lutjanidae	dog snapper	Lutjanus jocu	_2007	120	9	0	3	132	2007
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1983	1	0	0	0	1	1983-85
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1984	4	0	0	0	4	1983-85
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1985	49	0	0	0	49	1983-85
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1986	15	0	0	0	15	1986-88
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1987	13	0	0	0	13	1986-88

145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1988	39	0	0	0	39	1986-88
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1989	13	0	0	0	13	1989-91
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1990	9	0	0	0	9	1989-91
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1991	165	0	0	0	165	1989-91
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1992	193	0	0	0	193	1992
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1993	142	0	0	0	142	1993
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1994	104	0	0	0	104	1994
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1995	65	0	0	0	65	1995
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1996	10	0	0	0	10	1996-98
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1997	5	0	0	0	5	1996-98
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1998	33	0	0	0	33	1996-98
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_1999	48	0	0	0	48	1999
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2000	44	2	0	0	46	2000
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2001	39	0	0	0	39	2001
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2002	29	0	0	0	29	2002-03
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2003	28	0	0	2	30	2002-03
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2004	29	0	0	0	29	2004-06
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2005	0	0	0	0	0	2004-06
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2006	26	0	0	0	26	2004-06
145	Lutjanidae	mahogany snapper	Lutjanus mahogani	_2007	15	2	0	0	17	-9
147	Lutjanidae	lane snapper	Lutjanus synagris	_1983	145	0	0	0	145	1983
147	Lutjanidae	lane snapper	Lutjanus synagris	_1984	892	0	0	0	892	1984
147	Lutjanidae	lane snapper	Lutjanus synagris	_1985	415	0	0	0	415	1985
147	Lutjanidae	lane snapper	Lutjanus synagris	_1986	1324	0	0	0	1324	1986
147	Lutjanidae	lane snapper	Lutjanus synagris	_1987	571	0	0	0	571	1987
147	Lutjanidae	lane snapper	Lutjanus synagris	_1988	1011	0	0	0	1011	1988
147	Lutjanidae	lane snapper	Lutjanus synagris	_1989	1912	0	0	0	1912	1989
147	Lutjanidae	lane snapper	Lutjanus synagris	_1990	1598	0	0	0	1598	1990
147	Lutjanidae	lane snapper	Lutjanus synagris	_1991	2459	0	0	0	2459	1991
147	Lutjanidae	lane snapper	Lutjanus synagris	_1992	2421	0	10	0	2431	1992
147	Lutjanidae	lane snapper	Lutjanus synagris	_1993	716	0	5	0	721	1993
147	Lutjanidae	lane snapper	Lutjanus synagris	_1994	472	0	2	0	474	1994
147	Lutjanidae	lane snapper	Lutjanus synagris	_1995	691	0	3	0	694	1995
147	Lutjanidae	lane snapper	Lutjanus synagris	_1996	174	0	0	0	174	1996
147	Lutjanidae	lane snapper	Lutjanus synagris	_1997	193	0	4	0	197	1997
147	Lutjanidae	lane snapper	Lutjanus synagris	_1998	444	0	17	0	461	1998
147	Lutjanidae	lane snapper	Lutjanus synagris	_1999	876	0	7	0	883	1999
147	Lutjanidae	lane snapper	Lutjanus synagris	_2000	476	16	2	0	494	2000
147	Lutjanidae	lane snapper	Lutjanus synagris	_2001	1277	26	0	1	1304	2001
147	Lutjanidae	lane snapper	Lutjanus synagris	_2002	1344	2	0	0	1346	2002
147	Lutjanidae	lane snapper	Lutjanus synagris	_2003	737	36	0	3	776	2003
147	Lutjanidae	lane snapper	Lutjanus synagris	_2004	1342	27	0	0	1369	2004
147	Lutjanidae	lane snapper	Lutjanus synagris	_2005	0	18	7	1	26	2005-06
147	Lutjanidae	lane snapper	Lutjanus synagris	_2006	862	12	18	0	892	2005-06
147	Lutjanidae	lane snapper	Lutjanus synagris	_2007	1167	41	0	0	1208	2007
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1983	44	0	0	0	44	1983
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1984	266	0	0	0	266	1984
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1985	166	0	0	0	166	1985
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1986	379	0	0	0	379	1986
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1987	82	0	0	0	82	1987
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1988	658	0	0	0	658	1988
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1989	513	0	0	0	513	1989
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1990	547	0	0	0	547	1990
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1991	1684	0	0	0	1684	1991
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1992	608	0	41	0	649	1992
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1993	391	0	65	0	456	1993
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1994	544	0	17	0	561	1994
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1995	279	0	0	0	279	1995
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1996	295	0	0	0	295	1996

148	Lutjanidae	silk snapper	Lutjanus vivanus	_1997	156	0	8	0	164	1997
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1998	398	0	1	0	399	1998
148	Lutjanidae	silk snapper	Lutjanus vivanus	_1999	731	0	1	0	732	1999
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2000	1522	52	0	0	1574	2000
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2001	2397	54	0	0	2451	2001
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2002	1473	18	0	0	1491	2002
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2003	1841	56	0	0	1897	2003
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2004	2118	42	0	0	2160	2004
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2005	0	38	5	0	43	2005
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2006	1217	11	0	0	1228	2006
148	Lutjanidae	silk snapper	Lutjanus vivanus	_2007	949	26	0	0	975	2007
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1983	190	0	0	0	190	1983
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1984	1060	0	0	0	1060	1984
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1985	1149	0	0	0	1149	1985
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1986	1365	0	0	0	1365	1986
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1987	438	0	0	0	438	1987
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1988	1115	0	0	0	1115	1988
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1989	693	0	0	0	693	1989
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1990	1393	0	0	0	1393	1990
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1991	7833	0	5	0	7838	1991
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1992	7040	0	13	0	7053	1992
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1993	5021	0	13	0	5034	1993
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1994	3821	0	5	0	3826	1994
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1995	3767	0	1	0	3768	1995
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1996	496	0	0	0	496	1996
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1997	574	0	1	0	575	1997
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1998	1742	0	8	0	1750	1998
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_1999	2062	0	10	0	2072	1999
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2000	4063	14	8	0	4085	2000
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2001	2800	19	2	5	2826	2001
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2002	3630	21	0	14	3665	2002
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2003	4310	31	0	5	4346	2003
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2004	2396	39	0	4	2439	2004
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2005	0	19	18	13	50	2005
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2006	2663	8	11	5	2687	2006
149	Lutjanidae	yellowtail snapper	Ocyurus chrysurus	_2007	3265	15	0	10	3290	2007
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1983	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1984	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1985	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1986	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1987	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1988	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1989	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1990	70	0	0	0	70	1990
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1991	114	0	0	0	114	1991
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1992	39	0	0	0	39	1992
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1993	19	0	0	0	19	1993-94
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1994	12	0	0	0	12	1993-94
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1995	0	0	0	0	0	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1996	20	0	0	0	20	1996-97
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1997	10	0	0	0	10	1996-97
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1998	8	0	0	0	8	-9
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_1999	16	0	0	0	16	1999-01
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2000	2	3	0	0	5	1999-01
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2001	21	12	0	0	33	1999-01
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2002	3	6	0	0	9	2002-03
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2003	10	25	0	0	35	2002-03
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2004	40	8	0	0	48	2004
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2005	0	11	0	0	11	2005-06

150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2006	64	0	0	0	64	2005-06
150	Lutjanidae	wenchman	Pristipomoides aquilonaris	_2007	55	20	0	0	75	2007
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1983	3	0	0	0	3	1983-84
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1984	172	0	0	0	172	1983-84
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1985	97	0	0	0	97	1985
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1986	1538	0	0	0	1538	1986
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1987	377	0	0	0	377	1987
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1988	624	0	0	0	624	1988
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1989	315	0	0	0	315	1989
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1990	543	0	0	0	543	1990
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1991	2465	0	0	0	2465	1991
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1992	1026	0	70	0	1096	1992
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1993	1112	0	12	0	1124	1993
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1994	402	0	17	0	419	1994
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1995	68	0	0	0	68	1995
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1996	2	0	0	0	2	1996-97
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1997	70	0	2	0	72	1996-97
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1998	143	0	2	0	145	1998
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_1999	180	0	5	0	185	1999
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2000	161	15	0	0	176	2000
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2001	268	10	0	0	278	2001
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2002	251	16	0	0	267	2002
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2003	128	5	0	0	133	2003
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2004	181	1	7	0	189	2004
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2005	0	3	2	0	5	2005-06
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2006	96	0	6	0	102	2005-06
151	Lutjanidae	vermilion snapper	Rhomboplites aurorubens	_2007	149	11	0	0	160	2007
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1983	199	0	0	0	199	1983
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1984	614	0	0	0	614	1984
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1985	111	0	0	0	111	1985
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1986	701	0	0	0	701	1986
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1987	457	0	0	0	457	1987
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1988	140	0	0	0	140	1988
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1989	103	0	0	0	103	1989
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1990	87	0	0	0	87	1990
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1991	81	0	0	0	81	1991
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1992	75	0	0	0	75	1992
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1993	43	0	0	0	43	1993
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1994	39	0	3	0	42	1994
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1995	27	0	0	0	27	1995-96
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1996	34	0	0	0	34	1995-96
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1997	18	0	0	0	18	1997-98
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1998	37	0	16	0	53	1997-98
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_1999	26	0	0	0	26	1999-00
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2000	17	1	0	0	18	1999-00
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2001	58	3	0	14	75	2001
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2002	34	1	0	18	53	2002
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2003	27	0	0	21	48	2003
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2004	12	4	0	7	23	2004-05
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2005	0	0	0	23	23	2004-05
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2006	24	0	0	15	39	2006-07
166	Mullidae	yellow goatfish	Mulloidichthys martinicus	_2007	6	1	0	16	23	2006-07
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1983	480	0	0	0	480	1983
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1984	2160	0	0	0	2160	1984
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1985	1260	0	0	0	1260	1985
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1986	2803	0	0	0	2803	1986
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1987	1330	0	0	0	1330	1987
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1988	474	0	0	0	474	1988
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1989	611	0	0	0	611	1989

168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1990	428	0	0	0	428	1990
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1991	215	0	0	0	215	1991
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1992	177	0	0	0	177	1992
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1993	264	0	0	0	264	1993
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1994	217	0	15	0	232	1994
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1995	65	0	0	0	65	1995
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1996	19	0	0	0	19	1996-97
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1997	59	0	0	0	59	1996-97
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1998	332	0	7	0	339	1998
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_1999	223	0	6	0	229	1999
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2000	253	1	2	3	259	2000
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2001	131	2	0	8	141	2001
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2002	77	0	0	15	92	2002
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2003	102	0	0	12	114	2003
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2004	180	2	0	4	186	2004
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2005	0	0	0	15	15	2005-06
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2006	247	0	0	7	254	2005-06
168	Mullidae	spotted goatfish	Pseudupeneus maculatus	_2007	106	0	0	15	121	2007
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1983	42	0	0	0	42	1983
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1984	243	0	0	0	243	1984
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1985	169	0	0	0	169	1985
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1986	193	0	0	0	193	1986
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1987	123	0	0	0	123	1987
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1988	74	0	0	0	74	1988
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1989	49	0	0	0	49	1989
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1990	86	0	0	0	86	1990
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1991	65	0	0	0	65	1991
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1992	62	0	0	0	62	1992
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1993	90	0	1	0	91	1993
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1994	35	0	1	0	36	1994
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1995	18	0	0	0	18	-9
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1996	0	0	0	0	0	-9
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1997	10	0	0	0	10	1997-98
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1998	67	0	0	0	67	1997-98
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_1999	45	0	0	0	45	1999
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2000	35	0	0	0	35	2000
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2001	34	1	0	0	35	2001
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2002	19	0	0	0	19	2002-03
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2003	83	1	0	0	84	2002-03
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2004	97	0	0	0	97	2004
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2005	0	0	0	0	0	-9
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2006	81	0	0	0	81	2006
178	Ostraciidae	honeycomb cowfish	Acanthostracion polygonia	_2007	33	0	0	0	33	2007
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1983	61	0	0	0	61	1983
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1984	233	0	0	0	233	1984
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1985	163	0	0	0	163	1985
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1986	458	0	0	0	458	1986
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1987	312	0	0	0	312	1987
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1988	295	0	0	0	295	1988
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1989	78	0	0	0	78	1989
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1990	36	0	0	0	36	1990
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1991	308	0	0	0	308	1991
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1992	113	0	3	0	116	1992
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1993	83	0	5	0	88	1993
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1994	36	0	1	0	37	1994
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1995	44	0	0	0	44	1995
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1996	11	0	0	0	11	1996-97
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1997	26	0	0	0	26	1996-97
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1998	105	0	0	0	105	1998

179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_1999	64	0	0	0	64	1999
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2000	28	0	0	0	28	2000-01
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2001	60	1	0	0	61	2000-01
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2002	48	0	0	0	48	2002
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2003	45	0	0	0	45	2003
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2004	85	0	0	0	85	2004
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2005	0	0	0	0	0	-9
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2006	136	0	0	0	136	2006
179	Ostraciidae	scrawled cowfish	Acanthostracion quadricornis	_2007	37	0	0	0	37	2007
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1983	14	0	0	0	14	1983-84
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1984	60	0	0	0	60	1983-84
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1985	93	0	0	0	93	1985
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1986	227	0	0	0	227	1986
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1987	84	0	0	0	84	1987
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1988	78	0	0	0	78	1988
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1989	43	0	0	0	43	1989
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1990	16	0	0	0	16	1990-91
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1991	100	0	0	0	100	1990-91
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1992	43	0	0	0	43	1992
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1993	40	0	0	0	40	1993
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1994	15	0	0	0	15	-9
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1995	9	0	0	0	9	-9
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1996	2	0	0	0	2	1996-98
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1997	5	0	0	0	5	1996-98
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1998	66	0	0	0	66	1996-98
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_1999	18	0	0	0	18	1999-01
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2000	11	0	0	0	11	1999-01
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2001	35	1	0	0	36	1999-01
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2002	11	0	0	1	12	2002-03
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2003	22	0	0	0	22	2002-03
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2004	30	0	0	1	31	2004
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2005	0	1	0	1	2	2005-07
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2006	49	1	0	0	50	2005-07
180	Ostraciidae	spotted trunkfish	Lactophrys bicaudalis	_2007	24	0	0	0	24	2005-07
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1983	23	0	0	0	23	1983-85
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1984	17	0	0	0	17	1983-85
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1985	11	0	0	0	11	1983-85
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1986	154	0	0	0	154	1986
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1987	32	0	0	0	32	1987
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1988	33	0	0	0	33	1988
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1989	7	0	0	0	7	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1990	0	0	0	0	0	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1991	20	0	0	0	20	1991-92
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1992	47	0	2	0	49	1991-92
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1993	8	0	1	0	9	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1994	2	0	6	0	8	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1995	8	0	1	0	9	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1996	0	0	0	0	0	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1997	5	0	12	0	17	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1998	1	0	0	0	1	-9
181	Ostraciidae	trunkfish	Lactophrys trigonus	_1999	3	0	0	0	3	1999-01
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2000	20	2	0	0	22	1999-01
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2001	23	2	2	0	27	1999-01
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2002	46	2	0	0	48	2002
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2003	99	19	0	0	118	2003
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2004	43	18	0	0	61	2004
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2005	0	0	1	0	1	2005-07
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2006	357	1	0	0	358	2005-07
181	Ostraciidae	trunkfish	Lactophrys trigonus	_2007	21	1	0	0	22	2005-07

