

SEDAR

Southeast Data, Assessment, and Review

Data Report of SEDAR 4,
Atlantic and Caribbean Deepwater Snapper-Grouper,
Caribbean Species

SEDAR4-SAR2

Caribbean Deepwater Snapper-Grouper Data Report

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SEDAR 4. South Atlantic and Caribbean Deepwater Snapper-Grouper Workshop Terms of Reference

I. Terms of Reference for the Data Workshop.

1. Evaluate stock structure and develop a unit stock definition.
2. Evaluate the quality and reliability of life-history information (Age, growth, natural mortality, reproductive characteristics); develop models to describe growth, maturation, and fecundity by age, sex, or length as appropriate.
3. Evaluate the quality and reliability of fishery-independent measures of abundance; develop indices by appropriate strata (e.g., age, size, and fishery) for use in assessment modeling.
4. Evaluate the quality and reliability of fishery-dependent measures of abundance; develop indices for use in assessment modeling.
5. Evaluate the adequacy of the NMFS logbook data as a fishery-dependent measure of effort and catch rates; develop indices of abundance for use in assessment modeling.
6. Evaluate the quality and reliability of commercial and recreational fishery-dependent data for determining harvest and discard by species; develop estimates of total annual catch including both landings and discard removals by species.
7. Evaluate the quality and reliability of data available for characterizing the size and age distribution of the catch (landings and discard); characterize commercial, recreational, and headboat landings and discard by size and age.
8. Evaluate the quality and reliability of available data for estimating the impacts of management actions.
9. Recommend assessment methods and models that are appropriate given the quality and scope of the data sets reviewed and management requirements.
10. If data are not adequate for assessment modeling of each species listed in the complex, evaluate the feasibility of (1) using specific members of the stock complex as indicator species, or (2) using other metrics to evaluate stock status.
11. Provide recommendations for future research (research, sampling, monitoring, and assessment).
12. Prepare complete documentation of workshop actions and decisions, and generate introductory, descriptive, and research needs sections (1-4, 9) of the stock assessment report.

Data Workshop Working Paper List

#	Title	Author
SEDAR4-DW-01	Indices of Abundance from Commercial Logbook Data: South Atlantic stocks	Shertzer, K.; McCarthy, K.
SEDAR4-DW-02	MRFSS Landings and Length Data Summary for the South Atlantic	Vaughan, D. S.
SEDAR4-DW-03	General Canvass Landings Statistics for the South Atlantic Region	Poffenberger, J.
SEDAR4-DW-04	Summary information on commercial fishing operations in Puerto Rico from 1969-2001 and reporting rates needed to adjust commercial landings.	Cummings, N. Matos-Caraballo, D.
SEDAR4-DW-05	Summarized reported commercial landings in Puerto Rico from 1969-2001 with specific notes on the silk snapper landing category.	Cummings, N. Matos-Caraballo, D.
SEDAR4-DW-06	Not used	
SEDAR4-DW-07	Information on the general biology of silk and queen snapper in the Caribbean.	Cummings, N
SEDAR4-DW-08	Preliminary Estimation of Reported Landings, Expansion Factors and Expanded Landings for the Commercial Fisheries of the United States Virgin Islands.	Valle-Esquivel, M. Diaz, G. A.
SEDAR4-DW-09	Preliminary species composition estimates of TIP samples from commercial landings in the U.S. Virgin Islands.	Diaz, G. A. ; Valle-Esquivel, M.
SEDAR4-DW-10	Standardized Catch Rates of Silk Snapper, <i>Lutjanus vivanus</i> , from the St. Croix U.S. Virgin Islands Handline Fishery during 1984 - 1997.	Cass-Calay, S.L.; Valle-Esquivel, M.
SEDAR4-DW-11	Standardized Catch Rates of Queen Snapper, <i>Etelis oculatus</i> , from the St. Croix U.S. Virgin Islands Handline Fishery during 1984 - 1997	Cass-Calay, S.L.; Valle-Esquivel, M.
SEDAR4-DW-12	Discard Estimates for the South Atlantic Region.	Poffenberger, J.
SEDAR4-DW-13	Size Frequency Data from the Trip Interview Program, South Atlantic Region	Poffenberger, J.
SEDAR4-DW-14	Size frequency distributions of silk snapper and queen snapper from dockside sampling of commercial landings in the U.S. VI	Diaz, G. A.; Valle-Esquivel, M.
SEDAR4-DW-15	Preliminary information on the recreational catch of silk, queen, and blackfin snapper, from 2000 through 2002 in Puerto Rico with additional notes on sand tilefish	Cummings, N.; Slater, B.; Turner, S.
SEDAR4-DW-16	Preliminary analysis of some deepwater species in the South Atlantic headboat survey data.	Williams, E.; Dixon, B.
SEDAR4-DW-17	Age, growth and reproductive biology of the blueline tilefish, <i>Caulolatilus microps</i> , along the southeastern coast of the United States, 1982-99.	Harris, P. J.; Wyanski, D.M.; Powers, P.T.
SEDAR4-DW-18	Age, growth and reproduction of tilefish, <i>Lopholatilus chamaeleonticeps</i> , along the southeast Atlantic coast of the United States, 1980-87 and 1996-98.	Palmer, S.M.; Harris, P.J.; Powers, P. T.
SEDAR4-DW-19	Deep-water species report. South Carolina and Georgia.	Low, B.
SEDAR4-DW-20	South Atlantic Snapper-Grouper Regulatory Overview	Carmichael, J.
SEDAR4-DW-21	Summary of MARMAP sampling	Anon.
SEDAR4-DW-22	Blueline tilefish life history; How to assess reef fish stocks: Excerpts from NMFS-SEFC-80	various
SEDAR4-DW-23	Preliminary size frequency information for silk, queen, and blackfin snapper from the Puerto Rico commercial fisheries from 1985 through 2002 with additional notes on sand tilefish	Cummings, N.J. Phares, P
SEDAR4-DW-24	Brief summary of SEAMAP data collected in the Caribbean Sea from 1975 to 2002	Ingram, W.
SEDAR4-DW-25	Yellowedge Grouper age-length key	Bullock & Godcharles
SEDAR4-DW-26	Estimating catches and fishing effort of the southeast united states headboat fleet, 1972-1982	Dixon & Huntsman
SEDAR4-DW-27	Trends in Catch Data and Estimated Static SPR Values for Fifteen Species of Reef Fish Landed along the Southeastern United States,	Potts, Burton & Manooch

	February 1998.	
SEDAR4-DW-28	Trends in Catch Data and Estimated Static SPR Values for Fifteen Species of Reef Fish Landed along the Southeastern United States, February 2001.	Potts & Brennan
SEDAR4-DW-29	Description of the Southeast Fisheries Science Center Logbook Program for Coastal Fisheries	Poffenberger, J.

SEDAR4 Data Workshop

Location: Hampton Inn West Ashley, Charleston SC
Dates: November 3 – 7, 2003

Caribbean Team:

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SEDAR Stock Assessment Report Outline
Modified for SEDAR4 Caribbean-Atlantic Deepwater Snapper-Grouper
November 3-7, 2003

Section II. Caribbean Species

1. Caribbean Overview

Six scientists from the NOAA, NMFS Fisheries in Florida concentrated on the feasibility of using various fisheries biostatistical data sets for developing information for use in stock assessments of Caribbean deep water species. Only two members of the group had a general knowledge of the species, the fisheries and the data collection programs in the Caribbean and this resulted in multiple questions about utility of the data for assessments. In addition there were numerous other questions regarding specific data sets that could not be answered as the meeting was not attended by any member scientist of the U.S. Virgin Islands or Puerto Rico fisheries agencies.

It was noted that several of the working documents, which were prepared for the meeting, especially those related to the Puerto Rican fisheries, were developed in consultation with scientists familiar with the fisheries.

Because of the uncertainty about some components of the data, the workshop participants chose to provide broad summaries of the information available on the U.S. Caribbean fisheries, to identify the primary areas where further research is needed, to consider and determine which available information sets could be useful for developing future stock assessments, and to identify any additional data sets not available or considered at this workshop which could be informative in evaluating the status or the condition of these species.

2. Introduction

2.1. Management Unit Definition

Each fishery management plan (FMP) defines the management unit—the species or species complexes that are relevant to the FMP's objective. Currently, the Caribbean Reef Fish FMP includes virtually all finfish that are known or believed to be captured by commercial, recreational, and/or subsistence fishers in the U.S. Caribbean. A draft proposed amendment to this FMP would organize the management unit into species complexes (CFMC, 2003). The current preferred alternative would group silk and blackfin snapper along with black snapper, vermilion snapper, and uncategorized snappers into snapper unit 1. Queen snapper would be grouped with wenchman in snapper unit 2, and sand tilefish would be grouped with blackline and uncategorized tilefish in the tilefish species complex.

2.2. Regulatory History

Fisheries in the U.S. Caribbean are managed by three different government authorities. Federal waters extend from 3 to the lesser of 200 nm or an international border off the U.S. Virgin Islands; and 9 to the lesser of 200 nm or an international border off Puerto Rico. These are

managed through fishery management plans developed by the Caribbean Fishery Management Council and approved by Secretary of Commerce, with guidance from the National Marine Fisheries Service (NMFS, NOAA Fisheries). Inshore, fishing activity is managed by the Commonwealth of Puerto Rico and the territory of the U.S. Virgin Islands. These multiple jurisdictions complicate management, especially because many species use inshore and offshore habitats in different life history stages.

2.2.1 Federal Fisheries Management

The Caribbean Council manages 179 fish stocks under four FMPs:

- Fishery Management Plan for the Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands
- Fishery Management Plan for the Queen Conch Resources of Puerto Rico and the U.S. Virgin Islands
- Fishery Management Plan for the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands
- Fishery Management Plan for the Corals and Reef Associated Invertebrates of Puerto Rico and the U.S. Virgin Islands

The history of management measures developed and implemented under each FMP is detailed in the following sections.

- i. Fishery Management Plan for the Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands .

The Caribbean Council's Spiny Lobster FMP (CFMC 1981; 49 FR 50049) was implemented in January 1985, and was supported by an EIS. The FMP defined the Caribbean spiny lobster fishery management unit to include *Panulirus argus* (Caribbean spiny lobster), described objectives for the spiny lobster fishery, and established management measures to achieve those objectives. Primary management measures included:

- The definition of MSY as 830,000 lbs per year;
- The definition of OY as "all the non-[egg-bearing] spiny lobsters in the management area having a carapace length of 3.5 inches or greater that can be harvested on an annual basis," which was estimated to range from 582,000 to 830,000 lbs per year;
- A prohibition on the retention of egg-bearing (berried) lobsters (berried female lobsters may be kept in pots or traps until the eggs are shed), and on all lobsters with a carapace length of less than 3.5 inches;
- A requirement to land lobster whole;
- A requirement to include a self-destruct panel and/or self-destruct door fastenings on traps and pots;
- A requirement to identify and mark traps, pots, buoys, and boats; and

- A prohibition on the use of poisons, drugs, or other chemicals, and on the use of spears, hooks, explosives, or similar devices to take spiny lobsters.

Amendment 1 to the Spiny Lobster FMP (CFMC 1990a; 56 FR 19098), implemented in May 1991, added to the FMP definitions of overfished and overfishing, and outlined framework actions that could be taken should overfishing occur. The amendment defined "overfished" as a biomass level below 20% of the spawning potential ratio (SPR). It defined "overfishing" as a harvest rate that is not consistent with a program implemented to rebuild the stock to the 20% SPR. That amendment was supported by an Environmental Assessment (EA) and a finding of no significant impact (FONSI).

ii. Fishery Management Plan for the Queen Conch Resources of Puerto Rico and the U.S. Virgin Islands

The Caribbean Council's Queen Conch FMP (CFMC 1996a; 61 FR 65481) was implemented in January 1997, and was supported by an EIS.

The FMP defined the queen conch fishery management unit, described objectives for the queen conch fishery, and established management measures to achieve those objectives. Primary management measures included:

- The definition of the MSY of queen conch as 738,000 lbs per year;
- The definition of the OY of queen conch as "all queen conch commercially and recreationally harvested from the EEZ landed consistent with management measure set forth in this FMP under a goal of allowing 20% of the spawning stock biomass to remain intact;
- A prohibition on the possession of queen conch that measure less than 9 inches total length or that have a shell lip thickness of less than 3/8 inches;
- A requirement that all conch species in the fishery management unit be landed in the shell;
- A prohibition on the sale of undersized queen conch and queen conch shells;
- A recreational bag limit of three queen conch per day, not to exceed 12 per boat;
- A commercial catch limit of 150 queen conch per day;
- An annual spawning season closure that extends from 1 July through 30 September; and
- A prohibition on the use of hookah gear to harvest queen conch.

iii. Fishery Management Plan for the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands

The Caribbean Council's Reef Fish FMP (CFMC 1985; 50 FR 34850) was implemented in September 1985. The FMP, which was supported by an EIS, defined the reef fish fishery

management unit to include shallow water species only, described objectives for the shallow water reef fish fishery, and established management measures to achieve those objectives. Primary management measures included:

- The definition of MSY as equal to 7.7 million lbs;
- The definition of OY as "all of the fishes in the management unit that can be harvested by U.S. fishermen under the provisions of the FMP...This amount is currently estimated at 7.7 million lbs;"
- The specification of criteria for the construction of fish traps, which included a minimum 1 1/4-inch mesh size requirement and a requirement that fish traps contain a self-destruct panel and/or self-destruct door fastening;
- A requirement to identify and mark gear and boats;
- A prohibition on the use of poisons, drugs, and other chemicals and explosives to take reef fish;
- A prohibition on the take of yellowtail snapper that measure less than 8 inches total length for the first fishing year, to be increased one inch per year until the minimum size limit reached 12 inches;
- A prohibition on the take of Nassau grouper that measure less than 12 inches total length for the first fishing year, to be increased one inch per year until the minimum size limit reached 24 inches; and
- A prohibition on the take of Nassau grouper from 1 January to 31 March each year, a period that coincides with the spawning season of this species.

Amendment 1 to the Reef fish FMP (CFMC 1990b; 55 FR 46214) was implemented in December 1990. That amendment was supported by an EA. Primary management measures included:

- An increase in the minimum mesh size for traps to 2 inches;
- A prohibition on the take or possession of Nassau grouper; and
- A prohibition on fishing in an area southwest of St. Thomas, USVI from 1 December through 28 February of each year, a period that coincides with the spawning season for red hind (this seasonal closure would later become a year-round closure with the implementation of the Hind Bank Marine Conservation District through Amendment 1 to the Coral FMP).

Amendment 1 also defined overfished and overfishing for shallow water reef fish. "Overfished" was defined as a biomass level below 20% of the spawning stock biomass per recruit (SSBR) that would occur in the absence of fishing. For stocks that are overfished, "overfishing" was defined as a rate of harvest that is not consistent with a program that has been established to rebuild a stock or stock complex to the 20% SSBR level. For stocks that are not overfished, "overfishing"

was defined as "a harvesting rate that if continued would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis."

A regulatory amendment to the Reef Fish FMP (CFMC 1991; 56 FR 48755) was implemented October 1991. The primary management measures contained in this amendment, which was supported by an EA, included:

- A modification to the mesh size increase implemented through Amendment 1 to allow a mesh size of 1.5 inches for hexagonal mesh, and a change in the effective date of the 2-inch minimum mesh size requirement for square mesh to 13 September 1993; and
- A change in the specifications for degradable panels for fish traps related to the required number of panels (required two panels per trap), and their size, location, construction, and method of attachment.

Amendment 2 to the Reef Fish FMP (CFMC 1993; 58 FR 53145), implemented in November 1993, was supported by an SEIS. That amendment redefined the reef fish fishery management unit to include the major species of deep water reef fish and marine aquarium finfish. Primary management measures implemented through this amendment included:

- A prohibition on the use of any gear other than hand-held dip nets and slurp guns to collect marine aquarium fishes;
- A prohibition on the harvest or possession of Goliath grouper (formerly known as jewfish);
- A prohibition on the harvest, possession, and/or sale of certain species used in the aquarium trade, including seahorses and foureye, banded, and longsnout butterflyfish;
- A prohibition on fishing in an area off the west coast of Puerto Rico (Tourmaline Bank) from 1 December through 28 February each year, a period that coincides with the spawning season for red hind;
- A prohibition on fishing in an area off the east coast of St. Croix, USVI (Lang Bank) from 1 December through 28 February each year, a period that coincides with the spawning season for red hind; and
- A prohibition on fishing in an area off the southwest coast of St. Croix, USVI from 1 March through 30 June each year, a period that coincides with the spawning season for mutton snapper.

Existing definitions of MSY and OY were applied to all reef fish within the revised FMU, with the exception of marine aquarium finfish. The MSY and OY of marine aquarium finfish remained undefined.

A technical amendment to the Reef Fish FMP (59 FR 11560), implemented in April 1994, clarified the minimum mesh size allowed for fish traps.

Finally, an additional regulatory amendment to the Reef Fish FMP (CFMC 1996b; 61 FR 64485) was implemented in January 1997. That action, supported by an EA, reduced the size of the Tourmaline Bank closure that was originally implemented in 1993, and prohibited fishing in two areas off the west coast of Puerto Rico (Abrir La Sierra Bank (Buoy 6) and Bajo de Cico) from 1 December to 28 February of each year, a period that coincides with the spawning season of red hind.

- iv. Fishery Management Plan for the Corals and Reef Associated Invertebrates of Puerto Rico and the U.S. Virgin Islands

The Caribbean Council's Coral FMP (CFMC 1994; 60 FR 58221) was implemented in December 1995.

The FMP, which was supported by an EIS, defined the coral fishery management unit, described objectives for Caribbean coral resources, and established management measures to achieve those objectives. Primary management measures included:

- A prohibition on the take or possession of gorgonians, stony corals, and any species in the fishery management unit if attached or existing upon live rock;
- A prohibition on the sale or possession of any prohibited coral unless fully documented as to point of origin;
- A prohibition on the use of chemicals, plants, or plant-derived toxins, and explosives to take species in the coral fishery management unit; and
- A requirement that dip nets, slurp guns, hands, and other non-habitat destructive gear types be used to harvest allowable corals.

The FMP also required that harvesters of allowable corals obtain a permit from the local or Federal governments.

Amendment Number 1 to the Coral FMP (CFMC 1999; 64 FR 60132) was implemented in December 1999. Supported by an SEIS, that amendment established a closed area in the U.S. EEZ southwest of St. Thomas, USVI. That area is known as the Hind Bank Marine Conservation District (MCD). Fishing for any species, and anchoring by all fishing vessels, are prohibited in the Hind Bank MCD year round.

- v. Generic FMP amendments

The Caribbean Council submitted the *Generic Essential Fish Habitat Amendment to the Spiny Lobster, Queen Conch, Reef Fish, and Coral Fishery Management Plans* (Generic EFH Amendment) to NOAA Fisheries in 1998 to comply with the EFH provisions of the MSFCMA. NOAA Fisheries partially disapproved that amendment on 29 March 1999, finding that it did not evaluate all managed species or all fishing gears with the potential to damage fish habitat (64 FR 14884). The document was subsequently challenged by a coalition of environmental groups and fishing associations on the grounds that it did not comply with the requirements of the MSFCMA and NEPA (*American Oceans Campaign et al. v. Daley et al.*, Civ. No. 99-982 [D.D.C.]). The Federal Court opinion upheld the plaintiffs' claim that the Generic EFH Amendment was in

violation of NEPA, but determined that the amendment was in accordance with the MSFCMA. The Caribbean Council is currently preparing an EIS for the Generic EFH Amendment to comply with the 14 September 2000 court order. The notice of availability of the draft EIS, which could lead the Caribbean Council to further amend one or more of its FMPs, was published in the *Federal Register* on August 1, 2003 (68 FR 45237). The comment period on that document ends October 30, 2003.

The draft *Comprehensive Sustainable Fisheries Act Amendment to the Spiny Lobster, Queen Conch, Reef Fish, and Coral Fishery Management Plans* (Comprehensive SFA Amendment) prepared by the Caribbean Council and noticed in the *Federal Register* on 25 January 2002 (67 FR 3679) was intended to amend all four council plans to meet additional requirements added to the MSFCMA in 1996 through a Congressional amendment known as the Sustainable Fisheries Act (SFA). But a Federal review determined that the Comprehensive SFA Amendment was inconsistent with the requirements of the SFA and NEPA. The lack of an adequate range of alternatives for defining biological reference points, rebuilding schedules, and bycatch reporting standards was the primary deficiency cited in the notice of agency action to disapprove the document. That notice was published in the *Federal Register* on 1 May 2002 (67 FR 21598).

2.3. Assessment History

Research efforts in the U.S. Caribbean region have provided some insight into the life history, growth and biology of fish and shellfish species, and into the effects of fishing pressure on some exploited stocks. In particular, fishery independent surveys have provided information on size-structure, density, abundance and community structure of coral reef fishes and invertebrates of commercial importance. Many studies have concentrated on spiny lobster and queen conch. The earliest queen conch assessment was conducted by Wood and Olsen (1983). In the early 1990s stock assessments of spiny lobster, the shallow water reef-fish complex, and queen conch were conducted (see Bohnsack 1991, Appeldoorn et al. 1992, and Appeldoorn 1991, 1992a). Cummings and colleagues (1994) performed catch rate, size composition and stock assessment analyses of coney and red hind from St. Croix, U.S. Virgin Islands. A review of U.S. Caribbean data, with emphasis on queen conch was conducted by Valle-Esquivel (2002a), and was followed by catch rate and stock assessment analysis for the queen conch fisheries of Puerto Rico and St. Croix (Valle-Esquivel, 2002b).

3. Life History

3.1. Introduction

The life history of deep-water snappers from the U.S. Caribbean was reviewed by Cummings (2003) (SEDAR4-DW-07) and is reproduced in this section.

Kawaguchi (1974), Nelson and Carpenter (1968), Brownell and Rainey (1971), and Sylvester and Dammann (1974) previously noted the importance of silk snapper in the Caribbean reef fish fisheries as early as the 1970's. Sylvester et al. (1980) and Tabash and Sierra (1996) emphasized the importance of documenting the species biology in order to determine adequate management strategies. In response to a request for information in 2003 on deepwater snapper fisheries of Puerto Rico and the U.S. Virgin Islands by the Caribbean Fishery Management Council, biological information on silk and queen snapper was reviewed. The silk and queen snapper,

members of the Lutjanidae are one of the largest teleostan families, which includes 4 sub families, 17 genera, and 103 species (Allen 1985, Chow et al. 1993). This section provides a summary of the scientific literature on the general biology of silk, *Lutjanus vivanus* (Cuvier 1828) and queen (*Etelis oculatus*) (Valenciennes 1828) snappers, two species that are commonly observed in the commercial deep water reef fish fisheries of the Virgin Islands and Puerto Rico. Herein is provided summary information on their distribution, stock structure, growth, and reproduction for the silk and queen snapper. It is noted here that the life history of several additional snapper species, commonly associated with the silk snapper in the commercial fisheries, including the blackfin, black and wenchman should be reviewed in the future. The published and non-published literature was reviewed, as were electronic computer databases of summary biological reference such as Fishbase 2000 (ICLARM 2000).