182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1983	25	0	0	0	25	1983-84
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1984	108	0	0	0	108	1983-84
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1985	54	0	0	0	54	1985
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1986	244	0	0	0	244	1986
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1987	83	0	0	0	83	1987
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1988	50	0	0	0	50	1988
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1989	21	0	0	0	21	1989-90
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1990	21	0	0	0	21	1989-90
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1991	102	0	0	0	102	1991
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1992	42	0	1	0	43	1992
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1993	50	0	1	0	51	1993
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1994	17	0	0	0	17	1994-96
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1995	11	0	0	0	11	1994-96
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1996	7	0	0	0	7	1994-96
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1997	6	0	0	0	6	1997-98
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1998	28	0	0	0	28	1997-98
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_1999	23	0	0	0	23	1999-01
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2000	6	0	0	0	6	1999-01
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2001	16	2	0	1	19	1999-01
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2002	4	0	0	1	5	2002-04
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2003	13	1	0	1	15	2002-04
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2004	11	0	0	1	12	2002-04
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2005	0	1	0	0	1	2005-07
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2006	56	0	0	1	57	2005-07
182	Ostraciidae	smooth trunkfish	Lactophrys triqueter	_2007	9	0	0	0	9	2005-07
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1983	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1984	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1985	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1986	2	0	0	0	2	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1987	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1988	2	0	0	0	2	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1989	1	0	0	0	1	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1990	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1991	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1992	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1993	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1994	1	0	0	0	1	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1995	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1996	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1997	0	0	0	0	0	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1998	7	0	0	0	7	1998-99
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_1999	34	0	0	0	34	1998-99
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2000	25	0	0	1	26	2000-01
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2001	14	0	0	5	19	2000-01
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2002	32	0	0	4	36	2002
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2003	26	0	0	3	29	2003-04
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2004	9	0	0	1	10	2003-04
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2005	0	0	0	1	1	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2006	0	0	0	3	3	-9
189	Pomacanthidae	queen angelfish	Holacanthus ciliaris	_2007	0	0	0	4	4	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1983	5	0	0	0	5	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1984	0	0	0	0	0	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1985	0	0	0	0	0	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1986	4	0	0	0	4	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1987	8	0	0	0	8	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1988	3	0	0	0	3	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1989	2	0	0	0	2	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1990	1	0	0	0	1	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1991	1	0	0	0	1	-9

191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1992	4	0	0	0	4	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1993	0	0	0	0	0	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1994	0	0	0	0	0	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1995	0	0	0	0	0	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1996	7	0	0	0	7	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1997	0	0	0	0	0	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1998	15	0	0	0	15	-9
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_1999	8	0	0	0	8	1999-01
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2000	3	0	0	2	5	1999-01
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2001	29	1	0	4	34	1999-01
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2002	1	0	0	16	17	2002-03
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2003	0	0	0	13	13	2002-03
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2004	0	0	0	14	14	2004-06
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2005	0	0	0	14	14	2004-06
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2006	0	0	0	27	27	2004-06
191	Pomacanthidae	gray angelfish	Pomacanthus arcuatus	_2007	0	0	0	20	20	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1983	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1984	1	0	0	0	1	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1985	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1986	9	0	0	0	9	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1987	2	0	0	0	2	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1988	5	0	0	0	5	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1989	3	0	0	0	3	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1990	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1991	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1992	1	0	0	0	1	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1993	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1994	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1995	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1996	4	0	0	0	4	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1997	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1998	1	0	0	0	1	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_1999	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2000	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2001	8	2	0	1	11	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2002	0	0	0	1	1	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2003	3	3	0	2	8	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2004	2	0	0	0	2	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2005	0	0	0	0	0	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2006	10	0	0	1	11	-9
192	Pomacanthidae	French angelfish	Pomacanthus paru	_2007	0	0	0	5	5	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1983	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1984	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1985	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1986	2	0	0	0	2	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1987	4	0	0	0	4	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1988	1	0	0	0	1	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1989	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1990	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1991	18	0	0	0	18	1991-92
196	Priacanthidae	bigeye	Priacanthus arenatus	_1992	48	0	0	0	48	1991-92
196	Priacanthidae	bigeye	Priacanthus arenatus	_1993	26	0	2	0	28	1993-94
196	Priacanthidae	bigeye	Priacanthus arenatus	_1994	2	0	0	0	2	1993-94
196	Priacanthidae	bigeye	Priacanthus arenatus	_1995	2	0	0	0	2	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1996	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1997	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1998	9	0	0	0	9	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_1999	3	0	0	0	3	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2000	3	0	0	0	3	-9

196	Priacanthidae	bigeye	Priacanthus arenatus	_2001	0	1	0	0	1	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2002	0	0	0	1	1	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2003	0	2	0	0	2	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2004	11	1	0	0	12	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2005	0	0	0	0	0	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2006	4	0	0	0	4	-9
196	Priacanthidae	bigeye	Priacanthus arenatus	_2007	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1983	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1984	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1985	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1986	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1987	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1988	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1989	5	0	0	0	5	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1990	6	0	0	0	6	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1991	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1992	5	0	0	0	5	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1993	3	0	0	0	3	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1994	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1995	3	0	0	0	3	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1996	5	0	0	0	5	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1997	1	0	0	0	1	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1998	11	0	0	0	11	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_1999	1	0	0	0	1	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2000	3	2	0	0	5	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2001	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2002	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2003	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2004	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2005	0	0	0	0	0	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2006	2	0	0	0	2	-9
200	Scaridae	blue parrotfish	Scarus coeruleus	_2007	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1983	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1984	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1985	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1986	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1987	9	0	0	0	9	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1988	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1989	6	0	0	0	6	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1990	6	0	0	0	6	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1991	4	0	0	0	4	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1992	1	0	0	0	1	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1993	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1994	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1995	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1996	7	0	0	0	7	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1997	1	0	0	0	1	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1998	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_1999	5	0	0	0	5	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2000	1	0	0	0	1	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2001	13	0	0	0	13	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2002	1	0	0	0	1	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2003	5	1	0	0	6	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2004	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2005	0	0	0	0	0	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2006	1	0	0	0	1	-9
201	Scaridae	rainbow parrotfish	Scarus guacamaia	_2007	2	0	0	0	2	-9
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1983	0	0	0	0	0	-9
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1984	0	0	0	0	0	-9

203	Scaridae	princess parrotfish	Scarus taeniopterus	_1985	0	0	0	0	0	-9
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1986	7	0	0	0	7	1986-87
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1987	39	0	0	0	39	1986-87
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1988	19	0	0	0	19	1988-89
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1989	43	0	0	0	43	1988-89
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1990	43	0	0	0	43	1990
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1991	80	0	0	0	80	1991
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1992	65	0	0	0	65	1992
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1993	37	0	2	0	39	1993
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1994	22	0	3	0	25	1994-95
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1995	10	0	0	0	10	1994-95
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1996	3	0	0	0	3	-9
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1997	0	0	0	0	0	-9
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1998	9	0	0	0	9	1998-99
203	Scaridae	princess parrotfish	Scarus taeniopterus	_1999	35	0	0	0	35	1998-99
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2000	107	0	0	0	107	2000
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2001	224	0	0	0	224	2001
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2002	83	0	0	3	86	2002
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2003	29	2	0	3	34	2003
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2004	63	0	0	4	67	2004
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2005	0	2	0	6	8	2005-07
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2006	62	0	0	10	72	2005-07
203	Scaridae	princess parrotfish	Scarus taeniopterus	_2007	10	0	0	3	13	2005-07
204	Scaridae	queen parrotfish	Scarus vetula	_1983	0	0	0	0	0	-9
204	Scaridae	queen parrotfish	Scarus vetula	_1984	0	0	0	0	0	-9
204	Scaridae	queen parrotfish	Scarus vetula	_1985	0	0	0	0	0	-9
204	Scaridae	queen parrotfish	Scarus vetula	_1986	40	0	0	0	40	1986
204	Scaridae	queen parrotfish	Scarus vetula	_1987	9	0	0	0	9	1987-88
204	Scaridae	queen parrotfish	Scarus vetula	_1988	38	0	0	0	38	1987-88
204	Scaridae	queen parrotfish	Scarus vetula	_1989	33	0	0	0	33	1989
204	Scaridae	queen parrotfish	Scarus vetula	_1990	78	0	0	0	78	1990
204	Scaridae	queen parrotfish	Scarus vetula	_1991	20	0	0	0	20	1991-92
204	Scaridae	queen parrotfish	Scarus vetula	_1992	58	0	0	0	58	1991-92
204	Scaridae	queen parrotfish	Scarus vetula	_1993	40	0	0	0	40	1993
204	Scaridae	queen parrotfish	Scarus vetula	_1994	0	0	0	0	0	-9
204	Scaridae	queen parrotfish	Scarus vetula	_1995	0	0	0	0	0	-9
204	Scaridae	queen parrotfish	Scarus vetula	_1996	1	0	0	0	1	-9
204	Scaridae	queen parrotfish	Scarus vetula	_1997	17	0	0	0	17	1997-98
204	Scaridae	queen parrotfish	Scarus vetula	_1998	16	0	0	0	16	1997-98
204	Scaridae	queen parrotfish	Scarus vetula	_1999	65	0	0	0	65	1999
204	Scaridae	queen parrotfish	Scarus vetula	_2000	76	2	0	0	78	2000
204	Scaridae	queen parrotfish	Scarus vetula	_2001	146	4	0	0	150	2001
204	Scaridae	queen parrotfish	Scarus vetula	_2002	86	2	0	0	88	2002
204	Scaridae	queen parrotfish	Scarus vetula	_2003	62	0	0	0	62	2003
204	Scaridae	queen parrotfish	Scarus vetula	_2004	117	0	0	0	117	2004
204	Scaridae	queen parrotfish	Scarus vetula	_2005	0	0	0	0	0	-9
204	Scaridae	queen parrotfish	Scarus vetula	_2006	70	0	0	3	73	2006-07
204	Scaridae	queen parrotfish	Scarus vetula	_2007	12	0	0	2	14	2006-07
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1983	0	0	0	0	0	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1984	0	0	0	0	0	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1985	0	0	0	0	0	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1986	165	0	0	0	165	1986
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1987	149	0	0	0	149	1987
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1988	34	0	0	0	34	1988
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1989	33	0	0	0	33	1989
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1990	50	0	0	0	50	1990
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1991	33	0	0	0	33	1991
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1992	21	0	0	0	21	1992-93
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1993	13	0	0	0	13	1992-93

206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1994	26	0	0	0	26	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1995	0	0	0	0	0	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1996	0	0	0	0	0	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1997	2	0	0	0	2	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1998	8	0	0	0	8	-9
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_1999	14	0	0	0	14	1999-01
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2000	1	0	0	6	7	1999-01
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2001	5	3	0	3	11	1999-01
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2002	1	0	0	47	48	2002
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2003	7	4	0	25	36	2003
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2004	5	1	0	43	49	2004
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2005	0	0	0	37	37	2005
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2006	9	0	0	33	42	2006-07
206	Scaridae	redband parrotfish	Sparisoma aurofrenatum	_2007	0	0	0	14	14	2006-07
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1983	0	0	0	0	0	-9
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1984	0	0	0	0	0	-9
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1985	0	0	0	0	0	-9
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1986	263	0	0	0	263	1986
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1987	327	0	0	0	327	1987
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1988	374	0	0	0	374	1988
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1989	467	0	0	0	467	1989
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1990	557	0	0	0	557	1990
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1991	625	0	0	0	625	1991
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1992	404	0	0	0	404	1992
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1993	419	0	0	0	419	1993
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1994	227	0	0	0	227	1994
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1995	257	0	0	0	257	1995
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1996	326	0	0	0	326	1996
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1997	175	0	0	0	175	1997
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1998	503	0	0	0	503	1998
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_1999	811	0	0	0	811	1999
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2000	787	1	1	0	789	2000
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2001	856	4	0	0	860	2001
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2002	1014	7	0	2	1023	2002
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2003	696	4	0	3	703	2003
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2004	429	0	0	0	429	2004
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2005	0	0	0	12	12	2005-06
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2006	496	0	0	5	501	2005-06
207	Scaridae	redtail parrotfish	Sparisoma chrysopterum	_2007	96	0	0	12	108	2007
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1983	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1984	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1985	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1986	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1987	1	0	0	0	1	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1988	5	0	0	0	5	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1989	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1990	14	0	0	0	14	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1991	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1992	0	0	1	0	1	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1993	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1994	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1995	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1996	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1997	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1998	0	0	0	0	0	-9
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_1999	1	0	0	0	1	1999-00
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2000	46	2	0	0	48	1999-00
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2001	10	7	0	2	19	2001-03
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2002	4	0	0	6	10	2001-03

208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2003	19	8	0	7	34	2001-03
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2004	21	0	0	2	23	2004-06
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2005	0	0	0	2	2	2004-06
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2006	22	0	0	17	39	2004-06
208	Scaridae	yellowtail parrotfish	Sparisoma rubripinne	_2007	0	0	0	3	3	-9
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1983	0	0	0	0	0	-9
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1984	0	0	0	0	0	-9
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1985	0	0	0	0	0	-9
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1986	1472	0	0	0	1472	1986
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1987	696	0	0	0	696	1987
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1988	649	0	0	0	649	1988
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1989	597	0	0	0	597	1989
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1990	729	0	0	0	729	1990
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1991	767	0	0	0	767	1991
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1992	587	0	0	0	587	1992
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1993	471	0	0	0	471	1993
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1994	264	0	1	0	265	1994
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1995	191	0	0	0	191	1995
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1996	323	0	0	0	323	1996
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1997	215	0	0	0	215	1997
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1998	570	0	0	0	570	1998
209	Scaridae	stoplight parrotfish	Sparisoma viride	_1999	908	0	0	0	908	1999
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2000	993	0	0	5	998	2000
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2001	986	19	0	11	1016	2001
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2002	1137	0	0	50	1187	2002
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2003	570	15	0	51	636	2003
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2004	814	0	0	44	858	2004
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2005	0	0	1	47	48	2005
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2006	610	0	1	40	651	2006
209	Scaridae	stoplight parrotfish	Sparisoma viride	_2007	224	6	0	66	296	2007
216	Sciaenidae	reef croaker	Odontoscion dentex	_1983	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1984	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1985	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1986	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1987	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1988	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1989	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1990	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1991	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1992	3	0	0	0	3	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1993	1	0	0	0	1	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1994	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1995	2	0	0	0	2	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1996	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1997	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_1998	20	0	0	0	20	1998-99
216	Sciaenidae	reef croaker	Odontoscion dentex	_1999	276	0	0	0	276	1998-99
216	Sciaenidae	reef croaker	Odontoscion dentex	_2000	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_2001	83	0	0	0	83	2001
216	Sciaenidae	reef croaker	Odontoscion dentex	_2002	8	0	0	0	8	2002-03
216	Sciaenidae	reef croaker	Odontoscion dentex	_2003	59	0	0	0	59	2002-03
216	Sciaenidae	reef croaker	Odontoscion dentex	_2004	35	0	0	0	35	2004
216	Sciaenidae	reef croaker	Odontoscion dentex	_2005	0	0	0	0	0	-9
216	Sciaenidae	reef croaker	Odontoscion dentex	_2006	5	0	0	0	5	2006-07
216	Sciaenidae	reef croaker	Odontoscion dentex	_2007	33	0	0	0	33	2006-07
233	Serranidae	graysby	Cephalopholis cruentata	_1983	1	0	0	0	1	-9
233	Serranidae	graysby	Cephalopholis cruentata	_1984	2	0	0	0	2	-9
233	Serranidae	graysby	Cephalopholis cruentata	_1985	1	0	0	0	1	-9
233	Serranidae	graysby	Cephalopholis cruentata	_1986	121	0	0	0	121	1986

233	Serranidae	graysby	Cephalopholis cruentata	_1987	134	0	0	0	134	1987
233	Serranidae	graysby	Cephalopholis cruentata	_1988	70	0	0	0	70	1988
233	Serranidae	graysby	Cephalopholis cruentata	_1989	109	0	0	0	109	1989
233	Serranidae	graysby	Cephalopholis cruentata	_1990	208	0	0	0	208	1990
233	Serranidae	graysby	Cephalopholis cruentata	_1991	218	0	1	0	219	1991
233	Serranidae	graysby	Cephalopholis cruentata	_1992	274	0	30	0	304	1992
233	Serranidae	graysby	Cephalopholis cruentata	_1993	102	0	76	0	178	1993
233	Serranidae	graysby	Cephalopholis cruentata	_1994	74	0	83	0	157	1994
233	Serranidae	graysby	Cephalopholis cruentata	_1995	54	0	0	0	54	1995
233	Serranidae	graysby	Cephalopholis cruentata	_1996	5	0	0	0	5	1996-97
233	Serranidae	graysby	Cephalopholis cruentata	_1997	30	0	0	0	30	1996-97
233	Serranidae	graysby	Cephalopholis cruentata	_1998	8	0	0	0	8	1998-99
233	Serranidae	graysby	Cephalopholis cruentata	_1999	26	0	0	0	26	1998-99
233	Serranidae	graysby	Cephalopholis cruentata	_2000	9	10	0	0	19	2000-01
233	Serranidae	graysby	Cephalopholis cruentata	_2001	81	4	0	2	87	2000-01
233	Serranidae	graysby	Cephalopholis cruentata	_2002	23	0	0	4	27	2002-03
233	Serranidae	graysby	Cephalopholis cruentata	_2003	20	3	0	5	28	2002-03
233	Serranidae	graysby	Cephalopholis cruentata	_2004	23	7	0	10	40	2004
233	Serranidae	graysby	Cephalopholis cruentata	_2005	0	2	0	1	3	2005-07
233	Serranidae	graysby	Cephalopholis cruentata	_2006	11	0	0	4	15	2005-07
233	Serranidae	graysby	Cephalopholis cruentata	_2007	25	1	0	7	33	2005-07
234	Serranidae	coney	Cephalopholis fulva	_1983	455	0	0	0	455	1983
234	Serranidae	coney	Cephalopholis fulva	_1984	1148	0	0	0	1148	1984
234	Serranidae	coney	Cephalopholis fulva	_1985	576	0	0	0	576	1985
234	Serranidae	coney	Cephalopholis fulva	_1986	2177	0	0	0	2177	1986
234	Serranidae	coney	Cephalopholis fulva	_1987	1037	0	0	0	1037	1987
234	Serranidae	coney	Cephalopholis fulva	_1988	525	0	0	0	525	1988
234	Serranidae	coney	Cephalopholis fulva	_1989	397	0	0	0	397	1989
234	Serranidae	coney	Cephalopholis fulva	_1990	187	0	0	0	187	1990
234	Serranidae	coney	Cephalopholis fulva	_1991	1007	0	187	0	1194	1991
234	Serranidae	coney	Cephalopholis fulva	_1992	991	0	551	0	1542	1992
234	Serranidae	coney	Cephalopholis fulva	_1993	533	0	677	0	1210	1993
234	Serranidae	coney	Cephalopholis fulva	_1994	111	0	350	0	461	1994
234	Serranidae	coney	Cephalopholis fulva	_1995	187	0	0	0	187	1995
234	Serranidae	coney	Cephalopholis fulva	_1996	98	0	0	0	98	1996
234	Serranidae	coney	Cephalopholis fulva	_1997	71	0	0	0	71	1997
234	Serranidae	coney	Cephalopholis fulva	_1998	221	0	0	0	221	1998
234	Serranidae	coney	Cephalopholis fulva	_1999	221	0	0	0	221	1999
234	Serranidae	coney	Cephalopholis fulva	_2000	182	31	0	0	213	2000
234	Serranidae	coney	Cephalopholis fulva	_2001	438	30	0	0	468	2001
234	Serranidae	coney	Cephalopholis fulva	_2002	274	4	0	9	287	2002
234	Serranidae	coney	Cephalopholis fulva	_2003	301	71	0	4	376	2003
234	Serranidae	coney	Cephalopholis fulva	_2004	230	84	0	8	322	2004
234	Serranidae	coney	Cephalopholis fulva	_2005	0	32	2	10	44	2005
234	Serranidae	coney	Cephalopholis fulva	_2006	60	6	0	4	70	2006
234	Serranidae	coney	Cephalopholis fulva	_2007	19	13	0	6	38	2007
236	Serranidae	rock hind	Epinephelus adscensionis	_1983	1	0	0	0	1	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1984	3	0	0	0	3	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1985	6	0	0	0	6	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1986	12	0	0	0	12	1986-88
236	Serranidae	rock hind	Epinephelus adscensionis	_1987	9	0	0	0	9	1986-88
236	Serranidae	rock hind	Epinephelus adscensionis	_1988	102	0	0	0	102	1986-88
236	Serranidae	rock hind	Epinephelus adscensionis	_1989	80	0	0	0	80	1989
236	Serranidae	rock hind	Epinephelus adscensionis	_1990	26	0	0	0	26	1990-91
236	Serranidae	rock hind	Epinephelus adscensionis	_1991	48	0	0	0	48	1990-91
236	Serranidae	rock hind	Epinephelus adscensionis	_1992	6	0	0	0	6	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1993	17	0	0	0	17	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1994	0	0	0	0	0	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1995	4	0	0	0	4	-9

236	Serranidae	rock hind	Epinephelus adscensionis	_1996	10	0	0	0	10	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1997	3	0	0	0	3	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1998	6	0	0	0	6	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_1999	10	0	0	0	10	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2000	9	2	0	0	11	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2001	3	1	0	0	4	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2002	11	0	0	0	11	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2003	10	0	0	0	10	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2004	0	0	0	0	0	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2005	0	0	0	0	0	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2006	0	2	0	0	2	-9
236	Serranidae	rock hind	Epinephelus adscensionis	_2007	1	3	0	0	4	-9
238	Serranidae	red hind	Epinephelus guttatus	_1983	414	0	0	0	414	1983
238	Serranidae	red hind	Epinephelus guttatus	_1984	895	0	0	0	895	1984
238	Serranidae	red hind	Epinephelus guttatus	_1985	719	0	0	0	719	1985
238	Serranidae	red hind	Epinephelus guttatus	_1986	1047	0	0	0	1047	1986
238	Serranidae	red hind	Epinephelus guttatus	_1987	875	0	0	0	875	1987
238	Serranidae	red hind	Epinephelus guttatus	_1988	738	0	0	0	738	1988
238	Serranidae	red hind	Epinephelus guttatus	_1989	565	0	0	0	565	1989
238	Serranidae	red hind	Epinephelus guttatus	_1990	549	0	0	0	549	1990
238	Serranidae	red hind	Epinephelus guttatus	_1991	1124	0	1124	0	2248	1991
238	Serranidae	red hind	Epinephelus guttatus	_1992	783	0	1260	0	2043	1992
238	Serranidae	red hind	Epinephelus guttatus	_1993	427	0	791	0	1218	1993
238	Serranidae	red hind	Epinephelus guttatus	_1994	352	0	645	0	997	1994
238	Serranidae	red hind	Epinephelus guttatus	_1995	330	0	0	0	330	1995
238	Serranidae	red hind	Epinephelus guttatus	_1996	119	0	0	0	119	1996
238	Serranidae	red hind	Epinephelus guttatus	_1997	195	0	0	0	195	1997
238	Serranidae	red hind	Epinephelus guttatus	_1998	517	0	0	0	517	1998
238	Serranidae	red hind	Epinephelus guttatus	_1999	874	0	0	0	874	1999
238	Serranidae	red hind	Epinephelus guttatus	_2000	736	15	0	1	752	2000
238	Serranidae	red hind	Epinephelus guttatus	_2001	980	47	0	4	1031	2001
238	Serranidae	red hind	Epinephelus guttatus	_2002	842	21	0	3	866	2002
238	Serranidae	red hind	Epinephelus guttatus	_2003	928	29	0	2	959	2003
238	Serranidae	red hind	Epinephelus guttatus	_2004	991	21	0	8	1020	2004
238	Serranidae	red hind	Epinephelus guttatus	_2005	0	62	0	4	66	2005
238	Serranidae	red hind	Epinephelus guttatus	_2006	837	5	0	1	843	2006
238	Serranidae	red hind	Epinephelus guttatus	_2007	408	12	0	4	424	2007
241	Serranidae	misty grouper	Epinephelus mystacinus	_1983	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1984	2	0	0	0	2	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1985	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1986	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1987	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1988	7	0	0	0	7	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1989	2	0	0	0	2	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1990	2	0	0	0	2	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1991	4	0	0	0	4	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1992	9	0	0	0	9	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1993	5	0	0	0	5	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1994	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1995	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1996	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1997	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1998	1	0	0	0	1	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_1999	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2000	1	0	0	0	1	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2001	1	0	0	0	1	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2002	4	0	0	0	4	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2003	1	0	0	0	1	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2004	11	1	0	0	12	-9

241	Serranidae	misty grouper	Epinephelus mystacinus	_2005	0	0	0	0	0	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2006	11	0	0	0	11	-9
241	Serranidae	misty grouper	Epinephelus mystacinus	_2007	4	0	0	0	4	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1983	63	0	0	0	63	1983
243	Serranidae	Nassau grouper	Epinephelus striatus	_1984	114	0	0	0	114	1984
243	Serranidae	Nassau grouper	Epinephelus striatus	_1985	21	0	0	0	21	1985-86
243	Serranidae	Nassau grouper	Epinephelus striatus	_1986	17	0	0	0	17	1985-86
243	Serranidae	Nassau grouper	Epinephelus striatus	_1987	23	0	0	0	23	1987-
243	Serranidae	Nassau grouper	Epinephelus striatus	_1988	14	0	0	0	14	1987-
243	Serranidae	Nassau grouper	Epinephelus striatus	_1989	20	0	0	0	20	1989-90
243	Serranidae	Nassau grouper	Epinephelus striatus	_1990	17	0	0	0	17	1989-90
243	Serranidae	Nassau grouper	Epinephelus striatus	_1991	16	0	0	0	16	1991-92
243	Serranidae	Nassau grouper	Epinephelus striatus	_1992	45	0	2	0	47	1991-92
243	Serranidae	Nassau grouper	Epinephelus striatus	_1993	6	0	2	0	8	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1994	11	0	0	0	11	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1995	4	0	0	0	4	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1996	6	0	0	0	6	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1997	0	0	0	0	0	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1998	7	0	0	0	7	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_1999	13	0	0	0	13	1999-01
243	Serranidae	Nassau grouper	Epinephelus striatus	_2000	7	1	0	0	8	1999-01
243	Serranidae	Nassau grouper	Epinephelus striatus	_2001	19	0	0	0	19	1999-01
243	Serranidae	Nassau grouper	Epinephelus striatus	_2002	4	0	0	0	4	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_2003	3	6	0	0	9	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_2004	9	1	0	0	10	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_2005	0	0	0	0	0	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_2006	0	1	0	0	1	-9
243	Serranidae	Nassau grouper	Epinephelus striatus	_2007	0	1	0	1	2	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1983	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1984	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1985	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1986	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1987	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1988	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1989	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1990	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1991	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1992	15	0	0	0	15	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1993	11	0	0	0	11	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1994	1	0	0	0	1	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1995	16	0	0	0	16	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1996	7	0	0	0	7	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1997	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1998	2	0	0	0	2	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_1999	6	0	0	0	6	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2000	4	0	0	0	4	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2001	2	0	0	0	2	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2002	1	0	0	0	1	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2003	8	0	0	0	8	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2004	2	0	0	0	2	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2005	0	0	0	0	0	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2006	1	0	0	0	1	-9
244	Serranidae	black grouper	Mycteroperca bonaci	_2007	0	1	0	0	1	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1983	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1984	2	0	0	0	2	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1985	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1986	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1987	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1988	2	0	0	0	2	-9

247	Serranidae	tiger grouper	Mycteroperca tigris	_1989	12	0	0	0	12	1989-91
247	Serranidae	tiger grouper	Mycteroperca tigris	_1990	0	0	0	0	0	1989-91
247	Serranidae	tiger grouper	Mycteroperca tigris	_1991	48	0	1	0	49	1989-91
247	Serranidae	tiger grouper	Mycteroperca tigris	_1992	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1993	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_1994	35	0	0	0	35	1994
247	Serranidae	tiger grouper	Mycteroperca tigris	_1995	838	0	0	0	838	1995
247	Serranidae	tiger grouper	Mycteroperca tigris	_1996	598	0	0	0	598	1996
247	Serranidae	tiger grouper	Mycteroperca tigris	_1997	400	0	0	0	400	1997
247	Serranidae	tiger grouper	Mycteroperca tigris	_1998	445	0	0	0	445	1998
247	Serranidae	tiger grouper	Mycteroperca tigris	_1999	55	0	0	0	55	1999
247	Serranidae	tiger grouper	Mycteroperca tigris	_2000	21	0	0	0	21	2000-01
247	Serranidae	tiger grouper	Mycteroperca tigris	_2001	21	0	0	0	21	2000-01
247	Serranidae	tiger grouper	Mycteroperca tigris	_2002	1	0	0	0	1	2002-04
247	Serranidae	tiger grouper	Mycteroperca tigris	_2003	5	0	0	0	5	2002-04
247	Serranidae	tiger grouper	Mycteroperca tigris	_2004	101	0	0	0	101	2002-04
247	Serranidae	tiger grouper	Mycteroperca tigris	_2005	0	0	0	0	0	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_2006	1	0	0	0	1	-9
247	Serranidae	tiger grouper	Mycteroperca tigris	_2007	0	0	0	0	0	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1983	1	0	0	0	1	1983-85
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1984	16	0	0	0	16	1983-85
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1985	20	0	0	0	20	1983-85
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1986	16	0	0	0	16	1986-88
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1987	7	0	0	0	7	1986-88
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1988	13	0	0	0	13	1986-88
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1989	20	0	0	0	20	1989-91
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1990	8	0	0	0	8	1989-91
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1991	5	0	0	0	5	1989-91
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1992	4	0	1	0	5	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1993	3	0	0	0	3	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1994	1	0	0	0	1	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1995	6	0	0	0	6	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1996	0	0	0	0	0	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1997	14	0	0	0	14	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1998	2	0	1	0	3	1998-00
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_1999	11	0	0	0	11	1998-00
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2000	38	0	0	0	38	1998-00
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2001	3	1	0	0	4	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2002	4	0	0	0	4	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2003	2	4	0	0	6	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2004	1	0	0	0	1	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2005	0	0	0	0	0	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2006	5	2	0	0	7	-9
248	Serranidae	yellowfin grouper	Mycteroperca venenosa	_2007	1	0	0	0	1	-9