3.2. Silk Snapper (*Lutjanus vivanus*)

3.2.1. Distribution, Habitat, Association with other species, and Stock Structure

The silk snapper is a commonly caught lutjanid in the Western Atlantic, occurring as far north as North Carolina, including off Bermuda, west through the Gulf of Mexico, and as far south as Trinidad and northern Brazil (Bohlke and Chaplin 1968, Struhsaker 1969, and Allen 1985). The species, common near the edge of the continental and island shelves, inhabits waters mainly between 90 and 140 m although it has been observed up to about 300 m (Carpenter 1965, Rivas 1970, Sylvester and Dammann 1973, Allen 1985). Off the Carolinas and the Florida Keys the species mainly occurs between 25 and 72 m (Bullis and Thompson 1965) while in the Gulf of Mexico it has been found at depths between 162 and 216 m. Rivas (1970) reported on silk snapper which were sampled using bottom gear at depths from 30 m to 360 m, from 1950 through 1968 between Cape Hatteras, North Carolina and Fortaleza, Brazil by the Bureau of Commercial Fisheries (Exploratory Fishing and Gear Research Base, Pascagoula, Mississippi) in conjunction with the U.S. Fish and Wildlife service. Sylvester and Dammann (1973) found silk snapper at depths from 81 to 378 m. Sylvester and co-authors (1980) noted the possibility of different habitats for silk snapper adults and juveniles as supported by the fishery in Puerto Rico. Using electric reels in the early 1970's, Sylvester and Dammann reported that silk snapper were caught over irregular substrates with adults found mainly over mud bottom. According to Rivas (1970) silk snapper are the only deep water snappers found over mud substrate in the Western Atlantic in particular the region referred to as 'lower-shelf habitat' by Struhsaker (1969).

The studies of Brownell and Rainey (1971), Sylvester (1974), Boardman and Weiler (1979) suggest that silk snapper are commonly associated with blackfin and voraz (wenchman) snapper as well as several other species of groupers and jacks. Sylvester and Dammann (1974) observed silk snapper from 80 to 350 m (average 200 m) while blackfin were more common from 48 m to 82m. Boardman and Weiler also observed silk snapper associated with vermilion snapper (off Puerto Rico). These studies also suggested that silk were more frequent at the greater depths up to 175 m while blackfin and vermilion at the shallower depths (<100 m) (Boardman and Weiler 1979). Sylvester's studies were conducted off the U.S. Virgin Islands or nearby off Anegada and/or Virgin Gorda. Rivas (1970) suggested that bottom type could be an important factor in determining the actual vertical depth distribution of snappers. It is especially interesting to note that the tendency to school by size was observed in some of the studies (Dammann et al. 1970). In 111 bottom long sets made by the National Marine Fisheries Service (NMFS) from 76 m to 644 m, off St. Thomas and

Puerto Rico (including Culebra Island) in August 1982 (Russell 1982) silk snapper were observed occurring from 200 m to 322 m somewhat shallower depths than were queen snapper which were captured from 206 m to 484 m. In 90 bottom longline sets made in April 1984 (Russell 1984) by the NMFS off Puerto Rico, Culebra and St. Thomas silk snapper were captured most frequently between 200m and 298 m. Similar surveys were conducted during 1980 and 1983 by the NMFS and those results could provide additional knowledge regarding the distribution of this species. The information from these historical accounts of species occurrence by region suggests that attention should be given to the change in size distributions by area when describing catch size/age composition,

3.2.2. Morphometrics

Silk snapper is characterized by a normal fusiform body shape, weak preopercular notch and knob and long pectoral fins that reach the level of the anus. Individuals have pink to red coloration on the back and upper sides often appearing as a silvery sheen along the lower abdominal region. The fins of individuals are usually reddish or pale yellow. Small or young individuals (<25 cm) usually have a blackish spot on the upper side below the anterior dorsal soft rays. Maximum size observed in the field was 83 cm (total length) and 8.3 kg (IGFA 2001, Allen 1985). Chow et al. (1993) noted the close similarity morphologically among members of the Lutjanidae family, reported by previous ichthyologists (Richards 1985, Leis 1987, Richards and Lindeman 1987) making it especially difficult to differentiate between identification of larvae. Using restriction fragment length polymorphism (RFLP) analysis, silk snapper could be identified (Chow et al. 1993).

3.2.3. Food Habits

The silk snapper are considered mainly carnivorous by most researchers as are most members of the Lutjanidae. Randall (1968) noted that the larger species of the Lutjanidae eat mostly fishes. The stomachs of silk snapper sampled off the U.S. Virgin Islands in the early 1970's included fish (51%), isopods (8%), invertebrates (31%). The species is reported to ascend to shallower waters at night for feeding (Bohlke and Chaplin 1993). Parrish noted that most snappers tend to feed more actively at night. Allen (1985) reported silk snapper also feeding occasionally on some pelagic items such as urochordates.

3.2.4. Reproduction

The species is dioecious with no known tendency to change sex, and fertilization is external (Allen 1985). Spawning is thought to be year round in the more tropical latitudes with two predominant peaks. Silk snapper are thought to spawn in late spring through early summer in the temperate regions (e.g., Carolinas, Gulf of Mexico). Munro et al. (1973) reported on spawning of silk snapper from observations made off the reefs adjacent to Port Royal, on the south coast of Jamaica and on Pedro Bank and on Morant Bank, 50 NM southwest and southeast of Jamaica. Silk snapper were observed in ripe condition during March, September and November, suggesting year round spawning. Munro et al. (1973) also suggested two maxima in spawning timing, in April and September-October, for silk snapper off Jamaica. Leis (1987) reported on the early life history of

tropical snappers from a review of the literature. Leis noted that based on the available information from larval abundance that most lutjanids spawn year-round and with an apparent maximum reproductive activity in the spring and summer. Grimes's (1987) reviewed Lutjanidae reproduction and he put forth the idea that the seasonality pattern in spawning (i.e., a restricted spawning period during late spring/summer vs spawning year round) was related to geographical location with populations occurring on oceanic islands being characterized by year-round spawning while those occurring along the continental areas had more restrictive spawning periods. Grimes (1987) further noted that some specific populations did not seem to conform to this pattern and gave as examples those off Cuba, new Caledonia, and the deep water *Etelis carbunculus* off Hawaii and provided some reasoning based on continental production volume allied to high rainfall.

Boardman and Weiler (1979) reported a sex ratio for males to females of 0.8:1 (1.25:1) for fish sampled by traps off Puerto Rico. Sylvester et al. (1980) observed sampled silk snappers off the US Virgin Islands between July and September 1973 using bottom fishing gear, set lines, and traps. From some 27 sampling trips a sex ratio of 1.16 (male:female) was observed from 141 individual fish. Boardman and Weiler (1979) noted difficulty in identifying males in certain developmental stages which had large deposits of fat in the body cavity. Grimes (1987) reviewed the reproductive biology of the Lutjanidae and commented on sexual dimorphism and hermaphroditism in the Lutjanidae. Analyses of sex ratios in species of this family from geographically diverse locations did not suggest any trend towards variation in sex ratio at size that would indicate hermaphroditism. Grimes (1987) further noted that from the data of the more thorough studies (i.e., those in which a wide range of sizes were observed) suggested a tendency for females to be more prevalent at the larger sizes and suggested a differential longevity of the sexes.

Summarized information on silk snapper maturity and fecundity is presented in Table 1. Most of the information is from areas outside the U.S. Caribbean so caution should be exercised when applying to other geographical areas. Boardman and Weiler (1979) observed silk snapper off Puerto Rico maturing at about 38 cm and 50 cm respectively for males and females. Silk snapper off Cuba matured at 48 cm (females) and 50 cm (males) while silk snapper off Jamaica matured at 52 cm (females) and 57 cm (males) similar to fish from Puerto Rico. Grimes (1987) provided generalized information on spawning size of the Lutjanidae. Grimes (1987)'s review of reproduction in Lutjanidae suggested that for deep reef (>91 m in that review) snappers, individuals matured at about 49% of the maximum length while the shallow-water species matured at about 43% of the maximum length. This would suggest that the silk snapper could mature at about 37 cm much smaller than that observed in the field for fish sampled off the U.S. Virgin Islands, off Cuba, or off Jamaica. Grimes (1987) generalization for Lutjanidae would result in an estimate of spawning size of 43 cm for Queen snapper.

Sylvester (1970) suggested two spawning periods for silk snapper, one from April - June, and another from October-December, based on the presence of two abundance peaks for fish sampled off the U.S. Virgin Islands between July 1970 and December 1972. That study suggested a spawning maxima occurring in March and another around September-October. Collazo (1983 or 1984) from examination of some 2200 fish off Puerto Rico between 1979 and 1980 reported silk snapper spawning year round with two peaks in the percentage of ripe females occurring between April and June and October-December. Sylvester et al. (1980) examined fish off the U.S. Virgin Islands also for fecundity information. They noted the occurrence of a large number of immature eggs in mature ovaries suggesting greater than one spawn per year. The fecundity information shows large individual variation for this species. Sylvester et al. (1980) noted that eggs of silk

snapper were smaller and more numerous than those of another snapper inhabiting deep waters, the blackfin snapper, *L. buccanella*.

Very little information exists regarding the duration of the larval period Leis (1987). The results of three studies (Richards 1982, Starck 1970, and Brothers et al. 1983) suggest empirical estimates ranging from 25 to 47 days for the pelagic phase for shallow water Lutjanidae.

3.2.5. Growth

Several investigators have evaluated the relation between length and age from length frequency statistics and otoliths for different regions (Table 2). Records from angling reports suggest that the maximum size achieved by this species is about 76 cm and 6 kilograms. Thompson and Munro (1974) reported the maximum observed size in trap catches off Jamaica to be 72 cm FL and 68 cm FL for females and males respectively. From the summarized growth information, estimates of the annual growth rate parameter, k , ranged from about 0.1 to 0.32 while estimates of the asymptotic size, L infinity, ranged from 53 cm (FL) to 76 cm (FL) for fish from Cuba, Costa Rica and the U.S. Virgin Islands. Claro and Garcia-Arteaga (2001) noted that the growth rate parameter, k , derived by Thompson and Munro (1983) for silk snapper may be excessively high. Thompson and Munro (1983) reported that otoliths of silk snapper did not reveal regular clear bands easily interpretable as annuli. In general this species is characterized as relatively fast growing and showing some trend for a pattern of linear growth in the early years (Musa et al. 1979). Several studies exist describing other important meristic conversions such as length to length and weight to length formulae (Tables 3 and 4.). Updated estimates of growth parameters and weight to length relations should be determined using more recent sampling data available from commercial Trip Interview Sampling (TIP) program and the fishery independent SEAMAP program

3.2.6. Longevity

Tabash and Sierra's (1996) study off Costa Rica suggested a maximum life span of about seven years for silk snapper. These authors estimated size at first capture for 50% of the population to the hook and line fishery to be 25.5 cm or about 1.9 years of age.

3.2.7. Natural Mortality

Tabash and Sierra (1996) estimated natural mortality for silk snapper using Ralston's (1987) method to be 0.86.

3.2.8. Recruitment timing and size

Sylvester (1974) and Sylvester et al. (1980) studied silk snapper off the U.S. Virgin Islands and reported recruitment to the fisheries began at age 2 and full recruitment occurred by age 4. Sylvester (1974) observed individuals as small as 10-19 cm occurring during October through December.

3.3. Queen Snapper (*Etelis oculatus*)

Very little scientific information exists for this species. A few investigators have reported on the occurrence of the queen snapper in local fisheries. Thompson and Munro (1974) and Mahon et al. (1981) noted the importance in the Jamaican and Barbados fisheries respectively. The queen snapper is known in the St. Lucian fisheries as the 'Red Snapper' and makes up about 98% of the demersal landings annually between August and November from south of the island. Small individuals are apparently taken as by-catch in some trawl fisheries (Cervigón et al. 1992).

3.3.1. Distribution, Habitat, Association with other species, and Stock Structure

This species has a similar distribution as the silk snapper and is found in the Western Atlantic: Bermuda and North Carolina, USA, Gulf of Mexico southward through the Caribbean to Brazil. The queen snapper is reported to be particularly abundant in the Bahamas and the Antilles (Anderson, pers. comm as cited in ICLARM Fishbase). Queen snapper commonly is found in areas characterized by rocky bottoms and is abundant near oceanic islands. Direct observations of vertical distribution of the queen snapper are available from bottom longline sets made during scientific research cruises in August 1982 and April of 1984 by the NMFS off Puerto Rico, Culebra Island and St. Thomas (Russell 1982, 1984). Queen snapper were observed most frequently at depths of 206 m to 484 m from bottom longline sets made during the 1982 NMFS cruise and at depths of 300 m to 398 m during the 1984 NMFS cruise. Similar cruises were conducted during 1980 and 1983 and those results may add further insight into the vertical distribution of this species.

3.3.2. Morphometrics

The queen snapper has a small head and distinct large eye with a short snout. The body is generally fusiform. The maxilla is covered with small scales, the lower jaw protrudes slightly. The dorsal and anal fin bases are scaleless and the caudal fin deeply forked with the scale rows on the back running parallel with the lateral line. The coloration in the queen is distinct as in the silk snapper. The back and upper sides are deep pink to red; lower sides and belly pink; fins pink except the spinous portion of the dorsal fin and the entire caudal fin brilliant red (ICLARM Fishbase 2000)

3.3.3. Food Habits

As do other Lutjanidae the queen snapper eats animals and feeds and mostly on small fishes and squids as an adult. Younger queen snapper individuals also take crustaceans.

3.3.4. Reproduction

The queen snapper like the silk snapper exhibits dioecism. Spawning is probably year round (see below), and fertilization is external. However detailed information on reproduction in this species is not available in the literature.

3.3.5. Growth

Growth characteristics of the queen snapper are available from a very restricted geographical area. Maximum size of 100.0 cm TL and maximum published weight of about 5.3 kg has been observed from sport fishing angling records. Relationships for length to length and/or weight to length conversions were described from fish off Saint Lucia (Tables 5 and 6). Little information exist for converting lengths to ages and in particular from the U.S. Virgin Islands and Puerto Rico fish, the area of concern to the CFMC/SEFSC Caribbean Deep Water SEDAR data workshop (Table 7). The initial examinations of fish off Saint Lucia suggest the need for more detailed and comprehensive field collections of queen snapper ageing observations to better evaluate growth in this species. Murray and Neilson (2002) emphasize the need to confirm the estimates of queen snapper growth rate and to further evaluate their method (i.e., pooling growth increments from several segments) of analysis. Furthermore, Murray and Neilson (2002) noted that an overestimation of the growth rate parameter, k , would not be surprising from their approach. Murray and Neilson's (2002) estimate of k was 0.62

3.3.6. Recruitment timing and size

Murray and colleagues (1992) suggested this species had two pulses of entrance into the local fisheries based on examination of landings records. These investigators suggested that when taking into account the seasonality in reproduction this pattern of recruitment resembled that suggested by Grimes (1977) of "more or less" continuous year round spawning with peaks of reproductive activity in the spring and fall." These authors however pointed out that queen snapper were probably available to the Saint Lucian fisheries year round but were fished exclusively only when tuna catch rates were low.

3.3.7. Stock definitions

At the 2003 SEDAR3 Data Workshop held in Tampa, Florida, on yellowtail snapper Caribbean biologists from Puerto Rico DNER and the U.S.V.I. DFW and CFMC staff suggested that two management units be considered. The units were defined by geological platform, with one platform including Puerto Rico, St. John, St. Thomas and the British Virgin Islands and the second platform including only St. Croix (Figure 1) (SEDAR3 Data Workshop Report 2003). The rationale for the separation was the perception that there was little or no interchange of non-larval life history phases across the deep channel (thousands of meters) between the platforms and the observation that for several reef fish species fish tagged on the Puerto Rican platform had moved between islands on that platform, but no fish had been recovered over the other platform. The separation of platforms also assumes that recruitment primarily comes from local spawning.

4. Fishery Descriptions and Data Sources

4.1. Commercial

4.1.1. Overview

4.1.1.1. Puerto Rico

An overview of the history, operation and trends in the commercial fishery of Puerto Rico is presented in Cummings and Matos-Caraballo (2003) (SEDAR-DW-06). Excerpts from that document are reproduced in this section.

Commercial fisheries removals have occurred in Puerto Rico as early as the late 1800's however, detailed records documenting fishing activities, levels of removals, and information on fishing effort is not available prior to the early 1970's. Early investigators reported that fishing for a livelihood was not occurring and that sport fishing was absent in Puerto Rico at least in the early 1900's (Wilcox 1899, 1900, Jarvis 1932). The first investigations of Puerto Rican fisheries by U.S. scientists were conducted in 1899, soon after Puerto Rico was acquired from Spain, under the sponsorship of the United States Fish Commission. These early research trips were conducted mainly for the purposes of documenting imported fishery products and carrying out ichthyological surveys (Wilcox 1900 and Evermann and Marsh 1899,1900; Gray 1900 (as cited by USGS 2002)). Nichols (1929) also conducted ichthyological studies in Puerto Rico under the sponsorship of the Puerto Rico government and the New York Academy of Sciences, describing additional species overlooked by earlier researchers. More recent ichthyological surveys were done by Erdman (1956) in 1944-1946 and Randall (1963) in 1958. Some other research excursions took place in Puerto Rico prior to U.S. scientific studies (e.g., Plee in 1820, Gundlach (1881) in 1873 and 1875-76 and Stahl (1883) however these were primarily limited to ichthyological studies (see Anonymous 1969, USGS 2002).

Jarvis (1932), under the sponsorship of the U.S. Department of Commerce, Bureau of Fisheries, conducted a detailed survey in 1931 of the marketing and economic aspects of the fisheries and was one of the earliest to document Puerto Rico's commercial fishery. Jarvis described fishing methods, number of fishermen and number of boats operating, number of different gear being used (nets, pots, lines, etc.) and provided comprehensive descriptions on the regional differences in Puerto Rico's fisheries. This report illustrates the complexity and multi-species and multi-gear operations of the local fisheries in Puerto Rico as early as the early 1900's.

It also described in detail the topography of Puerto Rico coasts (Figure 1), including unique features that possibly affected local fisheries production. Off the northern coast of Puerto Rico, the 100- fathom contour occurs 1 to 2 miles offshore, beyond which the bottom drops rapidly to depths of 667 to 1,409 fathoms. Commercial fishing along this portion of the coast is conducted very close to the shore, and many months are not conducive to fishing due to adverse weather. The amount of fishable area off the northern coast (i.e., the total bottom area from the coastline to the 100 fm contour) is about 66,639 hectares. The southern coast (Yeguas Point on the southeast to Cape Rojo on the southwest), is also characterized by a steep drop-off close to shore. Historically the southern coast has been thought to offer more suitable nearshore habitat for local fisheries than the northern coast. Features that make the southern coast more suitable for fishing operations include less exposure to storms, which allow more extensive use of fish pots, a somewhat less abrupt drop-off, and the presence of a number of cays and sandy beaches, which make the use of beach seines possible. The amount of fishable area off the southern coast is about 123,660 hectares. Puerto Rico's western coast continues from Point Agujereada in the northwest to Cape Rojo in the southwest. The coast is markedly short in distance, about 1/3 the length of either the northern or

southern coast. The western coast however has historically been the center of major production, at least in part due to the larger amount of total fishable area, with 124,347 hectares shallower than 100 fathoms. The coastline continues some six or so miles offshore at depths of 10-15 fathoms, and further offshore good habitat has been reported at depths ranging from 100 to 200 fathoms. Also, off the western coast of Puerto Rico lie several banks where good fishing was reported historically, and the presence of two islands—Desecheo and Mona, 10 miles and 20 miles respectively offshore. The eastern coast continues from Cape San Juan on the north to Point Yeguas on the south, and includes the islands of Vieques and Culebra 14 and 11 miles offshore. The eastern coast fishing grounds, about 269,304 hectares, are rather shallow, not more than about 40 fathoms deep continuing from the coastline to the territorial waters of the Virgin Islands. Jarvis (1932) noted that if one considered the entire area off of Puerto Rico's eastern coast, the U.S. and British Virgin Isles, in addition to Anegada Island, Kingfish and Barracuda Banks, the possible fishable area off Puerto Rico's eastern coast was quite sizable, nearly 1500 square miles, thus providing an extensive opportunity for possible increase in fisheries production from this area. The latter objective, evaluating the possibility of increasing production, was apparently a primary objective which led to some of the early Puerto Rican fisheries descriptions from the late 1890's through the 1930's.

This section provides summarized information on the historical commercial landings in Puerto Rico as provided through published annual reports of the Puerto Rico (PR), Department of Natural Environmental Resources (DNER), Fisheries Research Laboratory (FRL). Prior to 1967 fishery status reports were provided by the Estado Libre Asociado, De Puerto Rico, Department of Agricultura, Laboratorio De Pesqueria Comercial. Since 1967 statistics on commercial fisheries in Puerto Rico have been collected under the Fisheries Statistics Program (FSP) on landings and commercial fisherman activities under the NOAA, NMFS State-Federal Cooperative Statistics Program. Since 1984 the Puerto Rico DNER, FRL, FSP program has also collected data on biostatistical samples from commercial fisheries. In response to a request for scientific information on the status of the deep-water snapper fisheries by the Caribbean Fishery Management Council (CFMC), this report provides historical information on the silk snapper commercial landings category and on total reported commercial landings from the published annual reports. This information will be used in developing required analytical databases of commercial landings statistics for analyses by the Deep Water Snapper Southeast Data and Assessment Workshop (SEDAR).

Annual fishery status reports of the PR DNER FRL FSP were available for most years since 1969, where total reported commercial landings of all fish and shellfish were summarized. Some information existed for a few years prior to 1969 (1930, 1946). Total reported commercial landings of all fish and shellfish ranged from 2.0 million pounds (1992) to 7.2 million pounds (1979) and averaged 3.8 million pounds from 1969 through 2000 (Table 8, Figure 2). Fish comprised between 70% (1979) and 100 % (1981) of the total reported fish and shellfish commercial landings by weight and averaged 85% over the period. Over the 30-year period, 1971 through 2000, reported commercial landings of the silk snapper category ranged from 115,000 pounds to 546,000 pounds and averaged about 10% of the total reported commercial fish landings in Puerto Rico. Apparently the landings category defined as 'silk snapper' comprised the actual reported landings of several snapper species including silk snapper, blackfin snapper, queen snapper and wenchman until 1997 (Aida Rosario, pers. comm.). Over the same period of time, the total combined fish and shellfish landings show declines beginning around 1979 and continuing through 1993. Over the same period of time, 1971-2000, the percentage of fish of the total reported commercial fish and shellfish

combined landings remained relatively constant, and the percentage of the silk snapper category landings of the total reported fish landings remained about 10%.