Appendix C: Time-series Lbar estimates

Ocean Surgeon

family	latin	common	time	LC	n	lbar	lw_se	up_se
Acanthuridae	Acanthurus bahianus	ocean surgeon	1998-99	210	37	231.6	2.5	2.5
Acanthuridae	Acanthurus bahianus	ocean surgeon	2000-01	210	43	238.2	2.0	2.0
Acanthuridae	Acanthurus bahianus	ocean surgeon	2002-03	210	40	231.5	1.8	1.8
Acanthuridae	Acanthurus bahianus	ocean surgeon	2004-06	210	38	230.4	2.9	2.9

Doctorfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Acanthuridae	Acanthurus chirurgus	doctorfish	1986-88	180	30	202.0	2.5	2.5
Acanthuridae	Acanthurus chirurgus	doctorfish	2002	180	58	225.8	0.8	0.8
Acanthuridae	Acanthurus chirurgus	doctorfish	2003	180	36	226.3	1.3	1.3
Acanthuridae	Acanthurus chirurgus	doctorfish	2004-05	180	34	227.2	3.0	3.0
Acanthuridae	Acanthurus chirurgus	doctorfish	2006	180	50	221.0	3.1	3.2
Acanthuridae	Acanthurus chirurgus	doctorfish	2007	180	46	225.0	0.0	0.0

Blue Tang

family	latin	common	time	LC	n	lbar	lw_se	up_se
Acanthuridae	Acanthurus coeruleus	blue tang	2001	170	52	176.0	0.9	0.9
Acanthuridae	Acanthurus coeruleus	blue tang	2002	170	36	184.4	4.0	4.1
Acanthuridae	Acanthurus coeruleus	blue tang	2003	170	76	215.4	2.6	2.7
Acanthuridae	Acanthurus coeruleus	blue tang	2004-05	170	79	183.9	2.4	2.4
Acanthuridae	Acanthurus coeruleus	blue tang	2006	170	118	193.4	1.9	1.9
Acanthuridae	Acanthurus coeruleus	blue tang	2007	170	67	177.0	1.1	1.1

Gray Triggerfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Balistidae	Balistes capriscus	gray triggerfish	2001	240	84	279.5	5.9	6.0
Balistidae	Balistes capriscus	gray triggerfish	2003-04	240	37	324.2	5.7	5.8

Queen Triggerfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Balistidae	Balistes vetula	queen triggerfish	1983	230	207	279.9	2.6	2.6
Balistidae	Balistes vetula	queen triggerfish	1984	230	580	297.5	1.8	1.9
Balistidae	Balistes vetula	queen triggerfish	1985	230	271	288.3	2.5	2.5
Balistidae	Balistes vetula	queen triggerfish	1986	230	520	283.1	1.9	2.0
Balistidae	Balistes vetula	queen triggerfish	1987	230	368	289.1	2.1	2.1
Balistidae	Balistes vetula	queen triggerfish	1988	230	318	289.8	2.3	2.3
Balistidae	Balistes vetula	queen triggerfish	1989	230	185	280.8	2.9	3.0
Balistidae	Balistes vetula	queen triggerfish	1990	230	104	279.7	3.8	3.8
Balistidae	Balistes vetula	queen triggerfish	1991	230	343	291.3	2.5	2.5
Balistidae	Balistes vetula	queen triggerfish	1992	230	302	292.8	3.0	3.0
Balistidae	Balistes vetula	queen triggerfish	1993	230	226	296.6	3.6	3.6
Balistidae	Balistes vetula	queen triggerfish	1994	230	118	293.5	4.4	4.5
Balistidae	Balistes vetula	queen triggerfish	1995	230	118	271.0	3.3	3.3
Balistidae	Balistes vetula	queen triggerfish	1996	230	47	293.1	5.9	6.0
Balistidae	Balistes vetula	queen triggerfish	1997	230	45	274.2	5.2	5.3
Balistidae	Balistes vetula	queen triggerfish	1998	230	203	293.6	3.8	3.8
Balistidae	Balistes vetula	queen triggerfish	1999	230	259	322.2	5.9	6.0
Balistidae	Balistes vetula	queen triggerfish	2000	230	201	318.2	6.4	6.5
Balistidae	Balistes vetula	queen triggerfish	2001	230	200	297.9	3.1	3.1
Balistidae	Balistes vetula	queen triggerfish	2002	230	217	314.7	4.9	5.0
Balistidae	Balistes vetula	queen triggerfish	2003	230	223	336.9	6.3	6.5
Balistidae	Balistes vetula	queen triggerfish	2004	230	223	349.5	5.8	5.9
Balistidae	Balistes vetula	queen triggerfish	2005-06	230	337	300.6	2.5	2.5
Balistidae	Balistes vetula	queen triggerfish	2007	230	134	322.5	6.3	6.4

Balck Durgon

family	latin	common	time	LC	n	lbar	lw_se	up_se
Balistidae	Melichthys niger	black durgon	1992	220	37	289.2	6.6	6.7
Balistidae	Melichthys niger	black durgon	1993-94	220	41	276.4	3.0	3.1
Balistidae	Melichthys niger	black durgon	1997-99	220	38	276.3	3.7	3.7

Balistidae	Melichthys niger	black durgon	2000	220	50	338.8	12.2	12.7
Balistidae	Melichthys niger	black durgon	2001	220	111	270.2	1.9	1.9
Balistidae	Melichthys niger	black durgon	2002	220	35	292.5	7.4	7.6
Balistidae	Melichthys niger	black durgon	2003	220	67	253.5	3.5	3.6
Balistidae	Melichthys niger	black durgon	2004-05	220	96	264.5	2.7	2.7
Balistidae	Melichthys niger	black durgon	2006-07	220	64	237.8	4.2	4.3

Black Margate

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Anisostremus surinamensis	black margate	1999-01	220	33	277.0	9.0	9.3

Porkish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Anisotremus virginicus	porkfish	1986	210	58	239.4	3.0	3.0
Haemulidae	Anisotremus virginicus	porkfish	1987	210	47	236.2	2.4	2.4
Haemulidae	Anisotremus virginicus	porkfish	1988	210	138	238.9	1.4	1.4
Haemulidae	Anisotremus virginicus	porkfish	1989	210	97	233.3	1.8	1.9
Haemulidae	Anisotremus virginicus	porkfish	1990	210	61	232.9	2.8	2.8
Haemulidae	Anisotremus virginicus	porkfish	1991	210	33	247.1	4.3	4.3
Haemulidae	Anisotremus virginicus	porkfish	1992-93	210	50	238.0	2.8	2.8
Haemulidae	Anisotremus virginicus	porkfish	1994-96	210	37	233.4	2.7	2.7
Haemulidae	Anisotremus virginicus	porkfish	1997-98	210	49	239.8	3.7	3.8
Haemulidae	Anisotremus virginicus	porkfish	1999	210	31	235.0	3.5	3.5
Haemulidae	Anisotremus virginicus	porkfish	2000	210	77	250.5	4.0	4.1
Haemulidae	Anisotremus virginicus	porkfish	2001	210	77	233.3	2.1	2.1
Haemulidae	Anisotremus virginicus	porkfish	2002	210	64	234.3	1.8	1.8
Haemulidae	Anisotremus virginicus	porkfish	2003	210	46	234.3	2.3	2.3
Haemulidae	Anisotremus virginicus	porkfish	2004	210	31	235.7	3.9	4.0
Haemulidae	Anisotremus virginicus	porkfish	2005-07	210	66	238.3	2.9	2.9

Margate

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Haemulon album	margate	1984-85	210	59	269.0	8.3	8.6
Haemulidae	Haemulon album	margate	1986-87	210	30	326.2	15.6	16.4

Haemulidae	Haemulon album	margate	1999-01	210	55	278.4	9.9	10.3

Tomtate

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Haemulon aurolineatum	tomtate	1984-86	150	44	193.6	4.4	4.5
Haemulidae	Haemulon aurolineatum	tomtate	1987-88	150	70	168.0	2.4	2.4
Haemulidae	Haemulon aurolineatum	tomtate	1989	150	38	201.1	5.2	5.3
Haemulidae	Haemulon aurolineatum	tomtate	1992	150	79	172.9	2.6	2.6
Haemulidae	Haemulon aurolineatum	tomtate	1993	150	48	173.7	2.8	2.8
Haemulidae	Haemulon aurolineatum	tomtate	1994-95	150	35	174.2	3.4	3.5
Haemulidae	Haemulon aurolineatum	tomtate	2001-03	150	83	179.7	1.3	1.3
Haemulidae	Haemulon aurolineatum	tomtate	2004-06	150	38	170.9	2.3	2.4

Ceasar Grunt

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Haemulon carbonarium	ceasar grunt	1992	190	168	215.9	1.4	1.4
Haemulidae	Haemulon carbonarium	ceasar grunt	1993	190	110	216.5	1.8	1.9
Haemulidae	Haemulon carbonarium	ceasar grunt	2003-04	190	35	212.9	2.0	2.0
Haemulidae	Haemulon carbonarium	ceasar grunt	2005-06	190	30	216.0	3.1	3.2

French Grunt

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Haemulon flavolineatum	French grunt	1983	190	194	219.8	1.4	1.4
Haemulidae	Haemulon flavolineatum	French grunt	1984	190	235	209.1	1.4	1.4
Haemulidae	Haemulon flavolineatum	French grunt	1985	190	50	205.4	2.7	2.8
Haemulidae	Haemulon flavolineatum	French grunt	1986	190	245	201.9	0.9	0.9
Haemulidae	Haemulon flavolineatum	French grunt	1987	190	75	203.6	1.8	1.8
Haemulidae	Haemulon flavolineatum	French grunt	1988	190	43	210.0	3.7	3.7
Haemulidae	Haemulon flavolineatum	French grunt	1992-94	190	33	230.7	7.2	7.4
Haemulidae	Haemulon flavolineatum	French grunt	1995	190	50	213.4	2.3	2.4
Haemulidae	Haemulon flavolineatum	French grunt	1996-98	190	54	204.9	2.3	2.3
Haemulidae	Haemulon flavolineatum	French grunt	1999	190	94	205.7	2.3	2.4
Haemulidae	Haemulon flavolineatum	French grunt	2000	190	96	202.6	1.9	1.9

Haemulidae	Haemulon flavolineatum	French grunt	2001	190	51	208.1	2.5	2.6
Haemulidae	Haemulon flavolineatum	French grunt	2002	190	38	202.9	2.4	2.4
Haemulidae	Haemulon flavolineatum	French grunt	2003	190	49	202.3	2.3	2.3
Haemulidae	Haemulon flavolineatum	French grunt	2004	190	30	204.1	2.2	2.2
Haemulidae	Haemulon flavolineatum	French grunt	2005-07	190	31	205.0	2.9	3.0

Sailors Choice

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Haemulon parra	sailors choice	1998-00	200	44	247.9	4.7	4.8
Haemulidae	Haemulon parra	sailors choice	2001-02	200	61	248.3	2.8	2.8
Haemulidae	Haemulon parra	sailors choice	2003-04	200	35	250.3	5.0	5.1

Bluestriped Grunt

family	latin	common	time	LC	n	lbar	lw_se	up_se
Haemulidae	Haemulon sciurus	bluestriped grunt	1984-85	200	265	228.1	1.3	1.4
Haemulidae	Haemulon sciurus	bluestriped grunt	1986	200	617	230.0	0.9	0.9
Haemulidae	Haemulon sciurus	bluestriped grunt	1987	200	343	228.2	1.1	1.1
Haemulidae	Haemulon sciurus	bluestriped grunt	1988	200	638	239.1	0.8	0.8
Haemulidae	Haemulon sciurus	bluestriped grunt	1989	200	278	232.8	1.3	1.4
Haemulidae	Haemulon sciurus	bluestriped grunt	1992	200	61	235.3	3.2	3.3
Haemulidae	Haemulon sciurus	bluestriped grunt	1993	200	75	245.8	3.7	3.8
Haemulidae	Haemulon sciurus	bluestriped grunt	1994	200	79	246.3	2.5	2.5
Haemulidae	Haemulon sciurus	bluestriped grunt	1995	200	99	240.8	2.8	2.9
Haemulidae	Haemulon sciurus	bluestriped grunt	1996	200	53	240.2	3.4	3.4
Haemulidae	Haemulon sciurus	bluestriped grunt	1997-98	200	218	238.5	2.1	2.1
Haemulidae	Haemulon sciurus	bluestriped grunt	1999	200	252	235.0	1.8	1.8
Haemulidae	Haemulon sciurus	bluestriped grunt	2000	200	251	231.8	1.5	1.5
Haemulidae	Haemulon sciurus	bluestriped grunt	2001	200	548	232.6	1.0	1.0
Haemulidae	Haemulon sciurus	bluestriped grunt	2002	200	341	232.8	1.2	1.2
Haemulidae	Haemulon sciurus	bluestriped grunt	2003	200	312	234.3	1.4	1.4
Haemulidae	Haemulon sciurus	bluestriped grunt	2004	200	324	233.3	1.1	1.1
Haemulidae	Haemulon sciurus	bluestriped grunt	2005-06	200	399	235.6	1.1	1.2
Haemulidae	Haemulon sciurus	bluestriped grunt	2007	200	130	242.9	2.5	2.5

Squirrelfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Holocentridae	Holocentrus adscensionis	squirrelfish	1986-87	200	31	211.0	2.1	2.1
Holocentridae	Holocentrus adscensionis	squirrelfish	1988	200	35	219.9	3.7	3.8
Holocentridae	Holocentrus adscensionis	squirrelfish	1989-91	200	365	221.5	0.8	0.8
Holocentridae	Holocentrus adscensionis	squirrelfish	1992	200	528	219.9	0.6	0.6
Holocentridae	Holocentrus adscensionis	squirrelfish	1993	200	251	217.5	0.8	0.8
Holocentridae	Holocentrus adscensionis	squirrelfish	1994	200	120	218.1	1.3	1.3
Holocentridae	Holocentrus adscensionis	squirrelfish	1995	200	103	218.3	1.5	1.5
Holocentridae	Holocentrus adscensionis	squirrelfish	1996-97	200	35	217.6	2.2	2.3
Holocentridae	Holocentrus adscensionis	squirrelfish	1998-99	200	111	218.5	1.9	1.9
Holocentridae	Holocentrus adscensionis	squirrelfish	2000	200	112	224.1	2.0	2.0
Holocentridae	Holocentrus adscensionis	squirrelfish	2001	200	89	264.4	6.5	6.7
Holocentridae	Holocentrus adscensionis	squirrelfish	2002	200	41	221.2	3.5	3.5
Holocentridae	Holocentrus adscensionis	squirrelfish	2003-04	200	67	215.9	1.6	1.6
Holocentridae	Holocentrus adscensionis	squirrelfish	2005	200	44	219.4	3.6	3.7
Holocentridae	Holocentrus adscensionis	squirrelfish	2006-07	200	93	231.2	3.0	3.0

Longspine Squirrelfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Holocentridae	Holocentrus rufus	longspine squirrelfish	1990-92	180	115	198.0	1.3	1.3
Holocentridae	Holocentrus rufus	longspine squirrelfish	1993	180	65	190.1	1.0	1.0
Holocentridae	Holocentrus rufus	longspine squirrelfish	1994	180	33	189.0	1.3	1.3
Holocentridae	Holocentrus rufus	longspine squirrelfish	1995-97	180	42	193.3	2.6	2.6
Holocentridae	Holocentrus rufus	longspine squirrelfish	1998-99	180	47	188.0	1.4	1.4
Holocentridae	Holocentrus rufus	longspine squirrelfish	2000-01	180	69	194.5	2.1	2.1
Holocentridae	Holocentrus rufus	longspine squirrelfish	2002-03	180	39	221.8	1.6	1.6
Holocentridae	Holocentrus rufus	longspine squirrelfish	2004-05	180	73	211.4	2.1	2.1
Holocentridae	Holocentrus rufus	longspine squirrelfish	2006-07	180	34	222.9	2.5	2.6

Blackbar Soldierfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Holocentridae	Myripristis jacobus	blackbar soldierfish	1991-92	140	39	167.2	2.2	2.2

Holocentridae	Myripristis jacobus	blackbar soldierfish	1993-95	140	30	168.9	3.4	3.5

Spanish Hogfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Labridae	Bodianus rufus	Spanish hogfish	1986-88	250	32	297.9	8.7	9.0

Puddingwife

family	latin	common	time	LC	n	lbar	lw_se	up_se
Labridae	Halichoeres radiatus	puddingwife	1989-91	190	40	273.9	6.2	6.3

Queen Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Etelis oculatus	queen snapper	1985-86	290	50	385.7	13.3	13.8
Lutjanidae	Etelis oculatus	queen snapper	1987	290	105	390.0	9.6	9.9
Lutjanidae	Etelis oculatus	queen snapper	1988	290	120	486.5	13.2	13.6
Lutjanidae	Etelis oculatus	queen snapper	1989	290	541	398.3	3.6	3.6
Lutjanidae	Etelis oculatus	queen snapper	1990	290	278	420.8	7.0	7.1
Lutjanidae	Etelis oculatus	queen snapper	1991	290	315	361.8	4.4	4.5
Lutjanidae	Etelis oculatus	queen snapper	1992	290	98	391.0	9.3	9.6
Lutjanidae	Etelis oculatus	queen snapper	1993	290	46	389.9	15.2	15.9
Lutjanidae	Etelis oculatus	queen snapper	1994-96	290	102	364.6	8.4	8.6
Lutjanidae	Etelis oculatus	queen snapper	1997-98	290	56	463.3	15.8	16.4
Lutjanidae	Etelis oculatus	queen snapper	1999	290	111	455.1	10.1	10.3
Lutjanidae	Etelis oculatus	queen snapper	2000	290	195	402.0	5.6	5.7
Lutjanidae	Etelis oculatus	queen snapper	2001	290	174	456.7	7.8	7.9
Lutjanidae	Etelis oculatus	queen snapper	2002	290	233	491.4	8.0	8.1
Lutjanidae	Etelis oculatus	queen snapper	2003	290	300	451.1	6.4	6.5
Lutjanidae	Etelis oculatus	queen snapper	2004	290	419	436.5	5.3	5.4
Lutjanidae	Etelis oculatus	queen snapper	2005-06	290	629	455.2	4.0	4.1
Lutjanidae	Etelis oculatus	queen snapper	2007	290	172	454.7	7.5	7.7

Mutton Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus analis	mutton snapper	1983	240	51	360.2	15.6	16.3
Lutjanidae	Lutjanus analis	mutton snapper	1984	240	211	374.3	7.5	7.6
Lutjanidae	Lutjanus analis	mutton snapper	1985	240	90	399.0	11.1	11.4
Lutjanidae	Lutjanus analis	mutton snapper	1986	240	199	399.4	8.0	8.2
Lutjanidae	Lutjanus analis	mutton snapper	1987	240	47	415.3	17.2	18.0
Lutjanidae	Lutjanus analis	mutton snapper	1988	240	143	347.6	8.3	8.5
Lutjanidae	Lutjanus analis	mutton snapper	1989	240	140	370.9	9.7	10.0
Lutjanidae	Lutjanus analis	mutton snapper	1990	240	195	354.1	8.2	8.4
Lutjanidae	Lutjanus analis	mutton snapper	1991	240	386	399.2	6.5	6.6
Lutjanidae	Lutjanus analis	mutton snapper	1992	240	367	397.3	6.4	6.5
Lutjanidae	Lutjanus analis	mutton snapper	1993	240	168	444.9	11.3	11.6
Lutjanidae	Lutjanus analis	mutton snapper	1994	240	206	372.2	7.7	7.9
Lutjanidae	Lutjanus analis	mutton snapper	1995	240	108	409.0	11.4	11.7
Lutjanidae	Lutjanus analis	mutton snapper	1996-97	240	60	354.4	11.4	11.8
Lutjanidae	Lutjanus analis	mutton snapper	1998	240	187	429.4	11.2	11.5
Lutjanidae	Lutjanus analis	mutton snapper	1999	240	214	323.5	5.7	5.8
Lutjanidae	Lutjanus analis	mutton snapper	2000	240	278	415.2	8.1	8.2
Lutjanidae	Lutjanus analis	mutton snapper	2001	240	246	379.5	8.2	8.4
Lutjanidae	Lutjanus analis	mutton snapper	2002	240	407	403.3	6.6	6.7
Lutjanidae	Lutjanus analis	mutton snapper	2003	240	545	435.6	6.4	6.4
Lutjanidae	Lutjanus analis	mutton snapper	2004	240	356	373.9	6.7	6.8
Lutjanidae	Lutjanus analis	mutton snapper	2005-06	240	521	366.7	5.1	5.2
Lutjanidae	Lutjanus analis	mutton snapper	2007	240	346	390.9	6.5	6.6

Schoolmaster

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus apodus	schoolmaster	1983-84	220	110	290.4	5.7	5.8
Lutjanidae	Lutjanus apodus	schoolmaster	1985	220	192	355.1	14.7	15.4
Lutjanidae	Lutjanus apodus	schoolmaster	1986	220	183	306.8	5.3	5.4
Lutjanidae	Lutjanus apodus	schoolmaster	1987	220	103	292.0	5.9	6.1

Lutjanidae	Lutjanus apodus	schoolmaster	1988	220	156	288.8	4.0	4.0
Lutjanidae	Lutjanus apodus	schoolmaster	1989	220	146	293.4	5.2	5.3
Lutjanidae	Lutjanus apodus	schoolmaster	1990	220	185	297.1	4.7	4.8
Lutjanidae	Lutjanus apodus	schoolmaster	1991	220	354	289.2	2.8	2.8
Lutjanidae	Lutjanus apodus	schoolmaster	1992	220	269	297.1	3.2	3.3
Lutjanidae	Lutjanus apodus	schoolmaster	1993	220	138	295.1	5.1	5.2
Lutjanidae	Lutjanus apodus	schoolmaster	1994	220	177	311.5	6.1	6.2
Lutjanidae	Lutjanus apodus	schoolmaster	1995	220	204	315.1	5.2	5.3
Lutjanidae	Lutjanus apodus	schoolmaster	1996	220	41	315.3	8.6	8.9
Lutjanidae	Lutjanus apodus	schoolmaster	1997	220	35	338.4	15.1	15.8
Lutjanidae	Lutjanus apodus	schoolmaster	1998	220	188	274.9	3.1	3.1
Lutjanidae	Lutjanus apodus	schoolmaster	1999	220	335	274.5	2.5	2.5
Lutjanidae	Lutjanus apodus	schoolmaster	2000	220	207	279.7	3.4	3.4
Lutjanidae	Lutjanus apodus	schoolmaster	2001	220	167	269.6	3.7	3.7
Lutjanidae	Lutjanus apodus	schoolmaster	2002	220	201	268.8	3.3	3.4
Lutjanidae	Lutjanus apodus	schoolmaster	2003	220	158	275.8	4.4	4.5
Lutjanidae	Lutjanus apodus	schoolmaster	2004	220	132	294.4	5.5	5.6
Lutjanidae	Lutjanus apodus	schoolmaster	2005-06	220	207	279.4	3.8	3.9
Lutjanidae	Lutjanus apodus	schoolmaster	2007	220	74	294.4	6.8	6.9

Blackfin Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus buccanella	blackfin snapper	1983-85	220	59	277.5	5.7	5.8
Lutjanidae	Lutjanus buccanella	blackfin snapper	1986	220	110	263.0	3.4	3.4
Lutjanidae	Lutjanus buccanella	blackfin snapper	1987	220	38	273.8	5.5	5.6
Lutjanidae	Lutjanus buccanella	blackfin snapper	1988	220	65	268.0	4.5	4.6
Lutjanidae	Lutjanus buccanella	blackfin snapper	1989	220	99	295.1	5.6	5.8
Lutjanidae	Lutjanus buccanella	blackfin snapper	1990	220	116	276.2	5.1	5.2
Lutjanidae	Lutjanus buccanella	blackfin snapper	1991	220	404	276.3	2.2	2.2
Lutjanidae	Lutjanus buccanella	blackfin snapper	1992	220	140	257.1	3.7	3.8
Lutjanidae	Lutjanus buccanella	blackfin snapper	1993	220	135	277.0	3.6	3.7
Lutjanidae	Lutjanus buccanella	blackfin snapper	1994	220	112	265.4	2.9	2.9

Lutjanidae	Lutjanus buccanella	blackfin snapper	1995-96	220	62	268.3	5.5	5.6
Lutjanidae	Lutjanus buccanella	blackfin snapper	1997-98	220	98	276.5	4.0	4.1
Lutjanidae	Lutjanus buccanella	blackfin snapper	1999	220	66	303.0	7.5	7.7
Lutjanidae	Lutjanus buccanella	blackfin snapper	2000	220	135	286.1	4.4	4.5
Lutjanidae	Lutjanus buccanella	blackfin snapper	2001	220	117	281.5	4.1	4.1
Lutjanidae	Lutjanus buccanella	blackfin snapper	2002	220	56	277.4	4.6	4.7
Lutjanidae	Lutjanus buccanella	blackfin snapper	2003	220	134	281.1	4.3	4.3
Lutjanidae	Lutjanus buccanella	blackfin snapper	2004	220	243	299.1	3.5	3.5
Lutjanidae	Lutjanus buccanella	blackfin snapper	2005-06	220	147	316.5	4.3	4.4
Lutjanidae	Lutjanus buccanella	blackfin snapper	2007	220	182	311.3	4.2	4.2

Cubera Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus cyanopterus	cubera snapper	1992	240	70	319.9	9.9	10.3
Lutjanidae	Lutjanus cyanopterus	cubera snapper	1993	240	49	314.0	9.1	9.4
Lutjanidae	Lutjanus cyanopterus	cubera snapper	1994-95	240	76	347.7	12.1	12.5

Gray Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus griseus	gray snapper	1984-86	240	37	287.2	6.5	6.7
Lutjanidae	Lutjanus griseus	gray snapper	1987-88	240	137	298.0	3.5	3.5
Lutjanidae	Lutjanus griseus	gray snapper	1988	240	37	316.2	6.8	7.0
Lutjanidae	Lutjanus griseus	gray snapper	1989-90	240	49	307.3	8.1	8.3
Lutjanidae	Lutjanus griseus	gray snapper	1994	240	60	294.1	5.8	5.9
Lutjanidae	Lutjanus griseus	gray snapper	1998	240	37	298.0	5.7	5.8
Lutjanidae	Lutjanus griseus	gray snapper	2000-02	240	37	335.6	13.4	13.9
Lutjanidae	Lutjanus griseus	gray snapper	2003-05	240	34	339.5	13.0	13.6
Lutjanidae	Lutjanus griseus	gray snapper	2006	240	30	298.5	7.2	7.4
Lutjanidae	Lutjanus griseus	gray snapper	2007	240	74	342.8	6.6	6.8

Dog Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus jocu	dog snapper	1983-85	250	58	350.2	13.8	14.4

Lutjanidae	Lutjanus jocu	dog snapper	1986	250	76	333.7	8.4	8.6
Lutjanidae	Lutjanus jocu	dog snapper	1987	250	30	325.9	11.5	12.0
Lutjanidae	Lutjanus jocu	dog snapper	1988	250	110	330.4	7.2	7.3
Lutjanidae	Lutjanus jocu	dog snapper	1989	250	31	383.5	23.4	24.9
Lutjanidae	Lutjanus jocu	dog snapper	1990	250	36	380.7	16.2	16.9
Lutjanidae	Lutjanus jocu	dog snapper	1991	250	88	360.2	10.1	10.4
Lutjanidae	Lutjanus jocu	dog snapper	1992	250	76	375.5	12.0	12.4
Lutjanidae	Lutjanus jocu	dog snapper	1993	250	54	355.5	12.6	13.1
Lutjanidae	Lutjanus jocu	dog snapper	1994	250	40	379.5	11.8	12.2
Lutjanidae	Lutjanus jocu	dog snapper	1995	250	42	321.1	9.1	9.3
Lutjanidae	Lutjanus jocu	dog snapper	1996-98	250	31	406.2	22.9	24.2
Lutjanidae	Lutjanus jocu	dog snapper	1999	250	62	371.1	15.9	16.6
Lutjanidae	Lutjanus jocu	dog snapper	2000	250	46	353.2	14.9	15.5
Lutjanidae	Lutjanus jocu	dog snapper	2001	250	70	447.2	19.7	20.6
Lutjanidae	Lutjanus jocu	dog snapper	2002	250	59	434.3	19.0	19.8
Lutjanidae	Lutjanus jocu	dog snapper	2003	250	64	400.0	15.4	16.0
Lutjanidae	Lutjanus jocu	dog snapper	2004	250	49	350.3	13.3	13.8
Lutjanidae	Lutjanus jocu	dog snapper	2005-06	250	79	390.6	9.7	10.0
Lutjanidae	Lutjanus jocu	dog snapper	2007	250	132	354.9	5.5	5.6

Mahogany Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus mahogani	mahogany snapper	1983-85	250	54	301.5	5.4	5.5
Lutjanidae	Lutjanus mahogani	mahogany snapper	1986-88	250	67	287.3	3.9	3.9
Lutjanidae	Lutjanus mahogani	mahogany snapper	1989-91	250	187	285.9	2.0	2.0
Lutjanidae	Lutjanus mahogani	mahogany snapper	1992	250	193	281.3	1.6	1.6
Lutjanidae	Lutjanus mahogani	mahogany snapper	1993	250	142	290.9	2.5	2.5
Lutjanidae	Lutjanus mahogani	mahogany snapper	1994	250	104	290.6	3.2	3.2
Lutjanidae	Lutjanus mahogani	mahogany snapper	1995	250	65	287.3	2.5	2.6
Lutjanidae	Lutjanus mahogani	mahogany snapper	1996-98	250	48	291.7	7.0	7.2
Lutjanidae	Lutjanus mahogani	mahogany snapper	1999	250	48	299.2	8.0	8.2
Lutjanidae	Lutjanus mahogani	mahogany snapper	2000	250	46	302.6	9.7	10.0

Lutjanidae	Lutjanus mahogani	mahogany snapper	2001	250	39	285.6	6.8	6.9
Lutjanidae	Lutjanus mahogani	mahogany snapper	2002-03	250	59	318.3	8.4	8.7
Lutjanidae	Lutjanus mahogani	mahogany snapper	2004-06	250	55	328.2	7.3	7.5