Historical reported commercial landings of combined fish and shellfish by region, as summarized from PR DNER FRL FSP annual reports, are shown in Table 8 and Figure 3 and for fish only by region in Table 9 and Figure 4. Reported commercial landings from the west coast were highest over this period, 1971 through 2001, followed by reported landings on the south coast and then the east. The trend of landings by region was consistent over the entire time period, and is not surprising when the amount of total possible fishing area of each region is considered.

Figures 5 and Figure 6 illustrate commercial landings of the silk snapper category by gear and region (Tables 10 and 11) as presented in the annual reports of PR DNER, FRL, FSP. Values from several years were missing. Most of the reported landings of silk snapper were from hand lines and fish pots. Other gears catching silk snapper included beach seines and gillnets but in general these did not comprise a significant amount of the total silk snapper category landed. Over the period, landings from hand lines and fish pots averaged 98 % of the total reported silk snapper landings category. Reported landings of silk snapper category from fish pots and hand lines show a sharp decline from 1983. Landings from the primary gear catching the silk snapper category, hand lines, show more variability than did reported landings from fish pots. The majority of the reported silk snapper category landings occurred on the west coast of Puerto Rico. Landings from 1969 through 1982 showed much more fluctuation than the later years. Large declines in silk snapper landings occurred in 1983. This information is summarized in Tables 8 to 11.

4.1.1.2.U.S. Virgin Islands

A review of the history and characteristics of the commercial fisheries of the United States Virgin Islands is presented in Valle-Esquivel and Diaz (2003) (SEDAR-DW-08). This section summarizes the information presented in that document. The fisheries from the U.S.V.I. are multi-gear and multi-species in nature. Five main gear types are used to harvest fish and shellfish species, particularly reef species and some pelagic fishes. These gears are: traps (or pots); nets (used as purse seines, beach seines, gillnets, castnets, and trammel nets); scuba gear; free diving; and hook and line gear. The reef fish harvest is composed of more than 12 families and 180 species, and the majority of offshore fisheries are composed of members of the Scombridae and Coryphaenidae families, with a total of 7 species.

It has been difficult to collect adequate data from the multi-gear and multi-species fishery in the Caribbean for use in fisheries management. In 1974, U.S. Virgin Islands Legislative Act 3330 established a mandatory reporting system for fisheries data. At the beginning of the program, the data consisted in total landings by gear type, which had limited use for assessment and management. To improve this information, the U.S. Virgin Islands, Department of Planning and Natural Resources (DPNR), Division of Fish and Wildlife, Bureau of Fisheries (DFW) and the NMFS, SEFSC entered into a cooperative agreement in 1983 to obtain more detailed data.

Landings data in the U.S. Virgin Islands are reported directly by fishermen. They mail or deliver monthly reports to the DFW. All reports for the 12-month period beginning in July must be received before a commercial fishing license is renewed. DFW is responsible for entering the data and verifying it prior to submission, once a year, to the Southeast Fisheries Science Center in Miami. The DFW maintains separate data sets for the landings made in St. Croix and the landings

made in St. Thomas and St. John combined because these islands they lie on different geological platforms and their fisheries are not directly linked. Computerization of the data began in 1982 for St. Thomas/St. John and in 1983 in St. Croix.

Currently, reported landings statistics are available in electronic form from January 1974 through December 2002. During this period, the DFW changed the monthly reporting form three times to accommodate the level of detail necessary to assess and manage this complex fishery. Maps of the U.S. Virgin Islands and the different catch report forms are provided in Appendix A. A summary of the fields contained in each form and the years when they were used by the USVI DPNR, DFW are provided in Table 12.

Landings records from 1974-1986 reported the landings (in pounds) per trip by category (snappers/groupers, bait fish, fin fish, lobsters, and 'other kinds', that included conch, whelk, octopus, squid, clam and oysters); gear type (hook and line, net, pot, speargun and dive), and area fished (Old Form). From 1986 to 1994-1996 similar reporting categories were used, but landings of snappers/groupers were combined with the rest of the finfish by gear category; conch, whelk and offshore (pelagic) fishes were given a separate field; and the distance fished from shore was introduced (Old Form 2). Many changes were incorporated to this form. Between 1986 and 1999 a "short" version was used to create the electronic database, which contained one field for the fish code, another for the gear type and a third for the total catch (Old Form 3). In 1993 fields for tuna, dorado, and wahoo landings were added. This form was used from 1993 to 1996 (Old Form 4).

In the 1994-1995 fishing year the St. Croix office introduced a New Form to provide better information on the composition of the commercial harvest. This Revised Form was designed to provide landings (in pounds) by family or species groups (instead of the broad categories of finfish that were used previously); the gear type used; an estimate of fishing effort (the number of gear and the estimated time in hours fished during the trip); and the distance from shore (i.e., less than 3 miles, 3 to 200 miles or greater than 200 miles). The fishing area designations and gear categories remained the same. The New, Revised or "long" form was tested by a small group of fishermen on a volunteer basis in the 1994-1995 and 1995-1996 fishing years. Its use was expanded to the entire territory in 1996.

For a long time, fishers continued to report landings data on outdated catch report forms, which resulted in the production of two or three data files per fishing year by island. Accompanying each generation of catch forms were new gear and location codes (a summary is provided in Appendix A). Because of all these changes in the reports, the data are available in separate files by fishing year (July-June), form-type and district (St. Thomas/St. John and St. Croix), resulting in multiple files for each fishing year containing different fields, gear and species categories. A summary of the information contained in each type of form is provided in Table 12.

The objectives of the State/Federal Cooperative Statistics Program for the collection of commercial fisheries landings information in the U. S. Virgin Islands are: to estimate total harvest, fishing effort, and the value of the commercial fishery; to develop an improved catch report form to record fish harvest by species group; and to maintain the Division of Fish and Wildlife computerized commercial landings database (DFW, 2001).

The Bureau of Fisheries (Division of Fish and Wildlife) submits annual, bi-annual or three-year reports to the National Marine Fisheries Service, whereby the landings and effort for that period are summarized by gear and species categories, and by the number of fishing trips per area. A distinction is made between the 'Reported' landings and the 'Projected' landings. These are

calculated by multiplying the total reported landings by the ratio of the number of licensed fishermen to the number of reporting fishermen. In some reports, 'Estimated Landings' were also calculated, based upon the number of monthly reports remitted. The total number of possible monthly reports (12 months multiplied by the number of registered commercial fishermen) is divided by the number of reports actually completed. The total reported landings are then multiplied by this ratio. This method is used to account for the fishermen who turn in only a percentage of the 12 monthly reports. Landings have thus been reported as Reported Landings, Projected Landings, and Estimated Landings.

4.1.2. Commercial Landings

4.1.2.1. Puerto Rico

4.1.2.1.1. Reported landings

Commercial landings of combined fish and shellfish in Puerto Rico were available in electronic form since 1983 only. A summary of the reported commercial landings of combined fish and shellfish is given in Table 13 and Figure 7. It is noted that calculated annual totals from the electronic data files for 1984-2002 are in close agreement (within 5% of the weight landed) to the reported totals from the annual reports of the PR DNER FRL FSP.

4.1.2.1.2. Expansion factors

Detailed information regarding commercial fishing activities in Puerto Rico documenting the number of individuals and number of vessels involved in the fishery and the level of cooperatiion is lacking until about 1971. Detailed information on the number of fishermen and number of fishing vessels is given in (SEDAR-DW-04). Summarized information from that document is presented below.

This section summarizes information on estimates of total numbers of commercial fishers and vessels operating in Puerto Rico and gives data on the sales receipts of fisheries landings reported to the Fisheries Research Laboratory (FRL) of the Puerto Rico, Department of Natural and Environmental Resources (DNER). In addition, the estimated reporting rate (fraction of total fishers reporting to FRL). In 1967 a fishery statistical monitoring program was implemented to monitor the commercial fishery landings of fish and shellfish in Puerto Rico. The program was implemented under the Commercial Fisheries Research and Development Act of 1964 (PL 88-309) to collect data on catches, landings, fisherman and vessels. In 1984 the program was extended to include the collection of biostatistical samples (e.g., length frequencies, biological samples of age and reproductive status). The program is supported currently by the National Marine Fisheries Service (NMFS) through the State/Federal Cooperative and Interjurisdictional fisheries Programs and the DNER.

Reports from the Puerto Rico DNER, annually submitted to the NOAA, NMFS were reviewed to develop a time series of information regarding the Puerto Rico's commercial fishery. These reports contained summarized information on the following: the number of fisherman reporting annually, number of annual commercial sales tickets reported, number of total fishing vessels by length group, number of gear units and quantity of gear, and estimates of reporting rates of fisherman. In most years through 1996 the FRL has conducted a comprehensive census of the total number of fisherman operating in the fishery, the number of and type of vessels used, and

information on the types and quantities of fishing gear in use. This information was utilized to establish a time series of the number of fishermen, number of vessels, number of sales records, and rate of reporting. The reporting rate was used to expand the reported landings to total landings.

The number of total fisherman and total fishing vessels operating in the commercial fishery of Puerto Rico was available for 1899, 1930 and most years since 1969 (Table 14, Figure 8). Over the period the number of fisherman has varied from 800 fishers to 1,872 reaching a maximum in 1982. From 1969 to 1980 the total number of fisherman increased by 46 %. No strong trend is obvious after 1982. The total number of vessels has varied from 350 to 1,449 also reaching a maximum in 1982. No strong trend in the number of vessels is apparent after 1982. The annual reports were further reviewed in an attempt to stratify the number of fishing vessels by size to identify the number of vessels engaged in offshore activities directed at deep-water species. From information presented in the annual reports there was some agreement between authors that vessels about 25 feet or greater in length directed fishing effort towards deep water snappers. Identification of vessels by size group was only possible for the earliest years in the data set (Figure 9). Apparently similar information may exist for the later years which could be useful in better understanding fishing operations in Puerto Rico.

Reporting of fishing activities in Puerto Rico has for the most part been on a voluntary basis. Prior to acquisition of Puerto Rico in 1898 by the U.S. catch records under the Spanish regime were retained at the fishing port location by an official port captain who maintained detailed records on total catch, the types of boats in operation (and numbers), value of catch, etc. and apparently these records were lost or destroyed (Wilcox 1899, 1900). Similar detailed information on the local fisheries apparently was not collected between the early 1900's and 1967, except for a few years when individual surveys were done by the U.S. Department of Commerce, Bureau of Fisheries to document imports and identify changes to increase local production. Fishery catches are currently obtained through reports of sales tickets which have been reported by individual fisherman or from fishing cooperatives since about 1967 (the data base includes sales records reported to PR DNER; not all sales have been reported). The number of sales records was available only since 1971 from the annual reports (Table 15). Annually the number of tickets submitted ranged from 16,260 to 38,887 with information missing for 1976-1981 and for 1994-1996. Through the annual censuses conducted by the PR DNER, some information on the number of fisherman not cooperating (i.e., reporting their landings) and the number of fishermen submitting sales records has been collected by fisheries port agents. In general it is felt that the degree of cooperation (i.e., reporting) has increased over the years (Tables 16, 17) after 1983. Catch reporting rates have been determined by the PR DNER FRL by port agents for use in expanding the level of catch reported on sales records. Expanded landings are shown in Figure 10. Over the period for which information exists to adjust sales tickets, 1971-2002, reporting rates ranged from 0.60 to 0.78.

4.1.2.1.3. Total landings

Expanded (total) combined fish and shellfish landings were calculated from the (reported) commercial landings for 1983-2002 and the expansion factors shown in Table 16 for Puerto Rico. The expanded landings by year and species are given in Table 18 and illustrated in Figure 10. It is noted that the landing category of silk snapper contains landings of snappers other than silk snapper prior to 1997.

4.1.2.2. Virgin Islands

4.1.2.2.1. Reported landings

Reported landings were summarized in three formats, based on the combined data sets discussed in the previous section:

1. Data from Old Report Form 1 (1974-1986).
2. Data from Old Report Forms 2,3, and 4 (1986-1999).
3. Data from New Report Form (1994-2002).

The landings and number of records estimated from the data files are summarized by calendar year, district, and the catch categories included in each type of catch report form. For each type (Old Form 1974-86, Old Form 1986-1999, New Form 1994-2002), reported and expanded landings are presented in Valle-Esquivel and Diaz (2003) (SEDAR-DW-08). Those are informative only with respect to the particular format used, but do not give a clear trend over time, given that there was an overlap in the use of different forms over the period 1974-2002. Therefore, only bulk landings estimated from the combined forms are presented in this report. The reported landings by year and district for the period 1974-2002 are provided in Table 19 and illustrated in Figure 11.

Annual reported landings of the multispecies and multigear fishery of the U.S. Virgin Islands appear to have increased from 58,000 in 1974 to 926,000 in 2002, with large fluctuations in between. During the first ten years of the time-series (1974-1984) total estimated landings increased almost ten-fold, from 58,000 pounds to 607,000 pounds. This initial rise was followed by a sharp decline in total landings between 1984-1988, reaching the minimum level ever of 68,000 pounds in 1988. Unfortunately, these numbers may also reflect underreporting, inaccurate, or incomplete information for that period, particularly because an extremely sharp increase was observed between 1988 and 1991, to the largest value ever, of almost 3,000,000 pounds. After 1991, another steep decline is observed, with the landings fluctuating around 1,250,000 pounds thereafter. Last year (1992), the total estimated landings were 926,000 pounds. The same general pattern was observed when the total landings were divided by island. Throughout the whole period, the proportion of total landings corresponding to St. Thomas/St. John approached 62% of the total, and the remaining 38% to St. Croix.

A close observation of these trajectories clearly indicates that landings for some years, particularly between 1984 and 1991, need to be corroborated with the Division of Fish and Wildlife (DFW) of the U.S. Virgin Islands. Once such information is retrieved, it is possible that the overall trajectory will become more consistent and can then be better interpreted. Sources of major fluctuations in the estimated landings (other than real changes weight landed) need to be identified by the DFW. These may include misreporting, changes in the data collection system (i.e., catch report forms), known shifts in technology (e.g., introduction of more efficient gear), or known changes in fish/shellfish abundance resulting from major environmental fluctuations or events (i.e., hurricanes, storms, etc.). Recording these sources of variation by year would be of extreme help to the analysts at the SEFSC.

It is clear that modification of the landings reports over time has moved toward more detailed landings statistics that will provide a basis for better analysis in the near future. However, at this time it is very difficult to disaggregate the landings by gear type of the initial years into finer categories without further information from the DFW. It is necessary to identify the species groups

that were classified under those gear-categories between 1974 and 1996, in order to be able to match the old with the new catch report forms and provide a better catch composition for the whole time-series, or a closer approximation of landings by species-group categories.

4.1.2.2.2. Expansion factors

Two expansion factors were extracted or re-calculated from information provided in the annual State – Federal Annual Reports from the Virgin Islands (DFW, 1990-2001). Only the first of these expansion factors is used to calculate the total landings (expanded landings) presented in section 4.1.2.2.3. In particular, the number of fishermen and the number of reports submitted were calculated as follows:

The first expansion factor (EF1) is a ratio of the number of licensed fishermen to the number of fishermen that turned in catch reports (any number of reports) for that year:

$$EF1 = \text{No. of Licensed Fishermen} / \text{Number of Reporting Fishermen.} \quad (1)$$

The expanded (or projected) landings were estimated as:

$$\text{Expanded Landings} = EF1 * \text{Reported Landings} \quad (2)$$

The second expansion factor (EF2) relates to licensed commercial fishers who submitted reports. A ratio can be made based on the total number of possible monthly reports (12 reports per year* the number of fishers that submitted reports= A) divided by the number of reports actually completed (B):

$$EF2 = A / B \quad (3)$$

This could then be applied to the expanded estimate from above to adjust total landings for fishers that did not turn in catch reports:

$$\text{Estimated Total Landings} = EF2 * \text{Expanded Landings} \quad (4)$$

Annual reports contained the first expansion information for years 1981 onward. Ratios for previous years were assumed equal to that of 1981, since estimates from available compliance data (1974-1986) gave disproportionate values for some years. Landings expanded this way may be underestimated because fishermen are treated equally (as reporting fishermen) whether they submitted one or more reports per year.

Information to calculate the second ratio was sparse and therefore the total landings were not estimated, as in equation (4). Furthermore, the implicit assumption that reporting fishermen fish every month and catch the same amount every month may overestimate landings.

The number of licensed and reporting fishermen by year and estimates of Expansion Factor 1 (EF1) from annual reports (DFW, 1981-2001) are given in Table 20. Data for years 1974-1979 were not available in annual reports, and calculated values (from data files) may be overestimated, so EF1 was assumed constant and equal to the first year of reported data (1979-80). This information is represented in Figure 12.

Expansion Factor 2 (EF2) was calculated from compliance reports for years 1974-1986 and taken from annual reports for years 1993-99 (DFW, 1997-2001). Neither estimates nor data for years 87-92 were available. The number of reporting fishermen and reports submitted by year and values of EF2 are provided in Table 21.

It is important to note that expansion factors by year for the whole time-series need to be corroborated with the Department of Fish and Wildlife. At the time of the present report, expansion factors were extracted from annual summary reports, rather than from the actual data based on fishermen lists and compliance reports. Availability of such lists would be of enormous help to recalculate expansion factors and total landings, and possibly, to have a better estimate of fishing effort as well as the variability about those estimates. If possible the data should include (but should not be limited to: the number and identification of the fishermen licensed by year; the number of fishermen harvesting; and the number of monthly reports submitted by the reported fishermen.

4.1.2.2.3. Total landings

Expanded (total) landings were calculated from the estimated (reported) landings and the Expansion Factor 1 (EF1) shown in Table 20 for each district. The expanded landings by year and district are given in Table 22 and illustrated in Figure 13.

Annual expanded landings evidently follow the same trajectory as the reported landings described in Section 4.1.2.2.1. However, the total landings for the whole period were incremented by approximately 54%, proportional to the overall effect of the annual expansion factors. Therefore, multispecies and multigear fishery of the U.S. Virgin Islands actually increased from 136,500 pounds in 1974 to 962,000 in 2002, with large fluctuations in between. Between 1974-1986, total landings increased from 136,500 to 1,700,000 pounds. This initial rise was followed by a sharp decline between 1986-1988, reaching the minimum level ever of 118,000 pounds in 1988. This, again may be partly attributed to misreporting and the inaccurate information available for those years. As with the reported landings, total landings experienced a sharp rise between 1988 and 1992, peaking at 4,500,000 pounds, the largest landings observed in the 15-year time-series. However, this level was not sustained, and by 1994 landings declined again to 1,700,000 pounds, around where they have been fluctuating ever since.

Compared to the reported landings, expansion factors for St. Thomas/St. John had a more dramatic effect on the overall landings for the whole period. The proportion of total landings for St. Thomas/St. John was approximately 64 % and 36 % for St. Croix.

The expanded landings presented here are approximations based on incomplete expansion factors (EF1) available at the time of this report. Collaboration between DFW and the SEFSC is needed to retrieve fishermen lists and compliance reports, which could serve in the calculation of new expansion factors. Then total landings may be better estimated.

4.1.3. Commercial Discards

There is currently no information available on discards from the U.S. Caribbean. There are, however, two proposals being drafted by the PR, DNER (MARFIN) and through the NOAA, CRP initiatives to assess discards in Puerto Rico and off St. Croix.

4.1.4. Commercial Catch Rates (CPUE/Abundance Indices)

4.1.4.1. Puerto Rico

It was noted that use of the Puerto Rico commercial sales records for use in developing abundance indices for silk and queen snapper had several limitations. These include, for years prior to 1997, that silk snapper landings also included the landings of other snappers. Catch rates for the silk snapper category thus would necessarily be inclusive of some unknown amount of landings of other snappers. Additional work on developing species-specific abundance for silk and queen snapper indices for years 1997 and later should be considered since these later years are free of this combined landings limitation.

In addition, information on effort expended from the Puerto Rico commercial sales landings records is problematic as many records reflect multiple-trips. It is recommended that the NMFS biologists work together with the Puerto Rico biologists to identify single trip records where possible for use in developing catch rates. Further cooperative work between Puerto Rico biologists and the NMFS biologist is also needed to identify individual species in the commercial landings data where landings are not combined with other species.

4.1.4.2. U.S. Virgin Islands

Standardized catch rate indices were constructed for silk and queen snapper using U.S. Virgin Islands TIP data. Index construction is documented in Cass-Calay and Valle-Esquivel (2003) (SEDAR4-DW-10 and SEDAR4-DW-11). Methods and results are described in detail in those documents. The general information is reproduced in this section.

NOAA, NMFS Trip Interview Program (TIP) sampling data were used to construct standardized indices of abundance for silk and queen snapper. The indices were constructed using a delta-lognormal approach (Lo et al. 1992), which combines two general linear models, a binomial model fit to the proportion of positive trips, and a lognormal model fit to catch rates on positive trips.

Due to variations in fishing location, depth of fishing and gear choice, we expect that many fishing trips had an intrinsically low probability of catching silk or queen snapper. Therefore, we excluded all trips that did not catch at least one member of the Caribbean deep-water snapper/grouper assemblage as defined by Cummings and Zweifel¹ (Table 23). Also, due to lack of observations, it was possible to construct indices only for the St. Croix hook and line samples (1984-1997). No trip interviews were available for this fishery after 1997.

The Caribbean SEDAR committee recognizes the value of the U.S. Virgin Islands TIP program. This program provides invaluable data which can be used to examine species composition, length frequency, length-weight relationships, nominal catch rates and construct standardized indices of abundance. The SEDAR committee recommends increasing the proportion of trips interviewed, and expanded sampling in St. Thomas and St. John. The committee also appreciates the expertise of the U.S. Virgin Islands biologists who administer and execute TIP sampling. We appreciate the assistance of these biologists and encourage their continued and enhanced involvement.

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4.1.4.2.1 Silk Snapper

Table 24 summarizes the positive trips, proportion positive trips, nominal CPUE, relative nominal CPUE (scaled to the mean), relative index estimates (scaled to the mean) and the variance of the index estimates, by time period (YEAR_CLASS). The relative nominal CPUE series and the delta-lognormal abundance index, with 95% confidence intervals, are graphically summarized in Figure 14. The standardized abundance index is quite similar to the nominal CPUE series, and has no consistent trend. However, in recent years (1992-1997) the index values are substantially lower than the standardized series average of 7.64 (the nominal average was 12.81 kg/trip).