Lane Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus synagris	lane snapper	1983	210	145	245.1	3.2	3.2
Lutjanidae	Lutjanus synagris	lane snapper	1984	210	892	245.0	1.1	1.1
Lutjanidae	Lutjanus synagris	lane snapper	1985	210	415	236.3	1.3	1.3
Lutjanidae	Lutjanus synagris	lane snapper	1986	210	1324	243.1	0.7	0.7
Lutjanidae	Lutjanus synagris	lane snapper	1987	210	571	239.6	1.1	1.2
Lutjanidae	Lutjanus synagris	lane snapper	1988	210	1011	247.1	0.9	0.9
Lutjanidae	Lutjanus synagris	lane snapper	1989	210	1912	249.8	0.7	0.7
Lutjanidae	Lutjanus synagris	lane snapper	1990	210	1598	245.9	0.7	0.7
Lutjanidae	Lutjanus synagris	lane snapper	1991	210	2459	247.2	0.6	0.6
Lutjanidae	Lutjanus synagris	lane snapper	1992	210	2431	248.4	0.6	0.6
Lutjanidae	Lutjanus synagris	lane snapper	1993	210	721	252.2	1.3	1.3
Lutjanidae	Lutjanus synagris	lane snapper	1994	210	474	244.6	1.3	1.3
Lutjanidae	Lutjanus synagris	lane snapper	1995	210	694	260.6	1.7	1.7
Lutjanidae	Lutjanus synagris	lane snapper	1996	210	174	248.7	2.7	2.8
Lutjanidae	Lutjanus synagris	lane snapper	1997	210	197	242.8	1.9	1.9
Lutjanidae	Lutjanus synagris	lane snapper	1998	210	461	248.6	1.4	1.4
Lutjanidae	Lutjanus synagris	lane snapper	1999	210	883	243.8	0.9	0.9
Lutjanidae	Lutjanus synagris	lane snapper	2000	210	494	255.4	1.4	1.4
Lutjanidae	Lutjanus synagris	lane snapper	2001	210	1304	262.1	1.1	1.1
Lutjanidae	Lutjanus synagris	lane snapper	2002	210	1346	254.9	0.9	0.9
Lutjanidae	Lutjanus synagris	lane snapper	2003	210	776	275.1	2.0	2.0
Lutjanidae	Lutjanus synagris	lane snapper	2004	210	1369	257.8	1.1	1.1
Lutjanidae	Lutjanus synagris	lane snapper	2005-06	210	918	260.7	1.4	1.4
Lutjanidae	Lutjanus synagris	lane snapper	2007	210	1208	265.0	1.1	1.1

Silk Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Lutjanus vivanus	silk snapper	1983	220	44	286.7	9.4	9.7
Lutjanidae	Lutjanus vivanus	silk snapper	1984	220	266	258.9	1.8	1.9
Lutjanidae	Lutjanus vivanus	silk snapper	1985	220	166	270.9	2.6	2.6
Lutjanidae	Lutjanus vivanus	silk snapper	1986	220	379	286.0	2.5	2.5
Lutjanidae	Lutjanus vivanus	silk snapper	1987	220	82	290.9	5.6	5.7
Lutjanidae	Lutjanus vivanus	silk snapper	1988	220	658	269.1	2.0	2.0
Lutjanidae	Lutjanus vivanus	silk snapper	1989	220	513	298.1	3.6	3.7
Lutjanidae	Lutjanus vivanus	silk snapper	1990	220	547	278.7	2.0	2.0
Lutjanidae	Lutjanus vivanus	silk snapper	1991	220	1684	273.4	1.2	1.2
Lutjanidae	Lutjanus vivanus	silk snapper	1992	220	649	265.6	1.4	1.5
Lutjanidae	Lutjanus vivanus	silk snapper	1993	220	456	275.2	2.1	2.1
Lutjanidae	Lutjanus vivanus	silk snapper	1994	220	561	270.2	1.6	1.6
Lutjanidae	Lutjanus vivanus	silk snapper	1995	220	279	274.8	2.5	2.5
Lutjanidae	Lutjanus vivanus	silk snapper	1996	220	295	268.8	2.4	2.4
Lutjanidae	Lutjanus vivanus	silk snapper	1997	220	164	276.0	3.4	3.4
Lutjanidae	Lutjanus vivanus	silk snapper	1998	220	399	274.7	2.3	2.3
Lutjanidae	Lutjanus vivanus	silk snapper	1999	220	732	284.9	2.0	2.0
Lutjanidae	Lutjanus vivanus	silk snapper	2000	220	1574	288.9	1.2	1.2
Lutjanidae	Lutjanus vivanus	silk snapper	2001	220	2451	284.2	1.1	1.1
Lutjanidae	Lutjanus vivanus	silk snapper	2002	220	1491	295.7	1.7	1.7
Lutjanidae	Lutjanus vivanus	silk snapper	2003	220	1897	315.6	1.6	1.6
Lutjanidae	Lutjanus vivanus	silk snapper	2004	220	2160	303.5	1.5	1.5
Lutjanidae	Lutjanus vivanus	silk snapper	2005	220	43	329.2	14.1	14.8
Lutjanidae	Lutjanus vivanus	silk snapper	2006	220	1228	339.9	2.2	2.2
Lutjanidae	Lutjanus vivanus	silk snapper	2007	220	975	335.4	2.4	2.4

Wenchman

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Pristipomoides aquilonaris	wenchman	1990	180	70	269.9	5.3	5.4
Lutjanidae	Pristipomoides aquilonaris	wenchman	1991	180	114	258.0	3.9	3.9

Lutjanidae	Pristipomoides aquilonaris	wenchman	1992	180	39	246.6	9.7	10.1
Lutjanidae	Pristipomoides aquilonaris	wenchman	1993-94	180	31	222.2	7.5	7.8
Lutjanidae	Pristipomoides aquilonaris	wenchman	1996-97	180	30	256.7	8.8	9.1
Lutjanidae	Pristipomoides aquilonaris	wenchman	1999-01	180	54	308.8	12.0	12.5
Lutjanidae	Pristipomoides aquilonaris	wenchman	2002-03	180	44	263.9	11.6	12.1
Lutjanidae	Pristipomoides aquilonaris	wenchman	2004	180	48	269.8	11.8	12.4
Lutjanidae	Pristipomoides aquilonaris	wenchman	2005-06	180	75	356.3	9.5	9.7
Lutjanidae	Pristipomoides aquilonaris	wenchman	2007	180	75	304.9	9.9	10.3

Vermilion Snapper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1983-84	200	175	212.9	1.3	1.3
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1985	200	97	218.0	1.7	1.7
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1986	200	1538	216.4	0.3	0.3
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1987	200	377	229.7	1.2	1.2
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1988	200	624	219.8	1.0	1.0
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1989	200	315	230.0	1.8	1.8
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1990	200	543	222.5	1.0	1.0
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1991	200	2465	219.1	0.4	0.4
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1992	200	1096	219.1	0.6	0.6
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1993	200	1124	218.4	0.5	0.5
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1994	200	419	219.2	0.9	0.9
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1995	200	68	219.5	2.2	2.3
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1996-97	200	74	235.9	3.2	3.2
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1998	200	145	220.9	1.3	1.4
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	1999	200	185	250.5	3.1	3.1
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2000	200	176	227.4	1.9	2.0
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2001	200	278	250.1	2.1	2.1
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2002	200	267	245.2	2.0	2.0
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2003	200	133	252.0	3.3	3.3
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2004	200	189	240.5	2.2	2.2
Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2005-06	200	107	263.2	4.3	4.3

Lutjanidae	Rhomboplites aurorubens	vermilion snapper	2007	200	160	266.3	3.9	3.9

Yellow Goatfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Mullidae	Mulloidichthys martinicus	yellow goatfish	1983	160	199	209.0	1.7	1.7
Mullidae	Mulloidichthys martinicus	yellow goatfish	1984	160	614	212.5	1.0	1.0
Mullidae	Mulloidichthys martinicus	yellow goatfish	1985	160	111	213.1	2.9	2.9
Mullidae	Mulloidichthys martinicus	yellow goatfish	1986	160	701	210.8	0.9	0.9
Mullidae	Mulloidichthys martinicus	yellow goatfish	1987	160	457	205.5	1.3	1.3
Mullidae	Mulloidichthys martinicus	yellow goatfish	1988	160	140	212.8	2.4	2.4
Mullidae	Mulloidichthys martinicus	yellow goatfish	1989	160	103	211.4	2.5	2.5
Mullidae	Mulloidichthys martinicus	yellow goatfish	1990	160	87	196.4	2.7	2.7
Mullidae	Mulloidichthys martinicus	yellow goatfish	1991	160	81	204.5	2.7	2.7
Mullidae	Mulloidichthys martinicus	yellow goatfish	1992	160	75	212.2	3.1	3.1
Mullidae	Mulloidichthys martinicus	yellow goatfish	1993	160	43	210.5	4.1	4.2
Mullidae	Mulloidichthys martinicus	yellow goatfish	1994	160	42	208.2	5.0	5.1
Mullidae	Mulloidichthys martinicus	yellow goatfish	1995-96	160	61	221.8	4.2	4.3
Mullidae	Mulloidichthys martinicus	yellow goatfish	1997-98	160	71	200.3	3.0	3.0
Mullidae	Mulloidichthys martinicus	yellow goatfish	1999-00	160	44	216.0	5.0	5.1
Mullidae	Mulloidichthys martinicus	yellow goatfish	2001	160	75	210.0	3.9	3.9
Mullidae	Mulloidichthys martinicus	yellow goatfish	2002	160	53	197.9	3.9	4.0
Mullidae	Mulloidichthys martinicus	yellow goatfish	2003	160	48	219.7	5.2	5.4
Mullidae	Mulloidichthys martinicus	yellow goatfish	2004-05	160	46	217.7	6.0	6.1
Mullidae	Mulloidichthys martinicus	yellow goatfish	2006-07	160	62	206.9	4.1	4.2

Spotted Goatfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Mullidae	Pseudupeneus maculatus	spotted goatfish	1983	150	480	198.2	0.9	1.0
Mullidae	Pseudupeneus maculatus	spotted goatfish	1984	150	2160	197.2	0.4	0.4
Mullidae	Pseudupeneus maculatus	spotted goatfish	1985	150	1260	189.6	0.6	0.6
Mullidae	Pseudupeneus maculatus	spotted goatfish	1986	150	2803	186.3	0.4	0.4
Mullidae	Pseudupeneus maculatus	spotted goatfish	1987	150	1330	189.4	0.5	0.5

Mullidae	Pseudupeneus maculatus	spotted goatfish	1988	150	474	189.0	1.0	1.0
Mullidae	Pseudupeneus maculatus	spotted goatfish	1989	150	611	184.7	0.8	0.8
Mullidae	Pseudupeneus maculatus	spotted goatfish	1990	150	428	181.9	0.9	1.0
Mullidae	Pseudupeneus maculatus	spotted goatfish	1991	150	215	191.7	1.5	1.5
Mullidae	Pseudupeneus maculatus	spotted goatfish	1992	150	177	193.9	1.7	1.7
Mullidae	Pseudupeneus maculatus	spotted goatfish	1993	150	264	189.4	1.2	1.2
Mullidae	Pseudupeneus maculatus	spotted goatfish	1994	150	232	175.4	1.2	1.2
Mullidae	Pseudupeneus maculatus	spotted goatfish	1995	150	65	186.3	3.4	3.5
Mullidae	Pseudupeneus maculatus	spotted goatfish	1996-97	150	78	182.9	2.3	2.4
Mullidae	Pseudupeneus maculatus	spotted goatfish	1998	150	339	167.2	1.0	1.0
Mullidae	Pseudupeneus maculatus	spotted goatfish	1999	150	229	166.3	1.1	1.1
Mullidae	Pseudupeneus maculatus	spotted goatfish	2000	150	259	173.8	0.9	0.9
Mullidae	Pseudupeneus maculatus	spotted goatfish	2001	150	141	180.4	1.8	1.8
Mullidae	Pseudupeneus maculatus	spotted goatfish	2002	150	92	182.9	2.7	2.8
Mullidae	Pseudupeneus maculatus	spotted goatfish	2003	150	114	177.6	1.9	2.0
Mullidae	Pseudupeneus maculatus	spotted goatfish	2004	150	186	186.6	1.2	1.2
Mullidae	Pseudupeneus maculatus	spotted goatfish	2005-06	150	269	178.4	1.2	1.2
Mullidae	Pseudupeneus maculatus	spotted goatfish	2007	150	121	178.2	1.7	1.7

Honeycomb Cowfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1983	200	42	238.8	4.6	4.7
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1984	200	243	246.8	2.1	2.2
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1985	200	169	245.7	2.6	2.7
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1986	200	193	241.9	2.2	2.2
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1987	200	123	242.8	3.4	3.4
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1988	200	74	228.8	3.5	3.5
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1989	200	49	244.3	5.3	5.4
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1990	200	86	237.0	3.3	3.4
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1991	200	65	242.8	3.8	3.9
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1992	200	62	262.0	6.2	6.3
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1993	200	91	238.3	3.9	4.0

Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1994	200	36	239.5	5.0	5.1
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1997-98	200	77	257.0	4.6	4.7
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	1999	200	45	254.7	5.6	5.8
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	2000	200	35	255.5	7.5	7.7
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	2001	200	35	242.0	5.1	5.3
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	2002-03	200	103	252.2	4.3	4.4
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	2004	200	97	254.4	3.9	3.9
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	2006	200	81	248.8	4.0	4.1
Ostraciidae	Acanthostracion polygonia	honeycomb cowfish	2007	200	33	262.6	7.7	7.9

Scrawled Cowfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1983	190	61	243.9	4.0	4.1
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1984	190	233	232.8	2.2	2.2
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1985	190	163	223.4	2.3	2.3
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1986	190	458	231.5	1.4	1.4
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1987	190	312	224.1	1.8	1.8
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1988	190	295	224.0	2.2	2.2
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1989	190	78	228.2	3.3	3.3
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1990	190	36	235.5	5.8	6.0
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1991	190	308	216.1	1.6	1.6
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1992	190	116	228.9	3.0	3.0
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1993	190	88	226.3	3.6	3.7
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1994	190	37	238.1	6.3	6.5
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1995	190	44	228.7	5.2	5.3
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1996-97	190	37	239.2	6.0	6.2
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1998	190	105	226.2	3.4	3.4
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	1999	190	64	235.7	4.8	4.8
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	2000-01	190	89	241.0	3.8	3.8
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	2002	190	48	251.9	7.2	7.4
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	2003	190	45	260.3	7.1	7.3
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	2004	190	85	261.5	4.8	4.8

Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	2006	190	136	239.7	3.0	3.1
Ostraciidae	Acanthostracion quadricornis	scrawled cowfish	2007	190	37	267.3	6.0	6.1

Spotted Trunkfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1983-84	150	74	197.3	4.0	4.1
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1985	150	93	194.3	3.2	3.3
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1986	150	227	204.5	2.7	2.7
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1987	150	84	191.4	4.1	4.2
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1988	150	78	202.4	4.2	4.3
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1989	150	43	201.7	6.4	6.6
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1990-91	150	116	202.1	3.5	3.6
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1992	150	43	209.1	8.3	8.7
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1993	150	40	192.9	6.2	6.4
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1996-98	150	73	215.8	5.7	5.8
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	1999-01	150	65	237.0	7.3	7.5
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	2002-03	150	34	229.8	7.9	8.1
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	2004	150	31	237.4	8.5	8.8
Ostraciidae	Lactophrys bicaudalis	spotted trunkfish	2005-07	150	76	249.0	6.0	6.1

Trunkfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Ostraciidae	Lactophrys trigonus	trunkfish	1983-85	280	51	319.3	4.1	4.2
Ostraciidae	Lactophrys trigonus	trunkfish	1986	280	154	334.0	2.3	2.3
Ostraciidae	Lactophrys trigonus	trunkfish	1987	280	32	336.9	5.6	5.6
Ostraciidae	Lactophrys trigonus	trunkfish	1988	280	33	351.7	7.2	7.4
Ostraciidae	Lactophrys trigonus	trunkfish	1991-92	280	69	354.0	4.4	4.5
Ostraciidae	Lactophrys trigonus	trunkfish	1999-01	280	52	365.9	6.5	6.6
Ostraciidae	Lactophrys trigonus	trunkfish	2002	280	48	367.9	7.1	7.3
Ostraciidae	Lactophrys trigonus	trunkfish	2003	280	118	355.8	4.2	4.3
Ostraciidae	Lactophrys trigonus	trunkfish	2004	280	61	356.5	4.7	4.8
Ostraciidae	Lactophrys trigonus	trunkfish	2005-07	280	381	359.4	2.1	2.1