Although the majority of the modeling diagnostics suggested adequate fits to the GLM models, the authors indicated concern about the low sample sizes. This concern was raised during the data workshop. The consensus of the workshop was that a minimum of 20-30 samples per year are necessary to construct a reliable index of abundance. During the entire period 1992-1997, less than 20 interviewed trips landed silk/queen snapper. Thus, the Caribbean workgroup recommends that the silk snapper nominal index be truncated at 1991, and that the delta-lognormal relative index be reconstructed using only the years 1984-1991.

4.1.4.2.2 Queen Snapper

Table 25 summarizes the positive trips, proportion positive trips, nominal CPUE, relative nominal CPUE (scaled to the mean), relative index estimates (scaled to the mean) and the variance of the index estimates, by time period (YEAR_CLASS). The relative nominal CPUE series and the delta-lognormal (Lo et al. 1992) abundance index, with 95% confidence intervals, are graphically summarized in Figure 15. The standardized abundance index is similar to the nominal CPUE series, and no consistent trend is apparent. However, like silk snapper, the most recent years (1992-1997) are lower than the series average. For the reasons discussed in the previous section (4.1.4.2.1), the Caribbean workgroup recommends that the queen snapper nominal index be truncated at 1991, and that the delta-lognormal relative index be reconstructed using only the years 1984-1991.

4.1.4.2.3 Blackfin Snapper

Due to time insufficiency, standardized abundance indices were not constructed for blackfin snapper landed by U.S. Virgin Islands commercial fisheries. However, the U.S. Virgin Islands TIP dataset includes over 400 trips that landed blackfin snapper. Including 195 handline trips and 161 trips that used pots and traps. In the future, it will be possible to examine nominal CPUE, and it may be possible to construct a standardized index of abundance.

4.1.4.2.4 Sand Tilefish

Due to insufficient data, it was not possible to construct standardized abundance indices for sand tilefish landed by U.S. Virgin Islands commercial fisheries. During the period 1984-1997, only six trips interviewed by U.S. Virgin Islands TIP port samplers reported landing sand tilefish.

4.1.5. Commercial Logbook Indices

There is no commercial logbook information available.

4.1.6. Commercial Sampling Intensity (Length/age/weight/species)

4.1.6.1. Puerto Rico

4.1.6.1.1. Sampling intensity

The NOAA, NMFS Puerto Rico Trip Interview Program (TIP) intercepts commercial fishing trips that land catch on the island. The most current available dataset, as of 11/03, contains information from nearly 29,000 trips during 1980–2003. However, very limited data is available before 1984 and 2003 trip information is incomplete. Table 26 summarizes the available data for interviewed trips by year and gear type. The ‘other’ gear category contains a variety of gears including spears, divers, nets and trawls.

The primary purpose of the Puerto Rico TIP sampling program is to obtain data for length composition and the length-weight relationship. Therefore, the data generally contains only observations of individual length and weight measurements, and the trip information associated with the catch (date, area, gear, days fished etc.). The data do not contain estimates of the sampling fraction nor the total weight or number of fish landed on a trip, by species or otherwise. It is not known how many of the Puerto Rico TIP samples were complete catch samples (i.e., 100% of the catch sampled for length and/or weight) therefore it is not certain if the species composition reflected from analyses of length data would reflect the species composition from the landed catch

The U.S. Virgin Island and Puerto Rico TIP samplers do not routinely collect hard parts for age composition. At the time of the SEDAR 4 data workshop, samples of length-at-age information were not available for any Caribbean deep-water species.

4.1.6.1.2. Species Composition

It is possible to examine the species composition of commercial landings using Puerto Rico TIP data assuming that the sampling was representative of the landings. For this analysis, we used the NODC code of the sampled individuals (NODCINDV). Ideally, species composition would be examined by weight; however length weight equations were not available to the working group for most of the species caught and the total weight landed, by trip, was not directly available from the Puerto Rico TIP data, nor is the sampling fraction. Species composition is essential to estimate the annual catch of some species (e.g. snappers) prior to 1997, because Puerto Rico reports aggregated landings of certain species groups in some years.

For each gear type, the annual percentage frequency distribution (in numbers of fish rather than the preferred weight of fish) of the ten most commonly observed species is summarized in Tables 27-32, and in Figures 39-44. In some cases (e.g. Gill and Trammel Net, Fish Pots and Traps), species composition shows consistent annual patterns. However, in others (Trolling, Longline) the species composition varies greatly from year to year. This may be an artifact of inadequate sample size or non-representative sampling. These results can be compared to similar information for the U.S.V.I. (Table 34).

Table 33 is a summary of the number of records that contain both length and weight measurements for all species recorded in the Puerto Rico TIP dataset. Each record is an individual

fish observed by a port sampler. For some species, numerous observations are available. These data could be used to examine length-weight relationships, and to convert species composition by number to species composition by weight. However, we found evidence of numerous uncertainties in both size measurements. We feel that these are mostly simple unit coding errors, which could be corrected on a species specific basis by an analyst familiar with the biological characteristics of the species.

4.1.6.1.3. Size Frequency

Size composition of the commercial landings was reviewed by Cummings and Phares and presented in document SEDAR4-DW-23 using the length frequency distributions sampled by the National Marine Fisheries Service, NMFS, Trip Interview Program (TIP). Information from that document is reproduced in this section. Tables 35-39 and Figures 24-28 are provided to illustrate the number of length frequency observations and the observed length frequency distributions sampled for three snappers commonly observed in the commercial fisheries of Puerto Rico, silk, blackfin, and queen. In addition the number of sand tile fish sampled annually is reported. These general summaries are provided for purposes of review to the SEDAR Data Workshop to establish the usefulness of these data for describing catch at size composition in future analyses of the commercial fisheries for these fisheries.

4.1.6.2. U.S. Virgin Islands

4.1.6.2.1. Sampling Intensity

Sampling intensity was estimated as the percentage of the total weight in the reported landings sampled by TIP. Tables 40-41 show the annual sample intensity for each district.

From 1984 to 1990, a relatively high proportion of the reported landings were sampled by the NMFS, TIP in St. Croix. In 1988, the TIP reported more total weight sampled than the reported total landings. Furthermore, the total reported landed weight during that year is the lowest in the period 1984-2002. Thus, we considered this reported value not to be reliable for data analysis. After 1990, the proportion of the total landings sampled by the TIP greatly decreased mostly due to a sharp increase in the reported landings and, to a lesser degree, to a decrease in the total weight sampled by TIP. After 1991, the average percentage of the total reported landings sampled by the TIP was approximately of 1%.

In the St. John/St. Thomas district the sampling was more sparse and lower in intensity. During the period 1984-2002, TIP only sampled a total of eight years. According to TIP, the percentage of the total reported landings sampled ranged from 0.1% to 2.1%.

4.1.6.2.2. Species Composition

Diaz and Valle-Esquivel (2003) (SEDAR4-DW-10) analyzed the species composition from the NMFS, Trip Interview Program samples (TIP) for commercial landings in the U.S. Virgin Islands. Information from that report is reproduced in this section.

The NMFS, TIP data set provides a record for each individual fish sampled. Species composition was estimated only from commercial landings records (i.e., fishing mode =1) and records where the sampled weight was not missing. A total of 251,867 records complied with the

criteria. Table 41 shows total landings and total sampled weights from TIP records for each district. Generally, where both total landings and sampled weights were reported, there was a good agreement between the two values. However, in St. John/St. Thomas from 1992 to 1995 TIP records only contain sampled individual weights and no landing weights (Table 41). Discrepancies between sampled weights and weight units were also found in 646 records (e.g. records indicating weight unit as kg but the sampled weight was expressed in grams). The eighteen gear categories in the 251,867 records were combined into four major gear groups as follows:

1.- Nets

- Gear 400: ENTANGLING NETS(GILL), UNSPECIFIED.
- Gear 425: GILL NETS, OTHER
- Gear 500: GILL NETS, GL 1-2 INCH
- Gear 505: GILL NETS, GL 2-4 INCH

2.- Pots and Traps

- Gear 300: POTS AND TRAPS, COMBINED
- Gear 345: POTS AND TRAPS, FISH

3.- Hook and Line

- Gear 600: TROLL & HAND LINES, COMBINED.
- Gear 610: LINES HAND, OTHER STILL FSH.BOT
- Gear 611: ROD AND REEL
- Gear 613: ELECTRIC OR HYDRAULIC REEL
- Gear 614: BUOY (vertical longline)
- Gear 616: ELECTRIC ROD AND REEL(HAND)
- Gear 655: LINES TROLL, TUNA
- Gear 660: LINES TROLL, OTHER TOP WATERS
- Gear 661: LINES POWER TROLL, OTHER
- Gear 675: LINES LONG SET WITH HOOKS TOP

4.- Spear/SCUBA

- Gear 760: SPEARS
- Gear 943: DIVING OUTFITS, OTHER

Table 41 shows the percentage of the total reported and expanded landings sampled by TIP. A relatively high proportion of the total reported and expanded landings were sampled in St. Croix from 1984 to 1990. These proportions sharply decreased after 1990. In the district of St. Thomas-St. John, NMFS-TIP only sampled in years 1985, 1986, 1987 and 1993 with percentages not higher than 2.1%.

The Tip Interview Program sampled weights were grouped by four gear groups described above. Tables 42-48 show the species composition expressed as percentage of total weight landed in each gear category by year and district.

To investigate the interannual variability of species composition by gear in the St. Croix district, we obtained a list of the ten species with the highest percentages by gear combining all

years. The percentage of these species in each gear, and year combination were then estimated and plotted and are shown in Figure 45. Figure 45a shows the species composition of sampled catches from Hook and Line. A sharp change in the species composition occurred in 1992. This change is most probably not the result of changes in the fishery itself, but of a sharp decrease of sampling by TIP of catches from this gear (Table 40). Similar changes in species composition over time were observed for the other gears (Fig. 45b-d) and are most probably the result of low sample sizes.

The variability of species composition observed over time raises the question if the TIP samples are representative of the entire commercial landings or not. We performed an exploratory analysis to compare species composition of both TIP samples and reported landings. After 1993, commercial landings were reported as total weight landed by species-complex (e.g. 'groupers', 'snappers', 'tunas', etc.). We estimated species composition of TIP samples by species-complex to compare with those from the reported landings. Figure 46 shows the species composition by species complex of both reported landings and TIP samples. The TIP samples do not accurately reflect the species composition of the reported landings. These observed differences could be the result of several factors. We believe that some of these differences are the result of sampling only very small fractions of the reported catches (Tables 40 and 41). However, we also acknowledge the possibility that the species and gear grouping performed in our analysis might not have followed the same protocol used by the scientists in the U.S.V.I. or might not reflect the way the fishery operates.

At the present time, we do not recommend using the TIP data to estimate species composition of the reported and expanded total landings. Further data analysis, with the help of local scientists from the U.S.V.I. with comprehensive knowledge of the fisheries, the biology of the species, and the NMFS TIP sampling program is necessary before a final decision can be reached regarding the TIP data set.

4.1.6.2.3. Size Frequency

The size composition of the commercial landings from the U.S. Virgin Islands was assessed by Diaz and Valle-Esquivel (2003) (SEDAR4- DW-14) and is reproduced in this section. Length and weight frequency histograms of silk and queen snapper sampled by TIP are presented. Table 49 shows the total number of silk and queen snapper sampled in each of the two U.S. Virgin Island districts (i.e., St. Croix and St. John/St. Thomas) by year. Silk and queen snapper were present in St. Croix TIP samples from 1983 to 1997 and in lower numbers in 2001 and 2002. In St. John/St. Thomas, TIP samples are sparser. Size frequency distributions (length and weight) of the sampled landings of each species in St. Croix are shown as histograms in Figures 29 to 33.

Figure 29 shows the length frequency distribution of sampled silk snappers in St. Croix together with the length at maturity of males and females according to Boardman and Weiler (1979). Figure 29 clearly shows that an important proportion of landed silk snappers in St. Croix are immature animals. Length at maturity of queen snapper was not available. Figure 33 shows the size frequency distributions in the St. John/St. Thomas only for those cases where at least 47 fish were sampled (i.e., silk snapper: 1985, 1992 and 1996; queen snapper: 1985).

Annual means, medians, 80th, and 90th percentiles of the sampled lengths and weights of both species in St. Croix were estimated and are presented in Figures 34 and 35. Both species show a declining trend in the values of these four statistics.

The results obtained in the analyses of size frequency reflect the same basic problem encountered during the analyses of species composition. In many cases, sample sizes are too small to draw any conclusions. In addition, it is not possible to perform any size frequency analyses by gear with the current data. The problem of small sample sizes is particularly clear in St. John and St. Thomas. Evidently, sampling effort should be increased not only in both districts, but it should also be apportioned across all sampling gears.

4.1.7. Commercial Catch-at-Age/Length

Information is not available to develop catch at length or catch at age composition for the commercial landings of silk, queen or blackfin snapper or sand tilefish for either the Puerto Rico or U.S.V.I. platform.

4.2. Recreational

4.2.1. MRFSS

4.2.1.1. Overview

Detailed information from recreational fisheries in the U.S. Caribbean can be found in SEDAR4-DW-15 (Cummings *et al.* 2003). The main findings are presented below.

Recreational fishing in the U.S. Caribbean can be a significant source of fishing mortality, and consists of activities by both locals and tourists. Presently, recreational fishers are not required to have a license or permit. Puerto Rico requires the registration of recreational vessels. In the Virgin Islands, recreational fishers are also moving toward a recreational license system. However, information on recreational fishing activities is generally lacking.

The Marine Recreational Fisheries Sampling Survey (MRFSS) surveys recreational fishers to provide information on the number and attributes of recreationally-caught fish, both those retained and released. This survey protocol has not yet been implemented successfully in the U.S. Virgin Islands. Jennings (1992) performed a telephone survey of U.S.V.I. recreational fishers in 1986. The Eastern Caribbean Center (2002) performed a smaller survey in 2000. These studies should be examined further. Otherwise, no data are available from the U.S.V.I. for the recreational fisheries.

The MRFSS has been conducted in Puerto Rico since 2000. This survey provides estimates of total fish landed, the variance of the total, and auxiliary information on the sizes of fish caught and their fate—retained or released. Consequently, the focus of this report is on recreational fishing activity in Puerto Rico.

4.2.1.2. Landings

It is estimated that over 300,000 silk, queen, and blackfin snapper, and sand tilefish were caught recreationally in Puerto Rico between 2000 and mid 2003 (Table 50, Figure 47). Most recreational activity was boat-based (Cummings *et al.* 2003) (Figures 47 and 48), and few fish were released (Table 50). Of these four species silk snapper were reported in the recreational catch most often, followed by queen snapper, blackfin snapper, and finally sand tilefish.

4.2.1.3.Discards

Data from Puerto Rico indicate that few fish caught recreationally are released. Anecdotal information suggests that the vast majority of fish caught in the U.S. Caribbean are retained for the market or for personal use—including species of low market value. With the exception of species that are commonly believed to be ciguatoxic, discards in this region are believed to be minimal.

4.2.1.4.Catch Rates (CPUE/Abundance Indices)

Because of the short time series of data from the recreational fishery in Puerto Rico, it was not considered useful to examine catch rate patterns.

4.2.1.5.Sampling Intensity

Sampling intensity for the recreational sector is defined here as the number of fish measured (Table 51). Size frequency information was also collected by sampling recreationally caught fish as they were landed. Of the estimated 315,000 silk, queen and blackfin snapper and sand tilefish caught recreationally in Puerto Rico between 2000 and 2003, only 285 were measured, accounting for 0.09% of the total estimated recreational catch. Sampling intensity varied from year to year and species to species (Table 51). Queen snapper were sampled most frequently (0.15%), followed by sand tilefish (0.12%), blackfin snapper (0.11%), and silk snapper (0.08%). The greatest fraction of recreational catch was sampled in 2001 (0.12%), followed by 2002 (0.09%), 2003 (0.08%), and 2000 (0.07%).

4.2.1.6.Catch-at-Age/Length

In Puerto Rico, lengths were taken from a number of silk, queen, and blackfin snapper, and sand tilefish caught in the recreational fishery. The vast majority of sampled fish came from private boat-based anglers. Only two in the sample of 285 fish came from shore catches. Size frequencies of each species by year are presented in Tables 52-55 and Figures 49-54.

5. Fishery-Independent Survey Data

5.1. SEAMAP Survey Description

In general, the fishery-independent survey data promises improved insight into the fisheries of the U.S. Caribbean. Yet, much work needs to be done. Only one of three datasets have been analyzed thus far. And, even for the data that have been analyzed, distinctions were not made between samples taken from the shelf around St. Croix, U.S. Virgin Islands, and those taken from the shelf around St. Thomas and St. John. This distinction could be important and should be examined because of the deep trench that separates St. Croix from other parts of the Virgin Islands and Puerto Rico. Such analyses are ongoing and involve cooperative efforts with Aida Rosario from Puerto Rico's Department of Natural Environmental Resources, Fisheries Research Laboratory (DNER-FRL).

5.1.1. Methods, Gears, and Coverage

The Caribbean SEAMAP sampling program is described in detail in Ingram (2003) (SEDAR4-DW-24). Excerpts from that document are presented in this section, with new information provided by Sladek Nowlis, Cummings and Rosario (pers. com.).

Caribbean SEAMAP data come from three different sampling programs. The first program was conducted by NMFS, SEFSC, Pascagoula laboratory from 1975 to 1984. It sampled 1646 stations, mostly using longlines (see Table 56). However, the gear was not standardized; the number of hooks differed among sets and longline gear was not always used. If one made the assumption that the number of hooks was consistent, then the longline-collected portion of this early data could possibly yield useful information. This analysis should be the focus of future work on the Caribbean SEAMAP database.

The second sampling program has run since 1991, with data available through 2002. NMFS, SEFSC, Pascagoula laboratory scientists have sampled 6,432 stations thus far, using a combination of handlines and fish traps (Table 57). Surveys from Puerto Rico were conducted once or more annually from 1991 through 1995, but data are not currently available for more recent years. Additional data may exist with scientists in Puerto Rico—this should be pursued. In the U.S. Virgin Islands, surveys have been conducted intermittently since 1992, with the last survey on St. Croix in 2002. Future efforts should strive to distinguish sampling on St. Croix from sampling on St. Thomas and St. John in the U.S. Virgin Islands. Data were analyzed separately for each area (i.e., Puerto Rico or the Virgin Islands) and each gear (i.e., handlines or fish traps). Sample sizes by area, gear, and year are reported in Table 58.

A moderate amount of data is available to examine size composition and catch rates from the U.S. Caribbean from fishery independent surveys. Regarding the four focal species, insufficient data were available to examine queen snapper. They only showed up in handline sampling from Puerto Rico, and even then in very small quantities (Tables 59-62). More data was available for silk snapper, blackfin snapper, and sand tilefish. For silk snapper, a moderate number of samples were available from handlines in Puerto Rico, with less data from traps in Puerto Rico or handlines in the Virgin Islands. The situation was similar for blackfin snapper but with even less data from handlines in the Virgin Islands and an equally small amount from traps in the Virgin Islands. More data exist from sand tilefish, especially from handlines in Puerto Rico. There was a moderate amount of data from handlines in the Virgin Islands, and less data from traps in both the Virgin Islands and Puerto Rico.

A third fishery independent sampling program may provide additional information about reef fish populations in Puerto Rico, but has not yet been analyzed. Aida Rosario, from Puerto Rico's DNER-FRL, has provided data to NMFS scientists from sampling efforts that included mostly handline, but also a few trap sampling stations, from 1988 to the present (Table 63A). These data cover a total of over 1,500 stations, about half of which had catches of deepwater snappers or sand tilefish. Hook and line gear was used at the majority of these stations. Over 5,000 fish of the focal species were sampled, mostly sand tilefish (N = 3282), silk snapper (N = 922), and blackfin snapper (N = 817). However, these samples were spread out over more than a decade, so that the median sample size per species per year was 29, although the mean was 90.2, driven by the consistently high sample sizes of sand tilefish (Table 63B). These data are likely to provide some information on catch per unit effort, even coarser information on the full complement of size

frequencies, and possibly useful information on average sizes. Further analyses are recommended, particularly on sand tilefish, silk snapper, and blackfin snapper.

5.1.2. Size/Age data

There were very few size observations of queen snapper in the NMFS SEFSC SEAMAP data base for 1991-2002. For silk and blackfin snapper in that NMFS SEAMAP data there were sufficient observations to examine size frequencies by gear for Puerto Rico (Fig. 36-37), but were insufficient for developing advice about the condition of the U.S.V.I. populations. There were sufficient data to examine size frequencies of sand tilefish in handline samples from both Puerto Rico and the U.S. Virgin Islands (Fig. 38). These data were aggregated across years so do not provide information about temporal trends, but they could provide some utility when compared to reference points such as the size at maturity or maximum size. Another analysis that could be informative would be to examine the mean and range of the size distribution each year.

5.1.3. Catch Rates – Number and Biomass

Overall catch rates in the NMFS SEFSC SEAMAP data base for 1991-2002 were calculated for each gear type in each area (Tables 59-62) by dividing overall catch rates by hours fished and then multiplying by 1000 (to yield catch per 1000 hours fished). Comparing areas assumes consistent sampling methods in Puerto Rico and the Virgin Islands. Comparing gears is more problematic and is primarily useful in increasing the number of species that are adequately sampled.

Sampling frequency in the NMFS SEFSC SEAMAP data base for 1991-2002 was much higher for some more common species living in shallow water. Red hind, *Epinephelus guttatus*, and coney, *E. fulvus*, were caught most frequently. Red hind were caught at the highest rates in Puerto Rico by both gears, followed by coneys at about half the rate (Tables 59-60). Coney was caught nearly an order of magnitude more frequently than other species in the Virgin Islands by both gears (Tables 61 and 62). In the Virgin Islands, red hind had the second highest catch rates by handlines and the fourth by fish traps. These species were represented in catches from each gear type in each year and area, excepting only the Virgin Islands in 1993, during which sampling was extremely light. Their catch rates (per 1000 hours fished) are graphed by area, gear, and year in Figs. 16-19. These data suggest a possible decline in coney and red hind in Puerto Rico from 1991 to 1995, but show no temporal trend in the Virgin Islands.

Catch rates (per 1000 hours fished) of four focal species in the NMFS SEFSC SEAMAP data base for 1991-2002 are illustrated in Figs. 20-23. Virgin Islands data were too sparse to examine temporal patterns for any species, with only enough data to look at sand tilefish (Fig. 23). In Puerto Rico, there were more extensive data that allowed examination of temporal patterns for sand tilefish, silk snapper, and blackfin snapper (Figs. 20-22). These data do not indicate any obvious trends in the CPUE of these species from 1991 to 1995.

5.1.4. Uncertainty and Measures of Precision

Fishery-independent surveys in the U.S. Caribbean provide limited information on the four species of current interest (silk, queen, and blackfin snapper; and sand tilefish). Sampling effort is generally low in the U.S. Virgin Islands, with intermittent temporal coverage and small sample sizes

in any given year. In Puerto Rico, there are years when sampling was far more extensive (i.e., 1992-94). Trap sampling has consistently been more prevalent than handline sampling in both areas, but catch rates were higher for the four focal species in handline sampling. The current level of sampling effort in the U.S. Virgin Islands is low enough that the data for the four focal species, may be of limited utility.

Significant uncertainty surrounds the size frequencies of silk, queen, blackfin snapper, and sand tilefish in the U.S. Caribbean. Additional analyses may be able to identify temporal trends in the mean size or size range for some of these species. At present, and in large part because of limited data, size frequency information is too aggregated to inform an assessment.

Uncertainty in catch rate was quantified and is represented in Figs. 16-23. These graphs include error bars representing one standard error. There were additional effects on catch rates (gear and temporal) which need to be more extensively examined to determine their usefulness for estimating stock status.

6. Research Recommendations

6.1. Recommendations for the collection of landings statistics

6.1.1. Puerto Rico

In Puerto Rico it is important to determine the feasibility of expansion factors to estimate total catch. The information used to calculate expansion factors by year needs to be verified. Reporting of single trips, rather than multiple-trips per record in the catch report forms should be encouraged. This would greatly facilitate the estimation of effort and CPUE.

6.1.2. U.S. Virgin Islands

The collection of landings statistics in the U.S.V.I. should also aim at breaking down the reported catch into species, since analysis of the current species-groupings is not straightforward without additional information on species composition from TIP or alternative sampling programs.

The information used to calculate expansion factors by year (number of fishermen registered, reporting, etc.) needs to be corroborated, and the feasibility of these expansion factors for estimation of total catch needs to be determined.

Further examination and analysis of the data sets available to date would require an improved collaboration between local and SEFSC biologists. In particular, it is important to determine what species were commonly grouped within each gear-type classification in the 'Old Report Forms'. This information would help to break up the aggregated catch from years prior to the implementation of the Trip Interview Program.

Landings files for most years for the period 1974-2002 have now been compiled and provided to the SEFSC. However, some coding, typing and other errors, duplicates, as well as gaps in the time-series still persist. Action is required to verify, correct the errors and edit those data for future use. Significant effort should be geared toward the standardization of the landings series.

Finally, it would be important to encourage fishermen to submit all the monthly catch reports, to submit reports for months when they do not fish, and to complete all the fields in the reports, since critical information such as effort, gear, and location fished are often missing or incomplete.

6.2. Recommendations for the Trip Interview Program (TIP)

- Encourage the development of length-weight equations from the existing information in TIP

Specific recommendations for Puerto Rico TIP include:

- Record the total weight landed by species for each trip.
- Record the sampled fractions.
- Coding errors in length and weight units must be corrected.

Specific recommendations for U.S. Virgin Islands TIP include:

- Encourage/ aid the development of a commercial logbook system to enable estimation of reporting fractions.
- Increasing the fraction of interviewed trips (the sampling fraction needed to achieve specific objectives will depend on the objective and the variability of the observed species composition) to properly determine the species composition., which is needed to break out the aggregated catches.
- Conduct regular interviews in St. Thomas and St. John, with the goal of increasing the sampling fraction.
- Encourage port samplers to complete all the fields in the sampling form. Often the trip effort information is missing, which is essential for the estimation of catch rates or relative indices of abundance.
- Continued and enhanced collaboration between the NMFS SEFSC scientists and the local USVI biologists and data collection agents.
- Correct coding errors, particularly in length and weight units.

Some questions that could be posed to local USVI biologists to improve the analyses of TIP data are:

- 1) How is the species in question landed, gutted or whole, etc.? How are length and weight typically recorded?
- 2) Is the species in question targeted or by-catch of another target species?
- 3) What species are often landed in association with a given species?
- 4) Is the species ever reported under a different name? For example, another species id, or a genus or family designation?

- 5) Are there environmental factors that might influence the abundance or catch rates of a given species?
- 6) Have management efforts, economic impacts, weather events, or other factors influenced fishing effort, catch rates or targeting?
- 7) Have fishery attributes changed (gear, boat type, technology, species targeted, skill of fishers etc.) changed during the period of monitoring. If so how?
- 8) Are interviewed trips chosen randomly? If not, what potential biases might exist in the dataset?

6.3. Recommendations for the estimation of catch rates

The following issues must be addressed to improve or construct catch rates for Puerto Rico and the U.S. Virgin Islands:

- In Puerto Rico the total catch by species for each trip in the TIP data is required. It has to be determined whether assumptions can be made regarding sampling fractions in TIP data to allow construction of Puerto Rico's CPUEs.
- The SEDAR Committee recommended that CPUEs for the U.S.V.I. be recalculated for a truncated time series (1984-1991), given that sample sizes for subsequent years are very limited.
- It is important to explore the availability of other fisheries-independent CPUE series.
- Standardization approaches for data-poor species, different from the delta-lognormal, need to be evaluated.
- The use of bootstrapping to estimate confidence intervals of the CPUE series should be investigated.
- The use of multivariate statistical analysis is recommended to identify the appropriate pool of gears to use when measuring effort.

6.4. Recommendations for the analysis of species composition

- In Puerto Rico, it is important to recommend increased interviews with an emphasis on representative sampling, and to record the sampling fraction.
- Eventually, if Puerto Rico moves toward reporting landings by species, it will be advisable to compare TIP and landings species composition.
- In the U.S.V.I., it is important to examine the species composition on handline and trolling trips separately, and to evaluate whether sampling is representative.

6.5. Recommendations for the Caribbean SEAMAP Survey

- Encourage continued annual surveys throughout the area.
- Determine the spatial/temporal coverage in fine detail.

- Data analysis and interpretation must address the temporal patterns observed in the size-frequency distributions.

Regarding the shallow reefish monitoring fishery-independent survey in Puerto Rico:

- Coordinate with NMFS to make this data readily available.
- Explore the CPUE and size-frequency data available from this data set.
- Compare with the other SEAMAP data set.

6.6. General Recommendations

- Continue and improve collaboration with scientists from Puerto Rico and the U.S. Virgin Islands. Advice is needed in terms of handling the data, interpreting it, correcting coding errors, duplicates, and other problems in the data collection, recording, and editing systems. Local scientists and staff can help to understand the sampling protocols, documenting the observed trends, and filling out persisting gaps in the time-series.
- Continued data exploration must be made with consultation of the local laboratories/agencies, including the biologists, field agents, and data-entry staff.
- There is a possibility that the data will have limited value for assessment in the near future; however, continued analysis and improved data collection may greatly increase the utility of the information. The fishery-dependent data from Puerto Rico in particular has a good potential for use in stock assessment.
- Emphasis should be placed on the improvement of the TIP sampling program, as catch rate standardization, catch composition and size-frequency analyses will continue to rely upon this information. However, fishery-independent surveys and the collection of other biological data are extremely important to develop alternative indices of abundance.
- It is recommended that early biological or biostatistical sample data for the U.S. V.I., from the early to mid 1970's be computerized and made available for future data workshops. It is strongly recommended that formal discussions between NMFS, SEFSC TIP program coordinator and the USVI DFW are held to ascertain what steps/procedures, etc. are needed to improve sampling in the U.S.V.I. fisheries. Similarly, discussions should be initiated between Puerto Rican biologists and NMFS assessment staff to identify any remaining historical data sets not yet available. It is noted that an effort to computerize Puerto Rico biostatistical samples from the mid 1980's is ongoing (N. Cummings personal communication).
- It is recommended that analytical efforts expended by the recent working group members be continued. First, some attention should be given towards identifying or selecting which species should be assessed more quantitatively. The Caribbean reefish fisheries are complicated comprising a mix of many species that are harvested by a number of gears.
- It is recommended that additional workshops such as this one be implemented to further develop the information for assessment, especially for those species and fisheries for which extensive information exist.
- It is noted that that strong cooperation of all agencies and local scientists involved would be beneficial.

6.7. Data Workshop Conclusions on the Availability of Data for Stock Assessments

The workshop participants reviewed summaries of the information presented by the Caribbean group which might be used to assess the status of silk, queen and blackfin snapper and sand tilefish on each platform (Table 64). For the Puerto Rican platform the availability of information was examined for three data sources: Puerto Rico, the United States Virgin Islands and the British Virgin Islands.

6.7.1. Puerto Rican platform

For Puerto Rico, reported commercial landings are available in electronic form only since 1983 although the local fisheries were exploited since the early 1900's. Efforts are underway to obtain previously computerized data files of landings for 1963-1982 (N. Cummings personal communication). These early landings statistics could better characterize fishing mortality levels on this multi-gear/multi-species fisheries complex and efforts should be made to extract these data.

Snapper landings in the Puerto Rico database are apparently aggregated for multiple species within the 'silk snapper group' in the Puerto Rico database before 1997 (after 1996 silk snapper is apparently not aggregated with other species) (Aida Rosario personal communication). Estimates of the landings of those snappers probably can be made given some assumptions about the species composition information from dockside sampling after considerable additional effort (see section 4.1.6.1.2) and consultation with Puerto Rican biologists who are familiar with the data collections and fisheries. It is strongly recommended that cooperative analyses be initiated between scientists from Puerto Rico and NMFS to accurately quantify species composition from these data. Analyses should take into account the highly variable operations of the local fisheries.

For sand tilefish annual landings are less than 1,000 lb and in most years less than 50 lb (Table 16). The dockside sampling (TIP) data which might be used for species composition had very few sand tilefish recorded (Tables 43 and 51-56) so that if sand tilefish landings had been included in the various unclassified categories, it would not be possible to estimate the amount of sand tilefish in such landings.

For Puerto Rico the recreational harvest of the three snapper species (Table 50) are thought to be relatively low compared to the commercial landings. Because they are thought to be low, the absence of recreational harvest estimates prior to 2000, was thought not to be a major problem for assessment of these stocks, given the other uncertainties in the data sets.

The landings in the United States Virgin Islands have not been recorded by species; therefore species composition information would be needed for St. John and St. Thomas to estimate catches by species. Only limited species composition samples have been collected from those islands, therefore estimates of the landings by species have not been made. Additionally there is no information on possible recreational harvests of these species around those islands. Also there was no information available at the workshop on the British Virgin Island fisheries. It is noted that an effort is ongoing to obtain historical information on landings and biostatistics samples for the British Virgin Island (BVI) fisheries (N. Cummings) for use in future data workshops regarding the Puerto Rico platform. It is also recommended that biologists from the BVI fisheries department be included in future data-workshops that involve the appropriateness of the use of data from the BVI in characterizing reefish stocks on the Puerto Rican platform.

Information on size composition is available for the three snappers from the Puerto Rican commercial fishery and a limited amount of information is available for silk snapper from the recreational fishery. Additionally, there are ample observations on the size of sand tilefish taken in the fishery-independent sampling near Puerto Rico, and there possibly are sufficient samples for silk and blackfin snappers from those surveys. For St. Thomas and St. John there are few or no size samples from the commercial and recreational fisheries. The workshop participants have not determined whether there were fishery independent samples from that area.

It is expected that crude information on commercial catch rates could be obtained for the three snappers from expanded annual landings and estimated deep water effort for Puerto Rico; it seems unlikely however that the TIP data could provide reliable indices of abundance for those species, because it does not appear that the total landed weight for a species was recorded and it appears that in general not all fish were measured. It is likely that the fishery independent sampling could be used to develop an index of abundance for sand tilefish, and probably also for silk and blackfin snapper. There do not seem to be sufficient data for calculating fishery dependent catch rates from St. John and St. Thomas.

In summary for the Puerto Rican platform:

For the Puerto Rican platform it seems that multiple years of commercial landings might be developed for the three snapper species from reported catches and species composition data. However it would best if these tasks were done in consultation with scientists familiar with the fisheries and the specific datasets. Those catches would however represent only a part of the total removals.

Some information can probably be obtained from the TIP collected size frequency of the commercial catch for the three snappers. It is recommended that analytical effort focus on further review of the available size frequency samples.

Of all of the available data sets, the fishery independent sampling on the Puerto Rican platform conducted by the NMFS, SEFSC and by the PR, DNER, FRL FSP may be most likely to provide indications of the abundance trends of at least silk and blackfin snapper and sand tilefish on the Puerto Rican platform. It is recommended that analytical efforts focus on aggregating those data sets and developing abundance indices.

6.7.2. St. Croix platform

The landings data from St. Croix probably can be disaggregated into species-specific data sets, but is restricted to a limited number of years when species composition is available and the landings are categorized by species-groups. However, the generally low sampling fractions indicate that there would be very great uncertainty about the estimated landings by species. Disaggregating the catch from the earlier years, when no species composition is available and landings were recorded by gear category may be cumbersome.

Added to these issues is the possible imprecision in the estimation of the total catch based on expansion factors. These will be more reliable once compliance reports are reviewed and reanalyzed for the full time-series. Given these uncertainties, the overall utility of the catch for use in stock assessment is questionable at the moment, particularly for years prior to the implementation of the TIP program.

The decrease in the mean size and the size of the larger (80th percentile) of both silk and queen snapper landed in St Croix between 1983-1996 could have been an indication of over harvesting. Additionally that the majority of silk snapper are below the estimated size at maturity would have been of substantial concern if fishing mortality rates were high.

The standardized commercial catch rates calculated from the TIP samples from St. Croix were based on relatively few observations and the time series ends in 1991 (too few observations in subsequent years). Thus, they do not provide information on the current status of the resource. It is recommended that cooperative efforts be initiated by NMFS, SEFSC and the USVI DFW to address improvements in sampling the nearshore reefish fisheries off these islands.

It is possible that the fishery independent sampling (1992-1994, 1999, 2002) conducted by the NMFS, SEFSC Pascagoula Laboratory off the Virgin Islands could provide useful information, but it was not clear to the workshop participants what portion of that sampling occurred on the St. Croix platform. Once again it is recommended that examination of the fishery independent data be given high priority in terms of expending analytical time.

Participants at the workshop understood that additional fishery independent data sets may exist for both the Puerto Rican and the St. Croix platforms particularly from *in situ* observations. It was recommended that efforts be made to obtain that information for possible use in developing additional indications of population status.

7. Stock Assessment Methods**7.1. Model 1****7.1.1. Overview****7.1.2. Data Sources****7.1.3. Model Configuration****7.1.4. Parameters Estimated****7.1.5. Uncertainty and Measures of Precision****7.2. Model 2 etc.****8. Stock Assessment Results****8.1. Model 1 Results (Estimates and Measures of Precision)****8.1.1. Stock Abundance at age****8.1.2. Stock Biomass (total and spawning stock)****8.1.3. Selectivity****8.1.4. Mortality****8.1.5. Stock-Recruitment Parameters****8.1.6. Retrospective and Sensitivity Analyses****8.1.7. Total Mortality****9. Biological Reference Points (SFA Parameters)****9.1. Existing Definitions and Standards****9.2. Estimation Methods****9.3. Results****9.3.1. Overfishing Definition****9.3.2. Overfished Definition****9.3.3. Control Rule****9.4. Status of Stock Declarations****10. Projections and Management Impacts****10.1. Probable Future Stock Conditions****10.1.1. Projection Methods****10.1.2. Projection Results****10.1.2.1. Stock Status****10.1.2.2. Abundance****10.1.2.3. Biomass****10.1.2.4. Exploitation****10.2. Management Outcomes and Risk Analysis****10.2.1. Impacts of Current Actions****10.2.2. Impacts of Potential Alternative Actions****11. Research Recommendations****12. Literature Cited****13. Tables****14. Figures****Section III. Workshop Reports****1. Data Workshop****1.1. Participants**

- 1.2. Working Documents List**
- 2. Assessment Workshop**
 - 2.1. Participants**
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- 3. Review Panel**
 - 3.1. Consensus Report**
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Appendix A. Abbreviations and Acronyms

allowable biological catch (ABC)	Marine Mammal Protection Act (MMPA)
advisory panel (AP)	Marine Recreational Fisheries Statistical
biological opinion (BO)	Survey (MRFSS)
biomass (B)	maximum fishing mortality threshold
carapace length (CL)	(MFMT)
catch (C)	maximum sustainable yield (MSY)
catch per unit effort (CPUE)	minimum stock size threshold (MSST)
Caribbean Fishery Management Council	National Environmental Policy Act (NEPA)
(CFMC)	National Marine Fisheries Service (NOAA
Code of Federal Regulations (CFR)	Fisheries)
draft environmental impact statement (DEIS)	National Marine Fisheries Service Southeast
Division of Fish and Wildlife – U.S. Virgin	Regional Office (SERO)
Islands (DFW)	National Oceanic and Atmospheric
Department of Natural and Environmental	Administration (NOAA)
Resources–Puerto Rico (DNER)	national standard (NS)
Endangered Species Act (ESA)	national standard guideline (NSG)
environmental impact statement (EIS)	natural mortality rate (M)
essential fish habitat (EFH)	optimum yield (OY)
exclusive economic zone (EEZ)	Paperwork Reduction Act (PRA)
Federal Register (FR)	Puerto Rico (PR)
final environmental impact statement (FEIS)	Regulatory Flexibility Act (RFA)
fishery management plan (FMP)	regulatory impact review (RIR)
fishery management unit (FMU)	spawning potential ratio (SPR)
fishing mortality (F)	spawning stock biomass (SSB)
fork length (FL)	supplemental environmental impact statement
habitat area of particular concern (HAPC)	(SEIS)
highly migratory species (HMS)	Sustainable Fisheries Act (SFA)
Magnuson-Stevens Fishery Conservation and	submerged aquatic vegetation (SAV)
Management Act (MSFCMA)	total allowable catch (TAC)
	total length (TL)
	U.S. Virgin Islands (USVI)

Carib -Table 1. Summary information on the fecundity of silk snapper from the published literature.

Study	Study area	Study Period	Maturity and Fecundity information	Spawning Period or Season
1. Thompson and Munro (1973)	Jamaica	November 1969 - March 1973	50% maturity 50-55 cm females, 55-60 cm fl males	Spawning year round.
2. Erdman 1976 cited in (2)	Puerto Rico	1976	Spawnd year round	
3. Grimes et. al. 1977	North Carolina	1970's	Spawnd year round with two peaks (July-September) October-December	
4. Boardman and Weiler 1979	Puerto Rico	1978	50% maturity 50cm females,38 cm males	Spawning year round
5. Sylvester et al. 1980	U.S. Virgin Islands	July 1972 - September 1973	Range in length 25.5 cm to 63.0 cm, n=24 mean # eggs = 108,000 range = 9,000 to 299,000	Not clearly identified in the study Authors suggested fish may spawn throughout the year
6. Collaxo 1983 or 1984 Comment: Copy of report read an in author's possession however, no year given of publishing.	Puerto Rico (San Juan, Mayaguez, Ponce)		n=2201 fish	Spawning observed year round (Table 7 that report) with peaks observed in 2 periods (April-June, October-December).

Carib. -Table 2. Summary information on length to age relationship for silk snapper from the literature.

Parameter	Units	Estimate	Reference	Sample Size	Study Area	Sampling Dates	Analysis Method
1. L infinity k tzero theta theta-prime	cm year year	62.0 0.32 -0.04 0.85 3.09	Tabash and Sierra 1996	1,867	Costa Rica	Sampled 8/1992-11/1994 monthly samples taken	ELEFAN I as implement in FiSAT (Gayaniilo et al. 1996)
2. L infinity	cm	70.0	Thompson and Munro (1974)		Jamaica		
3. L infinity k tzero theta theta-hat	cm year year	53.0 0.35 2.99	Reshetnikov and Claro 1974		Cuba		From otoliths and urohyal bones
4. L infinity k tzero theta theta-hat	cm year year	76.0 0.14 3.30	Garcia 1979		Cuba		Length based
5. Maximum size	cm	115.0	Sylvester et al. 1980.		Virgin Islands	Sampled 7/1972 - 8/1973 (Tobago Cay and south of Frenchcap Cay)	Walford Plot
6. L infinity k tzero n=45 otoliths; 3 separate redions taken	cm year year	59.25 0004.00 (4.0*10**-4) -522.02	Musa et al. 1983.		Puerto Rico		
Comments: 1) Fitting method not given; estimates of growth rate parameter (k) and tzero are suspect. 2) Authors noted difficulty in making mesuremetns in this species. 3) sample set did not contain fish at younger/smaller sizes below 12 cm FL.							
7. L infinity k tzero theta theta-hat rings not annual	cm year year	72.9 0.09 -2.64 2.68	Claro and Garcia-Arteaga 1994		Northeast Zone Cuba		Hardpart Analysis
8. L infinity k tzero theta theta-hat rings not annual	cm year year	75.7 0.1 -2.08 2.76	Claro and Garcia-Arteaga 1994		Southeast Zone Cuba		Hardpart Analysis
9. Maximum size	cm	76	Bolkle and Chaplin 1968		Bahamas		

Carib-Table 3. Summary information on length to length relationships for silk snapper from the literature.

1. Unsexed Fish
 Regression: SL = 0.7 + 0.86 x FL
 Number of fish: 47 r:
 Length range (cm): 23.0-52.0 Data Ref.: Manooch and Mason 1984
 Units : cm
2. Unsexed Fish
 Regression: TL = 0.9 + 1.04 x FL
 Number of fish: 47 r:
 Length range (cm): 23.0-52.0 Data Ref.: Thompson and Munro 1974
 Units : cm
3. Regression: TL = 0.0 + 1.072222 x FL
 Comments: Based on measurement of picture, in MORPHMET table from ICLARM Fishbase.
 Units : Cm
 4Regression: TL = 0.0 + 1.229299 x SL
 Comments: Based on measurement of picture, in MORPHMET table from ICLARM Fishbase.

Carib-Table 4. Summary information on weight to length relations for Silk snapper from the literature.