Smooth Trunkfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1983-84	150	133	178.1	2.0	2.0
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1985	150	54	172.6	2.8	2.8
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1986	150	244	182.0	1.8	1.8
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1987	150	83	184.0	3.5	3.6
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1988	150	50	188.7	5.3	5.5
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1989-90	150	42	192.9	7.0	7.3
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1991	150	102	186.7	3.0	3.1
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1992	150	43	192.6	3.6	3.7
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1993	150	51	191.7	5.8	6.0
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1994-96	150	35	212.8	8.4	8.7
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1997-98	150	34	184.5	3.5	3.5
Ostraciidae	Lactophrys triqueter	smooth trunkfish	1999-01	150	48	199.7	6.2	6.4
Ostraciidae	Lactophrys triqueter	smooth trunkfish	2002-04	150	32	209.0	9.2	9.7
Ostraciidae	Lactophrys triqueter	smooth trunkfish	2005-07	150	67	196.0	3.0	3.0

Queen Angelfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Pomacanthidae	Holacanthus ciliaris	queen angelfish	1998-99	220	41	248.9	5.2	5.3
Pomacanthidae	Holacanthus ciliaris	queen angelfish	2000-01	220	45	253.3	5.3	5.4
Pomacanthidae	Holacanthus ciliaris	queen angelfish	2002	220	36	257.6	6.1	6.2
Pomacanthidae	Holacanthus ciliaris	queen angelfish	2003-04	220	39	264.8	7.0	7.2

Gray Angelfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Pomacanthidae	Pomacanthus arcuatus	gray angelfish	1999-01	210	47	278.2	6.2	6.3
Pomacanthidae	Pomacanthus arcuatus	gray angelfish	2002-03	210	30	311.4	11.2	11.6
Pomacanthidae	Pomacanthus arcuatus	gray angelfish	2004-06	210	55	298.8	8.5	8.8

Gray Angelfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Pomacanthidae	Pomacanthus arcuatus	gray angelfish	1999-01	210	47	278.2	6.2	6.3

Pomacanthidae	Pomacanthus arcuatus	gray angelfish	2002-03	210	30	311.4	11.2	11.6
Pomacanthidae	Pomacanthus arcuatus	gray angelfish	2004-06	210	55	298.8	8.5	8.8

Bigeye

family	latin	common	time	LC	n	lbar	lw_se	up_se
Priacanthidae	Priacanthus arenatus	bigeye	1991-92	220	66	297.5	6.4	6.6
Priacanthidae	Priacanthus arenatus	bigeye	1993-94	220	30	309.9	6.8	6.9

Princess Parrotfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Scaridae	Scarus taeniopterus	princess parrotfish	1986-87	240	46	266.4	3.2	3.2
Scaridae	Scarus taeniopterus	princess parrotfish	1988-89	240	62	258.9	2.7	2.7
Scaridae	Scarus taeniopterus	princess parrotfish	1990	240	43	260.6	3.8	3.9
Scaridae	Scarus taeniopterus	princess parrotfish	1991	240	80	265.4	2.2	2.3
Scaridae	Scarus taeniopterus	princess parrotfish	1992	240	65	260.5	2.4	2.4
Scaridae	Scarus taeniopterus	princess parrotfish	1993	240	39	268.0	3.3	3.3
Scaridae	Scarus taeniopterus	princess parrotfish	1994-95	240	35	286.1	5.5	5.6
Scaridae	Scarus taeniopterus	princess parrotfish	1998-99	240	44	264.5	2.7	2.8
Scaridae	Scarus taeniopterus	princess parrotfish	2000	240	107	258.5	1.3	1.3
Scaridae	Scarus taeniopterus	princess parrotfish	2001	240	224	257.7	0.9	0.9
Scaridae	Scarus taeniopterus	princess parrotfish	2002	240	86	263.6	1.7	1.7
Scaridae	Scarus taeniopterus	princess parrotfish	2003	240	34	273.9	2.5	2.5
Scaridae	Scarus taeniopterus	princess parrotfish	2004	240	67	262.1	1.8	1.8
Scaridae	Scarus taeniopterus	princess parrotfish	2005-07	240	93	268.6	1.7	1.7

Queen Parrotfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Scaridae	Scarus vetula	queen parrotfish	1986	250	40	285.9	6.8	7.0
Scaridae	Scarus vetula	queen parrotfish	1987-88	250	47	293.7	4.5	4.5
Scaridae	Scarus vetula	queen parrotfish	1989	250	33	305.5	5.8	5.9
Scaridae	Scarus vetula	queen parrotfish	1990	250	78	303.4	3.1	3.1
Scaridae	Scarus vetula	queen parrotfish	1991-92	250	78	295.3	3.1	3.1
Scaridae	Scarus vetula	queen parrotfish	1993	250	40	285.0	4.4	4.5

Scaridae	Scarus vetula	queen parrotfish	1997-98	250	33	292.3	5.3	5.4
Scaridae	Scarus vetula	queen parrotfish	1999	250	65	284.1	2.7	2.7
Scaridae	Scarus vetula	queen parrotfish	2000	250	78	293.1	3.5	3.6
Scaridae	Scarus vetula	queen parrotfish	2001	250	150	299.3	2.5	2.5
Scaridae	Scarus vetula	queen parrotfish	2002	250	88	301.0	3.1	3.1
Scaridae	Scarus vetula	queen parrotfish	2003	250	62	300.9	4.2	4.3
Scaridae	Scarus vetula	queen parrotfish	2004	250	117	295.6	2.4	2.5
Scaridae	Scarus vetula	queen parrotfish	2006-07	250	87	304.4	3.1	3.1

Redband Parrotfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1986	200	165	212.1	1.0	1.0
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1987	200	149	210.5	0.9	0.9
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1988	200	34	235.4	4.7	4.8
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1989	200	33	235.6	4.0	4.1
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1990	200	50	234.7	3.4	3.5
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1991	200	33	223.9	3.5	3.6
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1992-93	200	34	217.1	3.8	3.9
Scaridae	Sparisoma aurofrenatum	redband parrotfish	1999-01	200	32	240.7	5.9	6.0
Scaridae	Sparisoma aurofrenatum	redband parrotfish	2002	200	48	226.7	1.3	1.4
Scaridae	Sparisoma aurofrenatum	redband parrotfish	2003	200	36	239.0	4.7	4.8
Scaridae	Sparisoma aurofrenatum	redband parrotfish	2004	200	49	233.6	2.8	2.9
Scaridae	Sparisoma aurofrenatum	redband parrotfish	2005	200	37	231.0	3.0	3.1
Scaridae	Sparisoma aurofrenatum	redband parrotfish	2006-07	200	56	224.5	2.0	2.1

Redtail Parrotfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1986	240	263	271.8	1.4	1.5
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1987	240	327	269.4	1.1	1.1
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1988	240	374	270.7	1.2	1.2
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1989	240	467	268.4	1.0	1.0
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1990	240	557	268.5	0.7	0.8

Scaridae	Sparisoma chrysopterum	redtail parrotfish	1991	240	625	269.5	0.8	0.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1992	240	404	264.3	1.0	1.0
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1993	240	419	267.7	0.9	0.9
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1994	240	227	274.7	1.5	1.6
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1995	240	257	277.6	1.4	1.4
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1996	240	326	271.3	1.1	1.1
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1997	240	175	275.7	1.8	1.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1998	240	503	272.1	1.0	1.0
Scaridae	Sparisoma chrysopterum	redtail parrotfish	1999	240	811	274.5	0.8	0.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2000	240	789	277.1	0.8	0.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2001	240	860	276.4	0.8	0.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2002	240	1023	281.5	0.8	0.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2003	240	703	279.8	0.8	0.8
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2004	240	429	272.2	1.1	1.1
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2005-06	240	513	275.8	1.1	1.1
Scaridae	Sparisoma chrysopterum	redtail parrotfish	2007	240	108	288.0	3.1	3.1

Yellowtail Parrotfish

family	latin	common	time	LC	n	lbar	lw_se	up_se
Scaridae	Sparisoma rubripinne	yellowtail parrotfish	1999-00	220	49	263.4	4.7	4.8
Scaridae	Sparisoma rubripinne	yellowtail parrotfish	2001-03	220	63	268.5	5.4	5.5
Scaridae	Sparisoma rubripinne	yellowtail parrotfish	2004-06	220	64	282.4	5.1	5.2

Reef Croaker

family	latin	common	time	LC	n	lbar	lw_se	up_se
Sciaenidae	Odontoscion dentex	reef croaker	1998-99	200	296	272.4	4.9	5.0
Sciaenidae	Odontoscion dentex	reef croaker	2001	200	83	282.5	6.7	6.8
Sciaenidae	Odontoscion dentex	reef croaker	2002-03	200	67	304.2	9.4	9.7
Sciaenidae	Odontoscion dentex	reef croaker	2004	200	35	348.0	15.1	15.8
Sciaenidae	Odontoscion dentex	reef croaker	2006-07	200	38	321.5	7.0	7.2

Graysby

family	latin	common	time	LC	n	lbar	lw_se	up_se
Serranidae	Cephalopholis cruentata	graysby	1986	200	121	230.2	2.7	2.7
Serranidae	Cephalopholis cruentata	graysby	1987	200	134	224.4	1.8	1.9
Serranidae	Cephalopholis cruentata	graysby	1988	200	70	233.5	3.5	3.6
Serranidae	Cephalopholis cruentata	graysby	1989	200	109	234.1	3.7	3.8
Serranidae	Cephalopholis cruentata	graysby	1990	200	208	241.8	1.8	1.8
Serranidae	Cephalopholis cruentata	graysby	1991	200	219	249.8	2.4	2.4
Serranidae	Cephalopholis cruentata	graysby	1992	200	304	237.9	1.5	1.5
Serranidae	Cephalopholis cruentata	graysby	1993	200	178	242.9	2.4	2.4
Serranidae	Cephalopholis cruentata	graysby	1994	200	157	243.7	2.5	2.5
Serranidae	Cephalopholis cruentata	graysby	1995	200	54	256.0	4.5	4.6
Serranidae	Cephalopholis cruentata	graysby	1996-97	200	35	247.5	4.0	4.1
Serranidae	Cephalopholis cruentata	graysby	1998-99	200	34	253.0	7.6	7.9
Serranidae	Cephalopholis cruentata	graysby	2000-01	200	106	234.2	2.7	2.8
Serranidae	Cephalopholis cruentata	graysby	2002-03	200	55	229.7	3.2	3.2
Serranidae	Cephalopholis cruentata	graysby	2004	200	40	237.5	4.3	4.4
Serranidae	Cephalopholis cruentata	graysby	2005-07	200	51	263.0	5.4	5.5

Coney

family	latin	common	time	LC	n	lbar	lw_se	up_se
Serranidae	Cephalopholis fulva	coney	1983	220	455	245.9	1.1	1.1
Serranidae	Cephalopholis fulva	coney	1984	220	1148	243.1	0.6	0.6
Serranidae	Cephalopholis fulva	coney	1985	220	576	248.5	1.0	1.0
Serranidae	Cephalopholis fulva	coney	1986	220	2177	241.5	0.4	0.4
Serranidae	Cephalopholis fulva	coney	1987	220	1037	240.1	0.6	0.6
Serranidae	Cephalopholis fulva	coney	1988	220	525	245.5	1.0	1.0
Serranidae	Cephalopholis fulva	coney	1989	220	397	247.5	1.3	1.3
Serranidae	Cephalopholis fulva	coney	1990	220	187	245.2	1.6	1.6
Serranidae	Cephalopholis fulva	coney	1991	220	1194	246.9	0.7	0.7
Serranidae	Cephalopholis fulva	coney	1992	220	1542	246.4	0.6	0.6
Serranidae	Cephalopholis fulva	coney	1993	220	1210	245.5	0.6	0.6

Serranidae	Cephalopholis fulva	coney	1994	220	461	244.6	1.0	1.0
Serranidae	Cephalopholis fulva	coney	1995	220	187	254.5	1.9	1.9
Serranidae	Cephalopholis fulva	coney	1996	220	98	254.9	2.5	2.6
Serranidae	Cephalopholis fulva	coney	1997	220	71	253.2	2.9	3.0
Serranidae	Cephalopholis fulva	coney	1998	220	221	254.5	1.7	1.7
Serranidae	Cephalopholis fulva	coney	1999	220	221	254.6	2.0	2.0
Serranidae	Cephalopholis fulva	coney	2000	220	213	250.2	1.9	1.9
Serranidae	Cephalopholis fulva	coney	2001	220	468	253.3	1.1	1.1
Serranidae	Cephalopholis fulva	coney	2002	220	287	253.3	1.5	1.6
Serranidae	Cephalopholis fulva	coney	2003	220	376	249.8	1.4	1.4
Serranidae	Cephalopholis fulva	coney	2004	220	322	254.2	1.4	1.4
Serranidae	Cephalopholis fulva	coney	2005	220	44	248.9	4.8	4.9
Serranidae	Cephalopholis fulva	coney	2006	220	70	255.2	3.0	3.0
Serranidae	Cephalopholis fulva	coney	2007	220	38	253.1	4.3	4.4

Rock Hind

family	latin	common	time	LC	n	lbar	lw_se	up_se
Serranidae	Epinephelus adscensionis	rock hind	1986-88	290	123	379.3	4.9	5.0
Serranidae	Epinephelus adscensionis	rock hind	1989	290	80	375.9	6.8	7.0
Serranidae	Epinephelus adscensionis	rock hind	1990-91	290	74	384.7	7.2	7.3

Nassau Grouper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Serranidae	Epinephelus striatus	Nassau grouper	1983	350	63	390.8	3.4	3.5
Serranidae	Epinephelus striatus	Nassau grouper	1984	350	114	391.3	2.6	2.7
Serranidae	Epinephelus striatus	Nassau grouper	1985-86	350	38	389.3	4.8	4.8
Serranidae	Epinephelus striatus	Nassau grouper	1987-19	350	37	387.8	5.1	5.2
Serranidae	Epinephelus striatus	Nassau grouper	1989-90	350	37	395.9	5.1	5.1
Serranidae	Epinephelus striatus	Nassau grouper	1991-92	350	63	477.1	8.6	8.8
Serranidae	Epinephelus striatus	Nassau grouper	1999-01	350	40	434.4	11.2	11.5

Tiger Grouper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Serranidae	Mycteroperca tigris	tiger grouper	1989-91	460	61	546.6	8.9	9.0
Serranidae	Mycteroperca tigris	tiger grouper	1994	460	35	502.8	6.5	6.6
Serranidae	Mycteroperca tigris	tiger grouper	1995	460	838	521.1	1.4	1.4
Serranidae	Mycteroperca tigris	tiger grouper	1996	460	598	521.6	1.6	1.6
Serranidae	Mycteroperca tigris	tiger grouper	1997	460	400	526.2	2.0	2.1
Serranidae	Mycteroperca tigris	tiger grouper	1998	460	445	538.3	2.1	2.1
Serranidae	Mycteroperca tigris	tiger grouper	1999	460	55	539.3	8.0	8.1
Serranidae	Mycteroperca tigris	tiger grouper	2000-01	460	42	534.2	11.5	11.7
Serranidae	Mycteroperca tigris	tiger grouper	2002-04	460	107	548.9	6.2	6.3

Yellowfin Grouper

family	latin	common	time	LC	n	lbar	lw_se	up_se
Serranidae	Mycteroperca venenosa	yellowfin grouper	1983-85	360	37	519.0	13.1	13.4
Serranidae	Mycteroperca venenosa	yellowfin grouper	1986-88	360	36	507.2	21.5	22.4
Serranidae	Mycteroperca venenosa	yellowfin grouper	1989-91	360	33	510.0	17.8	18.4
Serranidae	Mycteroperca venenosa	yellowfin grouper	1998-00	360	52	567.5	22.5	23.4

Appendix D: MAST Model Description & User's Guide

MANUAL FOR MORTALITY ASSESSMENT AND STOCK SIMULATION TOOL (MAST)

Version 1.0 - August 20th, 2011
Authors: Marc Nadon, Nathan Vaughan, Jerry Ault
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INTRODUCTION

MASTaggregates all analytical tools necessary for the management of exploited fish populations based on length mortality estimates and presents these in a user-friendly visual interface. MAST is coded in JAVA 7.It is composed of 3 general sections: 1) length-based mortality estimation, 2) theoretical models to find optimal fishing regulations, and 3) exploited population simulator. It will also soon have the capability of running stochastic processes through Monte Carlo simulation in order to evaluate uncertainty and risk associated with management scenarios.