Equation	Sample Size	Study Area	Length Range(cm)	Sampling Dates
1. Tabash and Sierra(1996): Weight (grams)= 0.00009 * Fl (mm)** 2.91	n=200 fish r-square =0.90	Costa Rica	18-54	9/1992 to 11/1994
2. Sylvester and Dammann 1973: Log Weight(kg) = -3.47058 + (2.41350*Log(Fl cm))	n=35 fish	U.S. Virgin Islands, Anegada, Virgin Gorda		
3. Boardman and Weiler 1979 Log Weight(grams)= 3.10 * Log (Fl mm) - 5.00	n=30; r=0.99	Puerto Rico		
4. Sylvester et al. (1980): No equation given, tables of raw lenth data presented figures of w-l equation presented	n=95	U.S. Virgin Islands		
5. Musa et al. 1983 Log Weight(grams)= 2.92 * log (FL Cm) - 4.60 Parameter estimates are suspect	n=121	Puerto Rico	12-39	1977-1979
6a. Bohnsack and Harper 1988 Log Weight(grams)= -4.2096 + (2.781 * log (Fl mm))	n=165	St. Croix	22-65	
6b. Bohnsack and Harper 1988 Log Weight(grams)= -4.6001 + (2.913 * log (Fl cm))	n=36	St. Thomas/St. John	20-64	
6c. Bohnsack and Harper 1988 Log Weight(grams)= -5.3646 + (3.237 * log (Fl cm)) Log Weight(grams)= log a + b(log FL (mm) from Bohnsack and Harper 1988, pg. 9	n=181	Puerto Rico	15-40	
7. Claro and GarcNa-Arteaga 1994 Log Weight(grams)=0.0166* log (Fl cm) - 3.03		Cuba (Southeast)	19-56	
8. Duarte et al. 1999 Log Weight(grams)=0.0456* log (Fl cm) - 2.8	n=18	Colombia	10.2-31	1995-1998

Carib-Table 5. Summary information on length to length relationships for queen snapper from the literature.

Sex of fish: unsexed

Regression: $SL(cm) = 0.0 + 0.7664233 \times TL (cm)$

Number of fish: 2 r:

Length (cm): 42.0-95.0 TL Data Ref.:

Comments: Derived from data in the BRAINS table in Fishbase.

Units : cm

Sex of fish: unsexed

Regression: $TL(cm) = -0.986 + 1.159 \times FL(cm)$

Number of fish: 394 r:0.964

Length (cm): Data Ref.: Murray and Moore 1992 .

Comment: 1987 samples off Saint Lucia between August and November.

Units : cm

Carib- Table 6. Summary information on weight to length relations for queen snapper from the published literature.

Equation: $\log(\text{Total weight (grams)}) = \log a + b (\log FL \text{ cm})$

a	b	Length range	n	Country	Location	Reference
0.0233	2.55	36.0 - 89.0 FL	21	US Virgin Is	St. Thomas/St. John	Bohnsack and Harper 1994
0.0173	2.578	20.0 - 70.0 FL	48	US Virgin Is	St. Croix	Bohnsack and Harper 1994
0.0632	2.771		62	Saint Lucia		Murray and Moore 1992

Carib-Table 7. Summary information on length to age relationship for queen snapper from the literature.

1.	Parameter	unit	Value	Referemce	Country	Sampling Dates	Analytical Methods
	L infinity	cm	102.0	Murray and Moore 1992	Saint Lucia	Sampled 1/1987-12/1987	ELEFAN I as implement in FiSAT (Gayanilo et al. 1996)
	k	year	0.29				monthly samples taken
	theta-prime		3.48				
2.	L infinity	cm	103.2	Murray 1992	Saint Lucia		
	k	year	0.61				
	tzero	year					
	Comment: Reference not found but as cited in Murray and Nelson 2002.						
3.	Reference:			Murray and Neilson 2002			
	k	year	1.078 +/- 0.687		Saint Lucia		Modification of method of Murray 1989 (quasi-Gulland and Holt (1959) plot method) where:
	k	year	0.621 +/- 0.076				regression of daily growth incremetns on mid-point of otolith segment (increment) to focus
	Notes: This study did not derive estimates of the asymptotic size, L Infinity.						
4.	k	year	0.71	Murray 1989	Saint Lucia		Elefan
	Notes: This study did not derive estimates of the asymptotic size, L Infinity.						

Carib-Table 8. Reported commercial landings in Puerto Rico all species, fish and the group of species labeled silk snapper. xxx*1000 indicates 1000s of pounds where xxx = all, fish or silk. Source of information: Puerto Rico DNR, FRL, FSP annual statistical reports. Copies of reports on file with NMFS, SEFSC, SFD

Calendar Year	Thousands of pounds of fish and shellfish and silk snapper category.							
	All*1000	All	Fish *1000	Total Fish	%fish	Silk *1000	Total Silk Pounds	Percent Silk of Total
1930		3080	3080100					
1946				3276	3276000			
1969						115.4	115400	
1970								
1971	3881	3881000	3305	3305000	0.851585	247	247000	0.074735
1972	3681	3681000	3109	3109000	0.844607	388	388000	0.124799
1973	3422	3422000	2916	2916000	0.852133	255	255000	0.087449
1974	3527	3527000	3034	3034000	0.860221	266	266000	0.087673
1975	4010	4010000	3433	3433000	0.85611	478	478000	0.139237
1976								
1977	5077	5077000	4315	4315000	0.849911	369	369000	0.085516
1978	6412	6412000	5511	5511000	0.859482	546	546000	0.099075
1979	7212	7212000	5028	5028000	0.697171			
1980	6668	6668000	5609	5609000	0.841182			
1981	5906	5906000	5144	5144000	0.870979	464	464000	0.090202
1982	5420	5420000	4650	4650000	0.857934	612	612000	0.131613
1983	5806	5806000	4733	4733000	0.815191	396.399	396399	0.083752
1984	3155	3155000	2543	2543000	0.806022	357.235	357235	0.140478
1985	2840	2840000	2302	2302000	0.810563	372.474	372474	0.161805
1986	2665	2665000	2225	2225000	0.834897	391.77	391770	0.176076
1987	2150	2150000	1825	1825000	0.848837	210.111	210111	0.115129
1988	2075	2075000	2075	2075000	1	176.196	176196	0.084914
1989	2305	2305000	2305	2305000	1	247.684	247684	0.107455
1990	2187	2187000	1881	1881000	0.860082	176.822	176822	0.094004
1991								
1992	2045	2045000	1778	1778000	0.869438	208.085	208085	0.117033
1993	2509	2509000	2148	2148000	0.856118	244.26	244260	0.113715
1994								
1995	3709	3709000	3174	3174000	0.855756	363.811	363811	0.114622
1996	3617	3617000	3028	3028000	0.837158	312.535	312535	0.103215
1997	3896	3896000	3317	3317000	0.851386	285.907	285907	0.086194
1998	3503	3503000	2867	2867000	0.818441	278.396	278396	0.097104
1999	3337	3337000	2735	2735000	0.819598	226.008	226008	0.082635
2000	3363	3363000	2743	2743000	0.815641	189.829	189829	0.069205
2001						291.722	291722	
2002								
average		3865851.85		3249370	0.849646			0.106705

Carib-Table 9. Reported commercial landings (thousand of pounds) of fish and shellfish in Puerto Rico, 1969 through 2000, by region. Data not available by region for 2001 and 2002. Source of information: Puerto Rico DNR, FRL, FSP annual statistical reports. Copies of reports on file with NMFS, SEFSC, SFD

Calendar Year	North All	North Shellfish	South All	South Shellfish	East All	East Shellfish	West All	West Shellfish	Total All	Total Shellfish	Total Fish
1969											
1970											
1971	405	112	446	75	1390	154	1640	235	3881	576	3305
1972	301	84	431	80	1321	154	1628	254	3681	572	3109
1973	255	54	556	91	844	102	1767	259	3422	506	2916
1974	210	33	689	107	604	62	2024	291	3527	493	3034
1975	335	30	832	124	586	78	2257	345	4010	577	3433
1976											0
1977	500	24	1155	171	1114	173	2308	394	5077	762	4315
1978	656	18	1728	284	1225	219	2803	380	6412	901	5511
1979	619	130	1975	767	1219	285	3399	1002	7212	2184	5028
1980	685	50	1487	251	1298	168	3198	590	6668	1059	5609
1981	547	55	1689	190	903	117	2767	400	5906	762	5144
1982	501	29	1278	232	700	149	2941	360	5420	770	4650
1983	417	23	941	202	518	95	3930	753	5806	1073	4733
1984	327	17	684	140	350	75	1794	380	3155	612	2543
1985	317	13	603	130	452	105	1468	290	2840	538	2302
1986	320	13	561	117	443	82	1341	228	2665	440	2225
1987	351	9	415	82	355	56	1029	178	2150	325	1825
1988	235		438		342		1060		2075		2075
1989	198		589		378		1140		2305		2305
1990	194	8	612	122	283	37	1098	139	2187	306	1881
1991											0
1992	312	13	511	123	268	38	954	93	2045	267	1778
1993	275	12	598	135	388	48	1248	166	2509	361	2148
1994											0
1995	559	20	1078	218	686	102	1386	195	3709	535	3174
1996	384	27	1149	232	677	133	1407	197	3617	589	3028
1997	481	21	1227	217	730	132	1458	209	3896	579	3317
1998	437	24	1077	208	619	131	1370	273	3503	636	2867
2000	342	16	1302	217	685	177	1034	210	3363	620	2743

Carib-Table 10. Annual reported silk snapper landings (thousand of pounds) in Puerto Rico by gear category.

Calendar Year	Beach Seine	Fish Pot	Lobster Pot	Gill Net	Hand Line	Troll Line	Trot Line	Cast Net	Dive and Spear	By Hand	Rod and Reel	Longline	Other	Total
1971		100316			230084								0	330400
1972		131000			259000								0	390000
1973		82000			172000								0	254000
1974		90000			176000								0	266000
1975		50000			428000								0	478000
1976														
1977		61000			308000								0	369000
1978		84000			462600								0	546600
1979														
1980														
1981														
1982														
1983	1231	291984	0	2348	99969	0	0	153	306			497	956	396488
1984	739	273266	0	2200	80499	0	0	0	531				531	357235
1985	1036	136228	0	3605	231200	0	0	82	0			323	405	372474
1986	450	41916	0	1877	346880	0	1	0	0			637	638	391761
1987	0	39177	0	1665	164496	0	0	200	0			2802	3002	208340
1988	206	26389	0	928	147766	0	0	0	732			175	907	176196
1989	65	39187	0	3752	202602	0	0	0	413			1665	2078	247684
1990	170	29894	0	112	144535	0	0	0	803	1268			2071	176782
1991														
1992	0	55702	0	0	152245	0	0	0	0	0	0	138	138	208085
1993	0	54589	0	0	189292	0	0	0	0	0	0	379	379	244260
1994	0	115717	0	0	220632	0	0	0	0	0	0	1814	1814	338163
1995	0	56136	0	0	306274	0	0	0	0	0	1401	0	1401	363811
1996	0	47827	0	0	264708	0	0	0	0	0	0	0	0	312535
1997	0	47150	0	0	238757	0	0	0	0	0	0	0	0	285907
1998	0	64737	0	0	195402	0	0	0	0	0	0	8257	8257	268396
1999	0	52025	0	0	171054	0	0	0	0	0	0	2929	2929	226008
2000	0	54986	0	0	114610	0	0	0	0	0	0	20233	20233	189829
2001													0	291722

Carib-Table 11. Reported commercial landings of the silk snapper category in Puerto Rico by coastal region.

Calendar Year	North	South	East	West	Total	Comments
1969					115400	
1970						ND
1971	28000	1000	16000	202000	247000	
1972	73000	6000	55000	254000	388000	
1973	61000	20000	21000	153000	255000	
1974	24000	22000	20000	200000	266000	
1975	28000	55000	16000	379000	478000	
1976						ND
1977	47000	73000	18000	231000	369000	
1978	70000	97000	31000	348000	546000	
1979						ND
1980						ND
1981					464000	ND
1982					612000	ND
1983	37394	29451	10198	319356	396399	
1984	34905	32211	8975	281144	357235	
1985	38098	47677	7658	279041	372474	
1986	38138	33139	6775	313718	391770	
1987	29194	23841	10541	146535	210111	
1988	17372	14714	3418	140692	176196	
1989	30418	25114	12304	179848	247684	
1990	21235	11009	4819	139759	176822	
1991						ND
1992	51936	17108	8131	130910	208085	
1993	26642	36586	13227	167805	244260	
1994						ND
1995	64669	27861	23137	248144	363811	ND
1996	44435	35388	18605	214107	312535	ND
1997	45938	23635	9223	207111	285907	
1998	44923	51101	11329	171043	278396	
1999	45795	25376	13877	140960	226008	
2000	33255	25980	13599	116995	189829	
2001					291722	
2002						ND

Source of information: Puerto Rico DNR, FRL, FSP annual statistical reports. Copies of reports on file with NMFS, SEFSC, SFD

Comments: Blanks = No information available= ND

Carib-Table 12. Fields contained in the different catch report forms used in the U.S. Virgin Islands between years 1974-2003.

1 OLD FORM (1) (1974-1985)	2 OLD FORM (2) (1986-1999)	3 OLD FORM (3) (Short) (1988-1992)	4 OLD FORM (4) (1992-1999)	5 NEW FORM (Revised) (1994-2003)
1. ID# 2. LAST NAME 3. FIRST NAME 4. BOAT LICENSE 5. FISHING LICENSE 6. DATE 7. # OF HELPERS 8. POT FISH SNAPPER GROUPER 9. POT FISH ALL OTHERS 10. NET FISH SNAPPER GROUPER 11. NET FISH ALL OTHERS 12. HOOK FISH SNAPPER GROUPER 13. HOOK FISH ALL OTHERS 14. SPEAR/GUN FISH SNAPPER GROUPER 15. SPEAR/GUN FISH ALL OTHERS 16. LOBSTER BY POT 17. LOBSTER BY HAND 18. OTHER KINDS CONCH, WHELK, OCTOPUS, SQUID, CLAM, OYSTERS 19. AREA 20. NOTES	1. LOCATION 2. FISHERMEN # 3. VESSEL # 4. DATE 5. POTFISH 6. NETFISH 7. HOOKFISH 8. SPEAR GUN 9. POT LOBSTER 10. DIVED LOBSTER 11. CONCH 12. WHELK	1. ID CODE 2. CLASS 3. ISLE: St. Croix St. Thomas/ St. John 4. TRIP DATE 5. FISH CODE: Bait (B), Conch (C) Finfish (S), Lobster (L), Whelk (W), Other(Z) 6. GEAR CODE: Diving (D), Hook& Line (H) Net (N), Pot or trap (P). 7. NO. POTS 8. NO. SPEAR GUNS (S_G) 9. NO. OTHER GEAR 10. FISH AREA	1. ID CODE 2. FISHED (yes/no) 3. TRIP DATE 4. POT FISH 5. POTS 6. HOOK FISH 7. NET FISH 8. SPEARGUN 9. POT LOBSTER 10. DIVED LOBSTER 11. CONCH 12. WHELK 13. BAITFISH 14. FISH AREA 15. DISTANCE FROM SHORE (> 3 miles) 16. TUNA 17. DORADO 18. WAHOO	1. GEAR TYPE 2. GEAR NO. 3. AREA FISHED 4. HOURS FISHED 5. GROUPED 6. SNAPPER 7. GRUNT 8. JACK 9. SURGEON 10. PARROT 11. SHELLFISH 12. TRIGGER 13. BARRA 14. GOAT 15. MACKEREL 16. OFFSHORE (D/T/W) 17. FAD 18. BAITFISH 19. LOBSTER 20. CONCH MEAT 21. WHELK MEAT 22. DISTANCE FR LAND

Carib- Table 13. Annual reported landings statistics (pounds, whole weight, not expanded) for all fishing center in Puerto Rico 1983-2003. Note that prior to 1997 'silk snapper' category also includes other snapper species. Data for 2003 incomplete.

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
AFRICAN POMPAÑO						174	491	347	433	627
ALMACO JACK						5				30
ANCHOVY						10				200
ANGELFISHES							82			
BALLYHOO	22,167	11,268	18,666	9,695	9,671	32,154	27,583	30,397	35,950	25,011
BAR JACK					2,489	388	1,342	6,235	4,926	2,709
BARRACUDA	25,553	10,889	9,441	18,893	20,674	13,134	16,877	7,938	23,722	10,015
BEARDED BROTLA						160				
BIGEYE					2			179	302	375
BIGEYE SCAD					21	2,588	8,134	8,211	7,933	5,146
BLACK JACK					46	5	40	115	6	3
BLUE RUNNER					685	996	3,686	484	1,471	1,338
BONEFISH						51	633	1,376	613	360
BOXFISH	40,376	38,547	34,103	36,155	36,144	36,999	50,021	47,463	49,238	40,128
BUTTERFISH,UNC					11				37	55
BUTTERFLY FISH					7			14	79	40
CATFISH,CHANNEL										
CATFISHES					15				6	
CLAM,UNC	49,364	46,247	29,358	654	198	1,312	166	576	406	203
COBIA							10	31		47
CONEY				10	3,758	4,458	6,745	5,820	9,146	6,797
CRAB,UNC	2,062	1,409	1,235	1,197	3,043	2,620	4,737	1,983	5,782	3,040
CREOLE-FISH										
CREVALLE									4	
CUTLASSFISH,ATLANTIC					40	21	44	67	321	322
DOLPHINFISH	42,337	14,867	19,246	33,098	28,637	69,301	69,319	98,084	69,717	85,209
DRUMS				4	6,295	2,784	2,601	4,590	5,496	1,627
EEL,AMERICAN										
EEL,MORAYS								18	8	
EELS,CONGER						42		3		
EELS,CUSK						238	35			
EELS,UNC										

Carib-Table 13 (continued).

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
FILEFISH (dup 4560 recode)						1,188	257		112	15
FINFISHES,UNC FOR FOOD			7,750	284,170	261,190	289,501	436,997	376,956	394,561	298,105
FINFISHES,UNC,BAIT,ANIMAL FOOD				9,533	6,467	5,553	3,343	7,807	7,067	5,382
FINFISHES,UNC,GENERAL	178,751	148,621	190,899	202,773	130,113	103,418	87,200	52,946	29,007	12,713
FLATFISH,UNC										
FLYINGFISHES						848	92	37		
GLASSEYE SNAPPER						48				
GOATFISHES	163,010	125,610	58,723	19,872	9,945	7,037	9,517	13,553	15,708	7,483
GRAYSBY										
GREATER AMBERJACK					887	1,733	1,930	1,080	1,164	909
GROUPER, TIGER										
GROUPER,BLACK								217		7
GROUPER,MARBLED							700			
GROUPER,MISTY							26	2,663	2,786	5,110
GROUPER,NASSAU				57	320	2,022	2,046	2,346	4,363	6,658
GROUPER,RED										535
GROUPER,YELLOWFIN					78	460	1,249	559	1,702	921
GROUPERS	332,414	318,648	304,294	194,887	132,044	61,303	88,275	59,172	78,458	69,660
GRUNT, COTTONWICK										42
GRUNT, SMALLMOUTH							20	34	48	17
GRUNT,BLUESTRIPED						5	35		20	16
GRUNT,FRENCH								200		
GRUNT,SPANISH							46			
GRUNT,TOMTATE						13		71		
GRUNT,WHITE	404,972	330,470	274,970	182,185	158,147	88,163	78,160	117,973	140,627	117,464
GRUNTS					466	1,750	1,321	1,258	2,827	797
HERRING,ATLANTIC THREAD					12	18	2,216	2,598	4,215	1,228
HERRINGS,UNC	21,366	19,150	20,344	12,593	23,548	8,041	12,205	7,514	20,629	17,171
HIND,RED				442	11,470	28,834	37,928	39,426	55,552	42,048
HIND,ROCK						18	1,100	15		
HOGFISH	72,696	70,980	41,814	37,669	36,548	30,152	25,549	21,682	30,963	21,178
HORSE-EYE JACK					120	377	1,011	209	16	
JACK, YELLOW							1,257	1,347	756	1,481
JACKNIFE FISH										
JACKS	42,525	30,008	34,700	44,616	41,765	24,579	30,243	22,654	36,085	24,152
JEWFISH					475	6,382	3,543	1,515	1,814	288

Carib-Table 13 (continued).

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
LOBSTER,SLIPPER(BULLDOZER)										
LOBSTER,SPINY	273,679	248,019	211,082	210,086	153,647	141,492	185,845	168,840	211,787	160,692
MACKEREL,BULLET							15			
MACKEREL,CERO					1,343	310	1,095	15,398	15,373	8,888
MACKEREL,KING	223,716	159,565	131,426	115,041	85,158	80,095	95,711	82,157	90,417	61,122
MARGATE				15	248	567	898	828	2,130	970
MARGATE,BLACK					457	41	43	578	729	421
MARLIN,BLUE					22	10,602	6,018	5,025	6,042	5,044
MARLIN,UNC	11,385	9,107	10,825	12,559	6,122	102			45	
MARLIN,WHITE					31					55
MINNOWS						10				
MOJARRAS	11,019	9,782	9,004	9,887	9,181	17,769	11,903	15,471	20,227	20,011
MOLLUSKS,UNC									55	72
MOONFISH,ATLANTIC				9	1,530	436	4,094	3,422	8,180	2,241
MULLET,SILVER	55,218	39,220	44,575	32,794	29,170	26,600	19,319	21,332	32,267	25,876
MULLETS					79	302	15	257	16	13
OCTOPUS	19,702	16,732	30,331	11,796	8,906	15,677	16,443	24,762	19,986	12,769
OILFISH										7
PARROTFISH	233,579	231,387	221,378	105,546	76,854	12,208	4,279	36,849	68,059	91,932
PERMIT					739	379	441	721	954	295
PORGY,JOLTHEAD										42
PORGY,SAUCEREYE										
PORKFISH							43			
PUDDINGWIFE (WRASSE)							55			
PUFFERS	7						10			
RAINBOW RUNNER						613	580	432	357	302
RAYS,UNC					374	596	26	1,280	1,646	1,984
REMORA						10		12		100
RUDDERFISH (SEA CHUBS)						520	466	209	1,417	337
SAILFISH					40		96	78	197	187
SAND PERCH,DWARF						19		24	20	16
SCAD,MACKEREL							472			
SCADS						29	470	443		
SCUPS OR PORGIES,UNC	83,621	66,907	22,075	18,071	10,659	9,167	9,734	9,357	12,970	10,008
SHARK,BLUE										
SHARK,BONITO(SHORTFIN MAKO)										

Carib- Table 13 (continued).

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
SHARK,COW										
SHARK,DOGFIH,SMOOTH										
SHARK,DUSKY										
SHARK,HAMMERHEAD								30		
SHARK,LEMON								600		
SHARK,NURSE								48	437	
SHARK,REEF										
SHARK,SCALLOPED HAMMERHEAD							65		60	
SHARK,SEVENGILL BIGEYE									84	
SHARK,SIXGILL BIGEYE						1			25	
SHARK,TIGER										
SHARK,UNC					13,375	27,631	29,799	40,033	46,876	35,588
SHARK,WHALE							326	9,811		
SHELLFISH,OTHER	3,915	3,397	3,675	4,873	1,945	6,221	3,691	1,616	1,638	921
SILVERSIDES						10				
SNAILS(CONCHS)	399,880	294,773	260,825	188,360	142,994	230,707	160,251	107,975	108,098	90,958
SNAKE MACKEREL						36	3			146
SNAPPER,BLACK						1,448	450	598	156	220
SNAPPER,BLACKFIN						25	13	109	108	72
SNAPPER,CARIBBEAN RED										
SNAPPER,CUBERA						36		46	760	61
SNAPPER,DOG						38	5		160	59
SNAPPER,GRAY AT (MANGROVE)							32	29	37	15
SNAPPER,LANE	167,173	152,406	119,138	80,673	60,137	80,104	109,512	112,832	138,842	91,080
SNAPPER,MAHOGONY						85	1,665			45
SNAPPER,MUTTON	65,141	53,086	45,633	30,338	20,059	21,554	31,756	25,192	42,139	32,516
SNAPPER,QUEEN					4,379	14,763	15,405	11,390	17,780	25,285
SNAPPER,SCHOOLMASTER						88		12		423
SNAPPER,SILK	396,343	357,156	371,827	356,899	207,063	170,034	245,961	176,884	167,230	207,966
SNAPPER,VERMILION					2,423	1,421	1,428	1,889	4,150	5,925
SNAPPER,YELLOWTAIL	167,867	134,184	140,451	93,804	92,363	77,272	91,050	107,035	148,623	149,154
SNAPPERS,UNC	65,870	36,215	32,953	28,950	23,468	21,436	22,641	34,345	50,944	44,718
SNOOK	42,378	25,138	22,625	24,820	29,538	29,368	24,463	19,983	32,377	29,002
SPADEFISH							13	57	36	
SPANISH FLAG										
SQUIRRELFISHES	19,152	12,539	15,931	12,487	3,950	4,546	5,785	6,447	9,057	6,078

Carib- Table 13 (continued).

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STINGRAYS					1,155	52	50	77	54	122
SUNFISHES					834	89	5	8,180	266	508
SURGEONFISHES					29				239	104
SWORDFISH						5,860	2	9,415		
TARPON					12,585	4,713	5,420	7,196	7,267	5,007
TENPOUNDER					1,775	108	9	386	708	594
THREADFIN					61	46	60	395	150	92
TILAPIAS						82	20	42		
TILEFISH, BLACKLINE						33		12		18
TILEFISH, SAND					44	62	31	40	81	17
TILEFISH, UNCLASSIFIED									100	
TRIGGERFISH, GRAY								67		
TRIGGERFISH, OCEAN								3		
TRIGGERFISH, QUEEN	89,865	72,920	46,348	31,035	38,371	27,596	33,034	28,525	30,942	27,736
TRIGGERFISHES	56				70	23	198	18	46	16
TRIPLETAIL							467	33		13
TUNA, ALBACORE	189					67	103	111	33	15
TUNA, BLACKFIN					1,473	1,334	3,442	7,007	6,819	7,766
TUNA, LITTLE (TUNNY)					1,213	5,050	5,089	3,680	8,160	6,118
TUNA, SKIPJACK					2,751	10,234	12,952	14,112	16,314	7,122
TUNA, UNC	189,126	65,051	69,377	78,223	108,618	113,851	104,729	40,213	28,040	22,708
TUNA, YELLOWFIN	214					11,003	3,714	68,530	52,750	26,360
WAHOO					744	633	448	163	279	81
WENCHMAN							204	85		288
total	3,916,688	3,154,298	2,855,022	2,534,769	2,081,308	2,014,087	2,291,174	2,180,489	2,458,815	2,044,963

Carib- Table 13 (continued)

Common Name	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total 1983-2002
AFRICAN POMPAÑO	282	29	65		519	27	8	27	11			3,040
ALMACO JACK							17		735	471	21	1,258
ANCHOVY			41	42	92		95	1		1		482
ANGELFISHES		28				8		347		13		478
BALLYHOO	29,903	32,427	56,850	57,714	58,042	49,449	50,648	56,378	60,542	68,047	4,418	742,562
BAR JACK	4,400	4,162	9,708	9,502	24,528	27,180	40,913	44,680	49,847	63,168	8,148	296,177
BARRACUDA	11,967	14,026	20,148	22,725	27,759	33,790	24,942	25,676	19,581	24,599	3,188	382,349
BEARDED BROTLA					17							177
BIGEYE	375		391	648	73	59		49	1	6	32	2,460
BIGEYE SCAD	4,177	2,387	11,272	4,183	4,972	3,559	8,506	350	894	933	83	73,266
BLACK JACK			18							70		303
BLUE RUNNER	5,438	6,048	4,183	468	86	19	1			74		24,977
BONEFISH	164	67	107	695	113	50		75	524	754	46	5,582
BOXFISH	55,838	53,555	68,567	67,466	81,893	90,937	83,933	83,580	76,386	79,181	5,995	1,150,510
BUTTERFISH,UNC	15	5,672	17		35	66		70	162	2	1	6,142
BUTTERFLY FISH			71	187	95	30	171	602	93	10		1,399
CATFISH,CHANNEL								46				46
CATFISHES	42		20						27			110
CLAM,UNC	142	4,513	7,626	8,329	690	1,522	1,297	2,011	1,391	377	320	156,382
COBIA	12	34	27	68	32	35	43		38	243		620
CONEY	6,014	5,523	9,790	10,969	12,103	13,877	10,262	11,544	15,653	19,044	2,155	151,513
CRAB,UNC	2,117	3,546	7,325	14,769	10,927	7,512	5,596	5,165	9,684	10,624	392	104,373
CREOLE-FISH								43		256		299
CREVALLE	5	12					110					131
CUTLASSFISH,ATLANTIC	898	140		774	182	308	559	211	31	340		4,258
DOLPHINFISH	75,240	91,143	197,550	149,174	166,299	137,053	130,064	137,686	106,245	100,636	13,143	1,820,905
DRUMS	2,844	5,164	5,953	1,971	2,411	2,050	4,717	1,717	4,078	4,109	1,340	58,411
EEL,AMERICAN			30	243		50						323
EEL,MORAYS	21		50			199	2			7		305
EELS,CONGER	5	9	9	245	7,002	67			22			7,404
EELS,CUSK										11		284
EELS,UNC			18	59	76			17				170

Carib – Table 13 (continued).

Common Name	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total 1983-2002
FILEFISH (dup 4560 recode)	127	29	269	464	1,195	65	15		30	165		3,931
FINFISHES,UNC FOR FOOD	348,876	356,478	459,340	366,227	365,274	323,759	243,244	193,735	175,577	152,361	7,171	5,334,101
FINFISHES,UNC,BAIT,ANIMAL FOOD	4,386	925	2,714	2,560	2,016	86	475	572	515	791	35	60,192
FINFISHES,UNC,GENERAL	20,374	18,493	44,681	47,329	64,304	89,907	53,262	49,526	39,218	52,645	690	1,616,180
FLATFISH,UNC						14	246					260
FLYINGFISHES			2	650	4			81				1,714
GLASSEYE SNAPPER	8						10		35			101
GOATFISHES	8,132	10,043	14,544	21,065	18,809	15,010	26,206	20,434	22,154	19,014	1,450	605,869
GRAYSBY			3	6			25			30		64
GREATER AMBERJACK	599	366	1,764	1,205	802	270	151	7	8	213	9	13,088
GROUPEL, TIGER			151	2,745								2,896
GROUPEL,BLACK				17								241
GROUPEL,MARBLED			200						50	350		1,300
GROUPEL,MISTY	3,889	4,993	5,948	5,465	4,349	5,562	6,718	5,246	6,184	5,683	611	64,622
GROUPEL,NASSAU	5,056	7,753	7,778	12,614	15,474	19,107	14,971	12,947	17,623	18,746	3,120	149,881
GROUPEL,RED			125		18		7		28			713
GROUPEL,YELLOWFIN	1,483	448	827	1,617	2,088	1,793	3,350	11,208	3,641	6,916	536	38,340
GROUPELS	82,009	80,744	93,174	86,694	72,655	43,197	47,919	40,632	53,313	46,988	4,973	2,286,480
GRUNT, COTTONWICK					422							464
GRUNT, SMALLMOUTH	22	6	4					10	12			173
GRUNT,BLUESTRIPED	6	651	82	35	101	28	109	12	5	53		1,158
GRUNT,FRENCH			18		7							225
GRUNT,SPANISH		10		12	17	10						95
GRUNT,TOMTATE		65										149
GRUNT,WHITE	161,127	141,902	142,505	170,161	164,041	112,694	117,124	114,982	152,445	147,179	16,818	3,317,291
GRUNTS	1,290	413	1,385	737	223	234	32	207	304	127		13,371
HERRING,ATLANTIC THREAD	2,365	981	1,654	1,520	120	240	100		173	101		17,541
HERRINGS,UNC	14,696	24,733	26,962	26,370	32,205	23,428	27,427	25,165	24,777	27,956	5,862	416,280
HIND,RED	40,411	28,717	42,235	53,393	60,253	55,012	65,974	60,901	68,232	81,236	10,696	772,064
HIND,ROCK		17		18		113		113				1,394
HOGFISH	21,187	32,331	49,483	60,601	68,577	49,570	46,390	58,230	67,947	68,613	6,553	912,160
HORSE-EYE JACK	70	141	121	41	1,878	6,126	5,109	7,568	6,535	4,830	1,482	34,152
JACK, YELLOW	917	24	71	918	426	3,314	2,021	2,460	3,726	3,215	420	21,933
JACKNIFE FISH		130					24	7	54	35		250
JACKS	30,106	41,284	54,571	48,617	55,984	37,182	30,082	29,752	36,355	30,635	6,671	725,895
JEWFISH	42		395	40	85	142		27	50	40		14,838

Carib – Table 13 (continued).

Common Name	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total 1983-2002
LOBSTER,SLIPPER(BULLDOZER)				5				121	380	171		677
LOBSTER,SPINY	169,143	192,539	279,674	281,122	283,752	298,924	327,560	257,120	281,579	301,389	21,333	4,637,971
MACKEREL,BULLET			15	508				19	148	62		767
MACKEREL,CERO	10,462	24,233	34,051	63,296	98,050	71,425	63,936	53,565	82,909	53,358	13,294	597,692
MACKEREL,KING	107,316	97,078	153,920	103,215	105,594	108,471	127,802	123,559	99,786	117,965	17,029	2,269,114
MARGATE	495	2,316	2,821	4,047	3,612	2,675	990	864	437	27		23,940
MARGATE,BLACK	434	424	149	3		6	32	10	5	11	12	3,343
MARLIN,BLUE	6,395	2,607	1,000	25	32	5	1,331	12		65		44,225
MARLIN,UNC			10	78	192	64			430	40		50,959
MARLIN,WHITE		31					19					136
MINNOWS				263		130						403
MOJARRAS	19,602	29,162	32,403	25,567	23,754	19,464	22,146	18,109	19,038	21,195	5,010	364,694
MOLLUSKS,UNC	70	170	358	284	138	532	565	253	1,271	1,096	177	4,864
MOONFISH,ATLANTIC	3,697	6,731	6,807	771	2,065	953	1,207	305	740	83	104	43,271
MULLET,SILVER	26,533	29,548	57,384	53,107	55,504	53,139	61,800	53,201	59,945	57,032	7,538	833,564
MULLETS	136	92	170	207	233	203	119	73	155	6		2,076
OCTOPUS	20,723	25,846	19,430	37,160	38,744	39,554	43,639	48,753	33,572	28,663	2,661	513,188
OILFISH			2,854									2,861
PARROTFISH	160,187	115,750	79,881	102,799	110,944	97,503	80,663	72,865	96,762	107,485	9,001	2,106,910
PERMIT	654	605	878	515	545	1,162	818	771	622	1,515	90	11,614
PORGY,JOLTHEAD	5	52	123	10				11	619	2,271		3,133
PORGY,SAUCEREYE									7			7
PORKFISH												43
PUDDINGWIFE (WRASSE)			5					19	104	32		215
PUFFERS			84	14		321						436
RAINBOW RUNNER	286	142	127	1,942	174	172	39	46	120	101		5,433
RAYS,UNC	1,180	5,547	7,445	3,742	242	14,901	1,920	8,512	1,948	764		52,107
REMORA	96		570	24	3,029	294	507	2,922	39	24	7	7,627
RUDDERFISH (SEA CHUBS)	144	1,080	57	190	86	248	836	121	293	474		6,478
SAILFISH	40	154	18	44	180							1,034
SAND PERCH,DWARF		24	4		23			7				137
SCAD,MACKEREL		31			2,656	12,530	3					15,692
SCADS	33	155	70	101	675	9,321		57		14		11,368
SCUPS OR PORGIES,UNC	11,171	11,038	18,638	30,744	28,431	26,555	34,586	28,863	35,863	35,595	2,496	514,053
SHARK,BLUE	16							9	7	10		42
SHARK,BONITO(SHORTFIN MAKO)		7	219						9	14		249

Carib – Table 13 (continued).

Common Name	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total 1983-2002
SHARK,COW		11		25	113		2,002					2,151
SHARK,DOGFISH,SMOOTH				1,005								1,005
SHARK,DUSKY										8		8
SHARK,HAMMERHEAD	78		15									123
SHARK,LEMON				34						10		644
SHARK,NURSE			9,002	80		70	20	281		15		9,953
SHARK,REEF						150			2	47		199
SHARK,SCALLOPED HAMMERHEAD												125
SHARK,SEVENGILL BIGEYE							137					221
SHARK,SIXGILL BIGEYE				2	41		80	1,150		25		1,324
SHARK,TIGER				15	68				400			483
SHARK,UNC	38,646	37,552	74,612	59,350	61,141	47,181	44,601	41,537	43,084	38,413	6,218	679,419
SHARK,WHALE			52	9,002	5,001	25	51					24,268
SHELLFISH,OTHER	3,161	6,553	6,018	5,512	4,809	14,240	9,584	8,946	10,245	5,479	803	106,439
SILVERSIDES					20		17					47
SNAILS(CONCHS)	164,612	170,847	214,282	239,866	238,648	260,955	214,100	280,313	244,970	235,697	29,713	4,249,111
SNAKE MACKEREL				11								196
SNAPPER,BLACK	699	32		14		207	672	403	20	505		5,424
SNAPPER,BLACKFIN	1,986		89	18	822	3,689	4,342	10,652	9,508	9,502	1,601	40,935
SNAPPER,CARIBBEAN RED					3							3
SNAPPER,CUBERA	20	121	120	59	9							1,232
SNAPPER,DOG	357	291	48	168	10		78	75	1,537	123		2,949
SNAPPER,GRAY AT (MANGROVE)	118	767	1,182	52		3	10	85	53	23	15	2,406
SNAPPER,LANE	90,962	135,489	241,892	265,632	270,275	221,030	196,988	204,314	183,363	184,701	19,263	3,106,543
SNAPPER,MAHOGONY	39	88	364	207	978	274	43	41	7			3,836
SNAPPER,MUTTON	29,359	39,729	79,935	76,462	76,602	77,437	96,377	84,256	88,646	91,907	21,180	1,108,124
SNAPPER,QUEEN	32,346	27,765	34,138	36,685	38,778	46,073	66,695	82,828	102,138	110,061	15,857	666,509
SNAPPER,SCHOOLMASTER		35		84	15	107	146	10	29			949
SNAPPER,SILK	244,065	338,852	363,300	311,324	285,787	209,384	224,818	187,639	267,025	198,190	38,491	5,287,747
SNAPPER,VERMILION	5,565	7,512	18,246	10,189	14,022	16,585	17,240	22,177	44,813	23,144	3,568	196,729
SNAPPER,YELLOWTAIL	183,159	186,459	291,892	273,828	273,088	252,087	279,467	360,624	317,330	291,145	48,312	3,910,882
SNAPPERS,UNC	43,859	39,579	48,828	50,753	66,957	55,989	62,110	48,934	56,688	56,786	7,303	892,023
SNOOK	28,291	34,642	49,066	49,208	57,842	44,989	49,808	40,169	46,759	45,163	9,757	725,629
SPADEFISH	40	134	536	214	56	160		7	87	9,109	12	10,449
SPANISH FLAG			8	25			14		43			90
SQUIRRELFISHES	7,490	8,999	14,138	15,662	21,604	19,007	14,703	15,816	17,553	16,106	1,963	247,050

Carib – Table 13 (continued).

Common Name	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total 1983-2002
STINGRAYS	886	1,299	1,121	1,427	549	1,260	1,229	1,209	1,571	252		12,313
SUNFISHES	210	1,074	616	1,739	213	255	793	51	490	980	5	16,303
SURGEONFISHES			7	225		4	13		20	6		647
SWORDFISH	57	11	96	140	28	318	39	728	54	621		17,369
TARPON	5,238	4,702	3,148	490	2,489	2,343	2,374	354	2,193	4,492	910	70,011
TENPOUNDER	682	133	190	102	240		108			67		5,102
THREADFIN	83	214	53		12				34	69	3	1,269
TILAPIAS	68				46				9	13		280
TILEFISH, BLACKLINE	35	247	337	269	9	156	996	209	105	26		2,452
TILEFISH, SAND	43	13		52	463	464	12	18		18		1,358
TILEFISH, UNCLASSIFIED	12				131			10				253
TRIGGERFISH, GRAY												67
TRIGGERFISH, OCEAN		11		34	82		293	5				428
TRIGGERFISH, QUEEN	38,160	46,668	69,067	63,671	73,200	64,448	49,591	40,810	59,803	53,574	5,261	985,364
TRIGGERFISHES	16	85	103	69	52	20	120	833	71	58		1,854
TRIPLETAIL		223	364	18	229	195	165	42	6	54		1,809
TUNA, ALBACORE		2,703	188	98	8,592	24,380	24,210	15,981	9,073	9,622	1,839	95,365
TUNA, BLACKFIN	12,069	12,291	13,262	14,309	7,002	450	982	3,277	23,994	27,122	7,511	142,599
TUNA, LITTLE (TUNNY)	14,002	8,738	16,856	8,795	39,723	21,084	18,315	17,174	20,146	14,891	3,512	209,034
TUNA, SKIPJACK	4,078	5,670	5,885	12,560	19,323	51,938	40,328	32,057	36,478	38,456	11,442	310,258
TUNA, UNC	30,970	59,043	77,343	100,222	95,675	59,354	22,417	21,878	16,279	11,062	1,695	1,314,179
TUNA, YELLOWFIN	26,750	2,459	1,659	603	45,520	41,654	48,921	46,636	33,045	19,308	1,309	429,126
WAHOO	1,560	1,274	1,041	971	5,290	1,154	6,697	2,160	5,026	1,095	166	28,616
WENCHMAN	1				542	2,303	3,645	4,953	7,164	6,199	411	25,384
total	2,495,667	2,707,839	3,689,106	3,582,415	3,804,027	3,454,684	3,328,744	3,252,906	3,391,585	3,274,504	423,251	

Carib- Table 14. Total number of commercial fishermen and vessels operating in Puerto Rico based on historical documents.

Calendar Year	Total Number of Fishermen					Reference	Total Number of Vessels
	Regular	Casual	Part Time	Helper	Total		
1899					800	PR DNR Annual Report	350
1900					756	Cummings	396
1930	600				1403	PR DNR Annual Report	711
1946	1734	922			2656	Kahn 1948	900
1969	376	615			991	PR DNR Annual Report	787
1970						PR DNR Annual Report	
1971	486	508			994	PR DNR Annual Report	811
1972	469	499			968	PR DNR Annual Report	897
1973	640	287			927	PR DNR Annual Report	785
1974	935	247			1182	PR DNR Annual Report	835
1975	1059	171			1230	PR DNR Annual Report	865
1976					1230	Matos 1990	901
1977	1138	230			1368	PR DNR Annual Report	1036
1978	1299	143			1442	PR DNR Annual Report	1073
1979					1442	CFMC Document	1073
1980	913	250	284		1447	PR DNR Annual Report	1089
1981						ND	
1982	1146	359	367		1872	PR DNR Annual Report	1449
1983	871	59	151	334	1415	PR DNR Annual Report	1125
1984					1295	PR DNR Annual Report	
1985					1585	PR DNR Annual Report	
1986					1135	CFMC Document	865

Carib- Table 14. (continued)

1987					1731	PR DNR Annual Report	882
1988	891	5	320	515	1731	PR DNR Annual Report	1107
1989					1822	CFMC Document	1107
1990	896		200	236	1332	CFMC Document	1005
1991					1219	PR DNR Annual Report	
1992	713		274	168	1155	PR DNR Annual Report	810
1993	782		294	287	1363	PR DNR Annual Report	1084
1994					1380	CFMC Document	
1995	1262		496	201	1959	CFMC Document	1501
1996	1061		496	201	1758	PR DNR Annual Report	1501
1997						ND	
1998						ND	
1999						ND	
2000						ND	
2001						ND	
2002						ND	
AVERAGE					1386.267		959.4231

Source of Information: PR DNR Annual Reports and as otherwise indicated in the table. Individual reports on file with the NMFS, SEFSC Sustainable Fisheries Division (SFD).

Carib- Table 15. Total Number of commercial sales records submitted annually to the PR DNR, FSP and the estimated annual fishermen reporting rate for commercial fishermen in Puerto Rico, 1969 through 2001.

Calendar Year	# Sales Tickets reported	Total number of Fishermen
1969		991
1970		
1971	36505	994
1972	30551	968
1973	24776	927
1974	24875	1182
1975	25402	1230
1976		1230
1977		1368
1978		1442
1979		1442
1980		1447
1981		
1982	25755	1872
1983	31632	1415
1984	18839	1295
1985	16260	1585
1986	18175	1135
1987	18129	1731
1988	18953	1731
1989	19969	1822
1990	21770	1332
1991		1219
1992	24218	1155
1993	25303	1363
1994		1380
1995		1959
1996		1758
1997	38470	
1998	32839	
1999	35545	
2000	38887	
2001		
2002		

Comments: Blanks indicate no information available.

Source of Information: PR DNR Annual Reports and as otherwise indicated in the table. Individual reports on file with the NMFS, SEFSC Sustainable Fisheries Division (SFD).

Carib- Table 16. Summary information on the number of fishermen and reporting rate for the Puerto Rico commercial fisheries (ND=no data found). Source of Information: PR DNR Annual Reports and as otherwise indicated in the table. Individual reports on file with the NMFS, SEFSC /Sustainable Fisheries Div.