Mortality, maturation, and growth-rates are density-independent (on the recruited population).Recruitment can be either density-independent or -dependent (through a stock-recruitment relationship).

The user interface and mortality estimators were coded by N. Vaughan while the population dynamics models and simulation toolwere mainly coded by M. Nadon, all under the supervision and guidance of Dr. Jerry Ault.

1 -GENERAL INFORMATION

TIMING

All time step computations in MAST are in days (i.e. fish ages and simulated times). All yearly parameters (e.g. K, M, etc.) are automatically converted into daily parameters by dividing by 365 (or other conversion steps). Parameters related to transitional management scenarios (e.g. transitional fishing mortality or minimum size-at-first-capture) are also converted into daily time steps. The daily time steps allow for great flexibility in the specification of maturity, recruitment, and mortality temporal patterns (e.g. seasonal closure, periodic recruitment). However, MAST only currently allows inputs in yearly increments (this will be changed in future versions).

MORTALITY

Fish cohorts enter all computational matrices at settlement (i.e. transition from pelagic larvae to bottom- or reef-associated fish). The number of recruits can either be specified through a stock-

recruitment relationship or can be fixed at a specific value (see *recruitment* section below). Once the initial number of recruits is specified, MASTcalculates initial number in each daily age group using an exponential mortality formula:

$$N_{t+1} = N_t \cdot e^{-(M+F_t)}$$

Thesestarting N values can be converted toaverage numbers, when needed,using the following equation:

$$\overline{N_t} = \frac{N_t}{M+F} \times (1 - e^{-(M+F_t)})$$

Natural mortality rates are either specified by the user or are derived from estimates of longevity using either a rule-of-thumbs approach that assumes that 1% or 5% of population numbers are left at maximum. This translates into the following general equation:

$$M = \frac{-\ln(S)}{t_\lambda}$$

where S is the survivorship to age t_λ (0.01 or 0.05). A 5% survivorship is a more conservative estimate of natural mortality and is set as the default in MAST.

Fishing mortality *F*is obtained by multiplying the *potential* fishing mortality rate (i.e. the instantaneous mortality coefficient of a fully available age group, which is provided by users) by the gear selectivity *S* which represents the fraction of an age group that is vulnerable to fishing.

$$F_t = q \cdot f \cdot S_t$$

Where q is the catchability coefficient (i.e. proportion of stock caught by a single unit of fishing effort), f is the fishing effort, and S is selectivity at age *t*.Fishing mortalities below minimum age-at-first-capture and above maximum observed-age (i.e. t_λ) are automatically set to zero (knife-edge selection if selectivity is set to 1 for all age groups).

GROWTH

MAST currently only has the option of using the Von Bertalanffy growth equation to determine length-at-age.

$$L_t = L_\infty(1 - e^{-K(t-t_0)})$$

Weight-at-age (W_t) is obtained from converting lengths into weights using the equation:

$$W_t = A \cdot L_t^B$$

Important: it is critical to use the proper A and B coefficient for specific length and weight units. Most published A and B values convert length in **cm** into weight in **grams**. MAST will convert those weights into kilograms by dividing by 1000 (all weight, biomass outputs are in kg). We therefore highly recommend inputting all length information in cm (e.g. L_{inf}, L_c, L_{max}, etc.). It is possible to input length information in other units (e.g. mm) if the proper A and B coefficient are used (i.e. those that will output weight in grams).

It is also critical to use the same measurement of fish length for all inputted data (e.g. fork, standard, or total length).

MATURITY

Users can enter either age- or size-at-maturity (MAST will automatically convert one to the other). Maturity is currently set to be knife-edged (i.e. 100% of a cohort reaches maturity at a specific age or size). A logistic curve may be available in future versions, if the need arises.

RECRUITMENT

For simplicity, recruitment levels are often set at a fix value and assumed to be density-independent, especially if spawning stock biomass is known to be at a safe level (SPR > 30%).Alternatively, recruitment can be dependent on spawning stock biomass (SSB).Current recruitment (R_t) is generally assume to be a function of the spawning stock biomass (SSB) at a certain time in the past equivalent to hatching time + pelagic larval stage duration (d).

$$R_t = SSB_{t-d} \cdot f(SSB_{t-d})$$

The Beverton-Holt version of this general equation (Ricker's equation will be available soon) is:

$$R = \frac{SSB}{\alpha + \beta \cdot SSB}$$

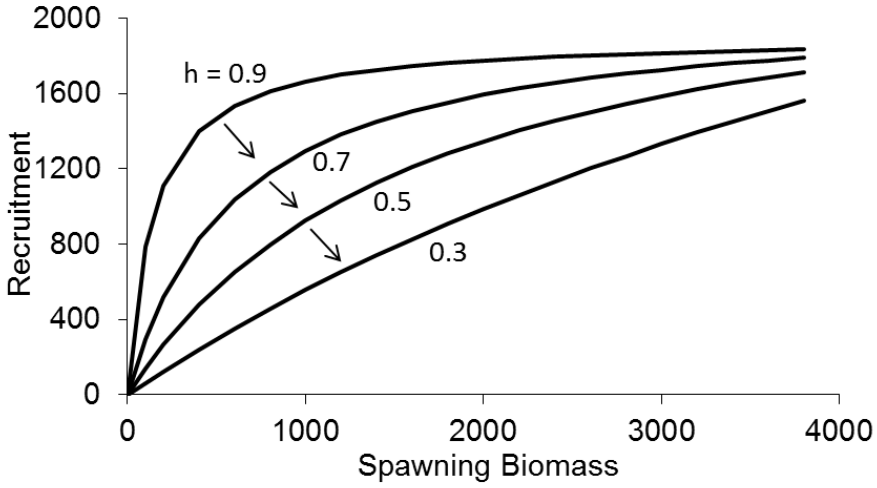
Using Francis (1992)'s re-parameterization,the two parameters of this equation can be defined as

$$\alpha = \frac{B_0(1-h)}{4hR_0} \quad \text{and} \quad \beta = \frac{5h-1}{4hR_0}$$

whereB_0 is an estimate of pristine spawning stock biomass, R_0 is number of recruits at B_0,*h*is the steepness of the initial stock-recruitment curve (i.e. fraction of R_0 corresponding to spawning stock biomass at 20% B_0). To use this stock-recruitment relationship, users need to define both B_0 and *h*. They also need to input the larval duration in days (i.e. time between spawning event and settlement).

Spawning schedule is currently set to be continuous throughout the year, but extra functionality will be added later, with the capability to define recruitment seasonality more precisely.

Below are examples of Beverton-Holt stock-recruitment curves with varying steepness *h*.



2 - LENGTH-BASED MORTALITY ESTIMATION

BEVERTON-HOLT MODEL

Beverton and Holt (1954) were the first to derive an equation relating average length in the catch (Lbar) to total mortality (Z).

$$\overline{L} = \frac{\int_{t_c}^{t_\infty} F_t \cdot L_t \cdot N_t \cdot dt}{\int_{t_c}^{t_\infty} F_t \cdot N_t \cdot dt} \quad \rightarrow \quad Z = \frac{K \cdot (L_\infty - \overline{L})}{(\overline{L} - L_c)}$$

However, Ehrhardt and Ault (1992) found this model to be biased because of the integration to infinite age (i.e. influenced by theoretical, very old, fish that are never present in catch records). This model is not available in MAST due to this problem.

AULT-EHRHARDT MODEL

Ault and Ehrhardt (1991) proposed a truncated version of the Beverton-Holt model that sets a realistic upper limit for maximum lengths (L_{max} or L_λ). As such, this model takes an extra parameter (t_λ or L_λ).

$$\overline{L} = \frac{\int_{t_c}^{t_\lambda} F_t \cdot L_t \cdot N_t \cdot dt}{\int_{t_c}^{t_\lambda} F_t \cdot N_t \cdot dt} \quad \rightarrow \left(\frac{L_\infty - L_\lambda}{L_\infty - L_c}\right)^{Z/k} = \frac{Z\left(L_c - \overline{L}\right) + K(L_\infty - \overline{L})}{Z\left(L_\lambda - \overline{L}\right) + K(L_\infty - \overline{L})}$$

This model does not have the same bias as the Beverton-Holt model, but, as with the B-H model, it does assume equilibrium conditions (i.e. stable recruitment and mortalities during a time period long enough for stock age structure to be stable).

VAUGHAN-AULT MODEL

An improved model is currently under development that will be able to deal with non-equilibrium mortality conditions. This model will merge the size-truncated model of Ehrhardt and Ault (1992) with the non-equilibrium model develop by Gedemke-Hoenig (which is based on the Beverton-Holt model and thus suffers from the same potential bias). This tool is not currently available in MAST 1.0.

3 - THEORETICAL MODELS USED TO ESTIMATE OPTIMAL MANAGEMENT REGULATIONS

Once current fishing mortality rates are estimated, it is possible to parameterize various models in order to estimate current stock status and preferable management targets. If recruitment is set at a fix level, users can run yield-per-recruit (YPR) and spawning potential ratio (SPR) analyses. If a stock-recruitment function is defined, users can run models in terms of absolute yield, which take the effect of reduced spawning stock biomass on recruitment (and yield) into account. These models all assume that a population has reached equilibrium.

YIELD-PER-RECRUIT

MAST calculates YPR in "piece-wise" fashion by applying the mortality equations defined above to a fixed number of recruits (e.g. 1000) all the way to maximum age (t_λ), using daily increments. YPR is calculated at each daily age by multiplying average biomass by fishing mortality F, summing all daily yields, and dividing by the original number of recruits.

$$YPR = \frac{1}{Recruits} \sum_{t=0}^{t_\lambda} F_t \cdot \overline{N}_t \cdot \overline{W}_t \cdot$$

YPR is calculated for a large number of combinations of length-at-first-capture (L_c) and fishing mortality rates (F). Specifically, YPRsare calculated from L_c = 1 cm to L_{max} in L_{max}/100 increments, and from F = 0 to 2.5 in increments of 0.025. The YPRs for all these combinations are exported from MAST and can be plotted in Excel or other software (see examples at the end of this section).

SPR

MAST calculates spawning potential ratio (SPR) in a similar way as for YPR. Biomass is calculated at each daily age and spawning stock biomass is simply the sum of all biomass above the age at maturity.Spawning stock biomass is calculated as

$$SSB = \sum_{t=t_m}^{t_\lambda} \overline{N}_t \cdot \overline{W}_t$$

whereW_t is the average weight-at-age. Spawning stock biomass is calculatedat pristine levels (B_0) and under various management scenarios (L_c, F), similarly to YPR. SPR is then calculated for different levels of L_c and F by dividing spawning stock biomass under exploitation by pristine spawning stock biomass.

$$SPR = \frac{SSB_F}{SSB_{F=0}}$$

SPR isopleth graphs can be produced from the MAST output, similarly to YPR isopleth (see example below).

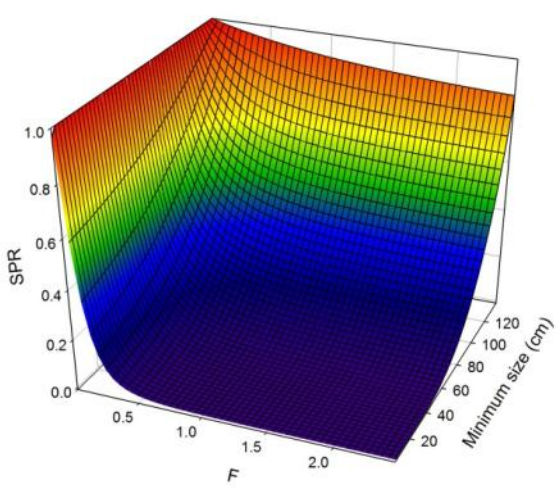
ABSOLUTE YIELD WITH VARIABLE RECRUITMENT

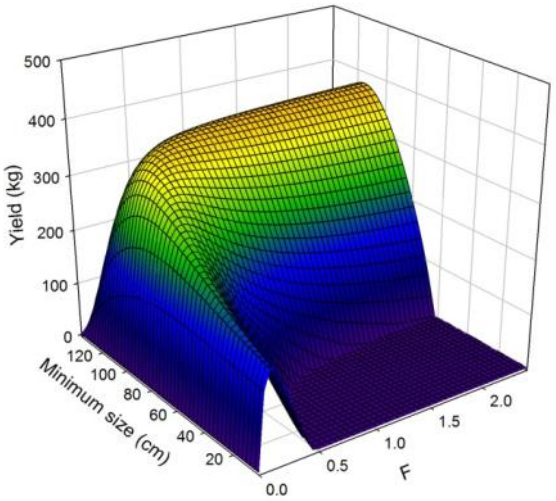
If a recruitment function is defined, yield can be calculated in absolute terms. MAST first calculates the number of recruits entering the population under equilibrium conditions (i.e. for specific L_c and F values). The following equation is used

$$R_e = \frac{SSB_e - \alpha}{\beta \times SSB_e}$$

whereα and β are parameters of the Beverton-Holt stock-recruitment equation. From the equilibrium recruitment level, the structure of the population at equilibrium is derived from which absolute yield can be calculated.As for YPR and SPR, absolute yield is calculated for various combinations of L_c and F and can be plotted in Excel.

Below are examples of SPR (left) and absolute yield (right) graphs created in SigmaPlot.





4 - EXPLOITED POPULATION SIMULATION

MAST includes population simulation capabilities which allow users to track Lbar, yield, or SPR forward through time in daily time steps according to various management scenarios (i.e. L_c and/or F changing at various times). To use this tool, users need to provide vectors of expected 'future' yearly changes in F and L_c.

The simulation can be run with fixed recruitment, set at a specified level. It can also be run with a stock-recruitment function after specifying pristine spawning stock biomass (B_0),steepness (h), and pelagic larvae duration.

Note: MAST is capable of running population simulations forward through time for a (theoretically) unlimited number of daily time steps, given some basic computer memory capacity (i.e. at least 256 mb). MAST determines available memory to JAVA and divides the simulation task in manageable blocks. The more memory a computer has, the larger the time blocks and the faster the simulation will run through completion.

Below is an example of a MASTsimulation output based on Mutton snapper life history (L_c = 300 mm).