Number Fishermen	Calendar Year1	Reporting Rate	Range	Standard Deviation	Cummings Value	Cummings Rationale	Reference
991	1969						ND
	1970						ND
994	1971						ND
968	1972	0.6			0.6	Not Changed	PR DNR Annual Report
927	1973	0.6			0.6	Not Changed	PR DNR Annual Report
1182	1974	0.6			0.6	Not Changed	PR DNR Annual Report
1230	1975	0.6			0.6	Not Changed	PR DNR Annual Report
1230	1976	0.6			0.6	Not Changed	PR DNR Annual Report
1368	1977	0.6			0.6	Not Changed	PR DNR Annual Report
1442	1978	0.68			0.68	Not Changed	Weiler and Suzrex-Caabro 1980
1442	1979	0.75			0.75	Not Changed	
1447	1980	0.75			0.75	Not Changed	same as above
	1981	0.75			0.75	Not Changed	same as above
1872	1982	0.75			0.75	Not Changed	same as above
1415	1983	0.61			0.61	Not Changed	same as above
1295	1984	0.59	.56 to .61		0.59	Not Changed	Garcia-Moliner 1986
1585	1985	0.56			0.56	Not Changed	Garcia-Moliner 1988
1135	1986	0.75			0.75	Not Changed	
1731	1987	0.75			0.75	Not Changed	
1731	1988	0.56		0.19	0.56	Not Changed	Caraballo and Sadovy 1990 Tech. Rpt.
1822	1989	0.51			0.51	Not Changed	No CF factor reported by Matos and Sadovy 1990Matos and Sadovy stated that the CF for 1989 and 1990 were the same as for 1991
1332	1990	0.51			0.51	Not Changed	same as above
1219	1991	0.51		0.16	0.51	Not Changed	Matos and Sadovy 1991
1155	1992	0.6		0.18	0.6	Not Changed	Matos 1993, pg. 5
1363	1993	0.6		0.18	0.6	Not Changed	Matos 1994, pg. 4
1380	1994	0.64		0.11	0.64	Not Changed	PR DNR Annual Report
1959	1995	0.71			0.71	Not Changed	Matos-Caraballo, 1998
1758	1996	0.71			0.71	Not Changed	Matos-Caraballo, 1998
	1997	0.78			0.78	Not Changed	Matos-Caraballo, 1998
	1998	0.78			0.78	Not Changed	Matos 2000 Coop. SF Rpt.
	1999				0.78	1997 value	PR DNR Annual Report
	2000	0.57			0.57	Not Changed	
	2001	0.68			0.68	Not Changed	same as above
	2002	0.86			0.86	Not Changed	same as above

Carib- Table 17. Reporting rates used to adjust the reported Puerto Rico Commercial landings.

Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Reporting Rate	0.61	0.59	0.56	0.75	0.75	0.56	0.51	0.51	0.51	0.60	0.60

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002
Reporting Rate	0.64	0.71	0.71	0.78	0.78	0.68	0.57	0.68	0.86

Carib- Table 18. Annual expanded reported landings statistics (pounds, whole weight) for all fishing center in Puerto Rico 1983-2003. Note that prior to 1997 'silk snapper' category also includes other snapper species.

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
AFRICAN POMPAÑO						174	491	347	433	627	282
ALMACO JACK						5				30	
ANCHOVY						10				200	
ANGELFISHES							82				
BALLYHOO	22,167	11,268	18,666	9,695	9,671	32,154	27,583	30,397	35,950	25,011	29,903
BAR JACK					2,489	388	1,342	6,235	4,926	2,709	4,400
BARRACUDA	25,553	10,889	9,441	18,893	20,674	13,134	16,877	7,938	23,722	10,015	11,967
BEARDED BROTLA						160					
BIGEYE					2			179	302	375	375
BIGEYE SCAD					21	2,588	8,134	8,211	7,933	5,146	4,177
BLACK JACK					46	5	40	115	6	3	
BLUE RUNNER					685	996	3,686	484	1,471	1,338	5,438
BONEFISH						51	633	1,376	613	360	164
BOXFISH	40,376	38,547	34,103	36,155	36,144	36,999	50,021	47,463	49,238	40,128	55,838
BUTTERFISH,UNC					11				37	55	15
BUTTERFLY FISH					7			14	79	40	
CATFISH,CHANNEL											
CATFISHES					15				6		42
CLAM,UNC	49,364	46,247	29,358	654	198	1,312	166	576	406	203	142
COBIA							10	31		47	12
CONEY				10	3,758	4,458	6,745	5,820	9,146	6,797	6,014
CRAB,UNC	2,062	1,409	1,235	1,197	3,043	2,620	4,737	1,983	5,782	3,040	2,117
CREOLE-FISH											
CREVALLE									4		5
CUTLASSFISH,ATLANTIC					40	21	44	67	321	322	898
DOLPHINFISH	42,337	14,867	19,246	33,098	28,637	69,301	69,319	98,084	69,717	85,209	75,240
DRUMS				4	6,295	2,784	2,601	4,590	5,496	1,627	2,844
EEL,AMERICAN											
EEL,MORAYS								18	8		21
EELS,CONGER						42		3			5
EELS,CUSK						238	35				
EELS,UNC											
FILEFISH (dup 4560 recode)						1,188	257		112	15	127
FINFISHES,UNC FOR FOOD			7,750	284,170	261,190	289,501	436,997	376,956	394,561	298,105	348,876

Carib- Table 18 (continued)

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
FINFISHES,UNC,BAIT,ANIMAL FOOD				9,533	6,467	5,553	3,343	7,807	7,067	5,382	4,386
FINFISHES,UNC,GENERAL	178,751	148,621	190,899	202,773	130,113	103,418	87,200	52,946	29,007	12,713	20,374
FLATFISH,UNC											
FLYINGFISHES						848	92	37			
GLASSEYE SNAPPER						48					8
GOATFISHES	163,010	125,610	58,723	19,872	9,945	7,037	9,517	13,553	15,708	7,483	8,132
GRAYSBY											
GREATER AMBERJACK					887	1,733	1,930	1,080	1,164	909	599
GROUPEL, TIGER											
GROUPEL,BLACK								217		7	
GROUPEL,MARBLED							700				
GROUPEL,MISTY							26	2,663	2,786	5,110	3,889
GROUPEL,NASSAU				57	320	2,022	2,046	2,346	4,363	6,658	5,056
GROUPEL,RED										535	
GROUPEL,YELLOWFIN					78	460	1,249	559	1,702	921	1,483
GROUPERS	332,414	318,648	304,294	194,887	132,044	61,303	88,275	59,172	78,458	69,660	82,009
GRUNT, COTTONWICK										42	
GRUNT, SMALLMOUTH							20	34	48	17	22
GRUNT,BLUESTRIPED						5	35		20	16	6
GRUNT,FRENCH								200			
GRUNT,SPANISH							46				
GRUNT,TOMTATE						13		71			
GRUNT,WHITE	404,972	330,470	274,970	182,185	158,147	88,163	78,160	117,973	140,627	117,464	161,127
GRUNTS					466	1,750	1,321	1,258	2,827	797	1,290
HERRING,ATLANTIC THREAD					12	18	2,216	2,598	4,215	1,228	2,365
HERRINGS,UNC	21,366	19,150	20,344	12,593	23,548	8,041	12,205	7,514	20,629	17,171	14,696
HIND,RED				442	11,470	28,834	37,928	39,426	55,552	42,048	40,411
HIND,ROCK						18	1,100	15			
HOGFISH	72,696	70,980	41,814	37,669	36,548	30,152	25,549	21,682	30,963	21,178	21,187
HORSE-EYE JACK					120	377	1,011	209	16		70
JACK, YELLOW							1,257	1,347	756	1,481	917
JACKNIFE FISH											
JACKS	42,525	30,008	34,700	44,616	41,765	24,579	30,243	22,654	36,085	24,152	30,106
JEWFISH					475	6,382	3,543	1,515	1,814	288	42
LOBSTER,SLIPPER(BULLDOZER)											
LOBSTER,SPINY	273,679	248,019	211,082	210,086	153,647	141,492	185,845	168,840	211,787	160,692	169,143
MACKEREL,BULLET							15				

Carib- Table 18 (continued)

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MACKEREL,CERO					1,343	310	1,095	15,398	15,373	8,888	10,462
MACKEREL,KING	223,716	159,565	131,426	115,041	85,158	80,095	95,711	82,157	90,417	61,122	107,316
MARGATE				15	248	567	898	828	2,130	970	495
MARGATE,BLACK					457	41	43	578	729	421	434
MARLIN,BLUE					22	10,602	6,018	5,025	6,042	5,044	6,395
MARLIN,UNC	11,385	9,107	10,825	12,559	6,122	102			45		
MARLIN,WHITE					31					55	
MINNOWS						10					
MOJARRAS	11,019	9,782	9,004	9,887	9,181	17,769	11,903	15,471	20,227	20,011	19,602
MOLLUSKS,UNC									55	72	70
MOONFISH,ATLANTIC				9	1,530	436	4,094	3,422	8,180	2,241	3,697
MULLET,SILVER	55,218	39,220	44,575	32,794	29,170	26,600	19,319	21,332	32,267	25,876	26,533
MULLETS					79	302	15	257	16	13	136
OCTOPUS	19,702	16,732	30,331	11,796	8,906	15,677	16,443	24,762	19,986	12,769	20,723
OILFISH										7	
PARROTFISH	233,579	231,387	221,378	105,546	76,854	12,208	4,279	36,849	68,059	91,932	160,187
PERMIT					739	379	441	721	954	295	654
PORGY,JOLTHEAD										42	5
PORGY,SAUCEREYE											
PORKFISH							43				
PUDDINGWIFE (WRASSE)							55				
PUFFERS	7						10				
RAINBOW RUNNER						613	580	432	357	302	286
RAYS,UNC					374	596	26	1,280	1,646	1,984	1,180
REMORA						10		12		100	96
RUDDERFISH (SEA CHUBS)						520	466	209	1,417	337	144
SAILFISH					40		96	78	197	187	40
SAND PERCH,DWARF						19		24	20	16	
SCAD,MACKEREL							472				
SCADS						29	470	443			33
SCUPS OR PORGIES,UNC	83,621	66,907	22,075	18,071	10,659	9,167	9,734	9,357	12,970	10,008	11,171
SHARK,BLUE											16
SHARK,BONITO(SHORTFIN MAKO)											
SHARK,COW											
SHARK,DOGFISH,SMOOTH											
SHARK,DUSKY											
SHARK,HAMMERHEAD								30			78

Carib- Table 18 (continued)

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
SHARK,LEMON								600			
SHARK,NURSE								48	437		
SHARK,REEF											
SHARK,SCALLOPED HAMMERHEAD							65		60		
SHARK,SEVENGILL BIGEYE									84		
SHARK,SIXGILL BIGEYE							1		25		
SHARK,TIGER											
SHARK,UNC					13,375	27,631	29,799	40,033	46,876	35,588	38,646
SHARK,WHALE							326	9,811			
SHELLFISH,OTHER	3,915	3,397	3,675	4,873	1,945	6,221	3,691	1,616	1,638	921	3,161
SILVERSIDES							10				
SNAILS(CONCHS)	399,880	294,773	260,825	188,360	142,994	230,707	160,251	107,975	108,098	90,958	164,612
SNAKE MACKEREL							36	3		146	
SNAPPER,BLACK						1,448	450	598	156	220	699
SNAPPER,BLACKFIN						25	13	109	108	72	1,986
SNAPPER,CARIBBEAN RED											
SNAPPER,CUBERA						36		46	760	61	20
SNAPPER,DOG						38	5		160	59	357
SNAPPER,GRAY AT (MANGROVE)								29	37	15	118
SNAPPER,LANE	167,173	152,406	119,138	80,673	60,137	80,104	109,512	112,832	138,842	91,080	90,962
SNAPPER,MAHOGONY							85	1,665		45	39
SNAPPER,MUTTON	65,141	53,086	45,633	30,338	20,059	21,554	31,756	25,192	42,139	32,516	29,359
SNAPPER,QUEEN					4,379	14,763	15,405	11,390	17,780	25,285	32,346
SNAPPER,SCHOOLMASTER							88	12		423	
SNAPPER,SILK	396,343	357,156	371,827	356,899	207,063	170,034	245,961	176,884	167,230	207,966	244,065
SNAPPER,VERMILION					2,423	1,421	1,428	1,889	4,150	5,925	5,565
SNAPPER,YELLOWTAIL	167,867	134,184	140,451	93,804	92,363	77,272	91,050	107,035	148,623	149,154	183,159
SNAPPERS,UNC	65,870	36,215	32,953	28,950	23,468	21,436	22,641	34,345	50,944	44,718	43,859
SNOOK	42,378	25,138	22,625	24,820	29,538	29,368	24,463	19,983	32,377	29,002	28,291
SPADEFISH							13	57	36		40
SPANISH FLAG											
SQUIRRELFISHES	19,152	12,539	15,931	12,487	3,950	4,546	5,785	6,447	9,057	6,078	7,490
STINGRAYS					1,155	52	50	77	54	122	886
SUNFISHES					834	89	5	8,180	266	508	210
SURGEONFISHES					29				239	104	
SWORDFISH						5,860	2	9,415			57
TARPON					12,585	4,713	5,420	7,196	7,267	5,007	5,238

Carib- Table 18 (continued)

Common Name	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
TENPOUNDER					1,775	108	9	386	708	594	682
THREADFIN					61	46	60	395	150	92	83
TILAPIAS						82	20	42			68
TILEFISH,BLACKLINE						33		12		18	35
TILEFISH,SAND					44	62	31	40	81	17	43
TILEFISH,UNCLASSIFIED									100		12
TRIGGERFISH,GRAY								67			
TRIGGERFISH,OCEAN								3			
TRIGGERFISH,QUEEN	89,865	72,920	46,348	31,035	38,371	27,596	33,034	28,525	30,942	27,736	38,160
TRIGGERFISHES	56				70	23	198	18	46	16	16
TRIPLETAIL							467	33		13	
TUNA,ALBACORE	189					67	103	111	33	15	
TUNA,BLACKFIN					1,473	1,334	3,442	7,007	6,819	7,766	12,069
TUNA,LITTLE (TUNNY)					1,213	5,050	5,089	3,680	8,160	6,118	14,002
TUNA,SKIPJACK					2,751	10,234	12,952	14,112	16,314	7,122	4,078
TUNA,UNC	189,126	65,051	69,377	78,223	108,618	113,851	104,729	40,213	28,040	22,708	30,970
TUNA,YELLOWFIN	214					11,003	3,714	68,530	52,750	26,360	26,750
WAHOO					744	633	448	163	279	81	1,560
WENCHMAN							204	85		288	1
total	3,924,620	3,162,234	2,862,962	2,542,713	2,089,256	2,022,039	2,299,130	2,188,449	2,466,779	2,052,931	2,503,639

Carib- Table 18 (continued)

Common Name	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total 1983-2002
AFRICAN POMPANO	29	65		519	27	8	27	11		3,040
ALMACO JACK						17		735	471	1,258
ANCHOVY		41	42	92		95	1		1	482
ANGELFISHES	28				8		347		13	478
BALLYHOO	32,427	56,850	57,714	58,042	49,449	50,648	56,378	60,542	68,047	742,562
BAR JACK	4,162	9,708	9,502	24,528	27,180	40,913	44,680	49,847	63,168	296,177
BARRACUDA	14,026	20,148	22,725	27,759	33,790	24,942	25,676	19,581	24,599	382,349
BEARDED BROTLA				17						177
BIGEYE		391	648	73	59		49	1	6	2,460
BIGEYE SCAD	2,387	11,272	4,183	4,972	3,559	8,506	350	894	933	73,266
BLACK JACK		18							70	303
BLUE RUNNER	6,048	4,183	468	86	19	1			74	24,977
BONEFISH	67	107	695	113	50		75	524	754	5,582
BOXFISH	53,555	68,567	67,466	81,893	90,937	83,933	83,580	76,386	79,181	1,150,510
BUTTERFISH,UNC	5,672	17		35	66		70	162	2	6,142
BUTTERFLY FISH		71	187	95	30	171	602	93	10	1,399
CATFISH,CHANNEL							46			46
CATFISHES		20						27		110
CLAM,UNC	4,513	7,626	8,329	690	1,522	1,297	2,011	1,391	377	156,382
COBIA	34	27	68	32	35	43		38	243	620
CONEY	5,523	9,790	10,969	12,103	13,877	10,262	11,544	15,653	19,044	151,513
CRAB,UNC	3,546	7,325	14,769	10,927	7,512	5,596	5,165	9,684	10,624	104,373
CREOLE-FISH							43		256	299
CREVALLE	12					110				131
CUTLASSFISH,ATLANTIC	140		774	182	308	559	211	31	340	4,258
DOLPHINFISH	91,143	197,550	149,174	166,299	137,053	130,064	137,686	106,245	100,636	1,820,905
DRUMS	5,164	5,953	1,971	2,411	2,050	4,717	1,717	4,078	4,109	58,411
EEL,AMERICAN		30	243		50					323
EEL,MORAYS		50			199	2			7	305
EELS,CONGER	9	9	245	7,002	67			22		7,404
EELS,CUSK									11	284
EELS,UNC		18	59	76			17			170
FILEFISH (dup 4560 recode)	29	269	464	1,195	65	15		30	165	3,931
FINFISHES,UNC FOR FOOD	356,478	459,340	366,227	365,274	323,759	243,244	193,735	175,577	152,361	5,334,101

Carib- Table 18 (continued)

Common Name	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total 1983-2002
FINFISHES,UNC,BAIT,ANIMAL FOOD	925	2,714	2,560	2,016	86	475	572	515	791	60,192
FINFISHES,UNC,GENERAL	18,493	44,681	47,329	64,304	89,907	53,262	49,526	39,218	52,645	1,616,180
FLATFISH,UNC					14	246				260
FLYINGFISHES		2	650	4			81			1,714
GLASSEYE SNAPPER						10		35		101
GOATFISHES	10,043	14,544	21,065	18,809	15,010	26,206	20,434	22,154	19,014	605,869
GRAYSBY		3	6			25			30	64
GREATER AMBERJACK	366	1,764	1,205	802	270	151	7	8	213	13,088
GROUPE, TIGER		151	2,745							2,896
GROUPE, BLACK			17							241
GROUPE, MARBLED		200						50	350	1,300
GROUPE, MISTY	4,993	5,948	5,465	4,349	5,562	6,718	5,246	6,184	5,683	64,622
GROUPE, NASSAU	7,753	7,778	12,614	15,474	19,107	14,971	12,947	17,623	18,746	149,881
GROUPE, RED		125		18		7		28		713
GROUPE, YELLOWFIN	448	827	1,617	2,088	1,793	3,350	11,208	3,641	6,916	38,340
GROUPE, S	80,744	93,174	86,694	72,655	43,197	47,919	40,632	53,313	46,988	2,286,480
GRUNT, COTTONWICK				422						464
GRUNT, SMALLMOUTH	6	4					10	12		173
GRUNT, BLUESTRIPED	651	82	35	101	28	109	12	5	53	1,158
GRUNT, FRENCH		18		7						225
GRUNT, SPANISH	10		12	17	10					95
GRUNT, TOMTATE	65									149
GRUNT, WHITE	141,902	142,505	170,161	164,041	112,694	117,124	114,982	152,445	147,179	3,317,291
GRUNTS	413	1,385	737	223	234	32	207	304	127	13,371
HERRING, ATLANTIC THREAD	981	1,654	1,520	120	240	100		173	101	17,541
HERRINGS, UNC	24,733	26,962	26,370	32,205	23,428	27,427	25,165	24,777	27,956	416,280
HIND, RED	28,717	42,235	53,393	60,253	55,012	65,974	60,901	68,232	81,236	772,064
HIND, ROCK	17		18		113		113			1,394
HOGFISH	32,331	49,483	60,601	68,577	49,570	46,390	58,230	67,947	68,613	912,160
HORSE-EYE JACK	141	121	41	1,878	6,126	5,109	7,568	6,535	4,830	34,152
JACK, YELLOW	24	71	918	426	3,314	2,021	2,460	3,726	3,215	21,933
JACKNIFE FISH	130					24	7	54	35	250
JACKS	41,284	54,571	48,617	55,984	37,182	30,082	29,752	36,355	30,635	725,895
JEWFISH		395	40	85	142		27	50	40	14,838
LOBSTER, SLIPPER(BULLDOZER)			5				121	380	171	677
LOBSTER, SPINY	192,539	279,674	281,122	283,752	298,924	327,560	257,120	281,579	301,389	4,637,971
MACKEREL, BULLET		15	508				19	148	62	767

Carib- Table 18 (continued)

Common Name	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total 1983-2002
MACKEREL,CERO	24,233	34,051	63,296	98,050	71,425	63,936	53,565	82,909	53,358	597,692
MACKEREL,KING	97,078	153,920	103,215	105,594	108,471	127,802	123,559	99,786	117,965	2,269,114
MARGATE	2,316	2,821	4,047	3,612	2,675	990	864	437	27	23,940
MARGATE,BLACK	424	149	3		6	32	10	5	11	3,343
MARLIN,BLUE	2,607	1,000	25	32	5	1,331	12		65	44,225
MARLIN,UNC		10	78	192	64			430	40	50,959
MARLIN,WHITE	31					19				136
MINNOWS			263		130					403
MOJARRAS	29,162	32,403	25,567	23,754	19,464	22,146	18,109	19,038	21,195	364,694
MOLLUSKS,UNC	170	358	284	138	532	565	253	1,271	1,096	4,864
MOONFISH,ATLANTIC	6,731	6,807	771	2,065	953	1,207	305	740	83	43,271
MULLET,SILVER	29,548	57,384	53,107	55,504	53,139	61,800	53,201	59,945	57,032	833,564
MULLETS	92	170	207	233	203	119	73	155	6	2,076
OCTOPUS	25,846	19,430	37,160	38,744	39,554	43,639	48,753	33,572	28,663	513,188
OILFISH		2,854								2,861
PARROTFISH	115,750	79,881	102,799	110,944	97,503	80,663	72,865	96,762	107,485	2,106,910
PERMIT	605	878	515	545	1,162	818	771	622	1,515	11,614
PORGY,JOLTHEAD	52	123	10				11	619	2,271	3,133
PORGY,SAUCEREYE								7		7
PORKFISH										43
PUDDINGWIFE (WRASSE)		5					19	104	32	215
PUFFERS		84	14		321					436
RAINBOW RUNNER	142	127	1,942	174	172	39	46	120	101	5,433
RAYS,UNC	5,547	7,445	3,742	242	14,901	1,920	8,512	1,948	764	52,107
REMORA		570	24	3,029	294	507	2,922	39	24	7,627
RUDDERFISH (SEA CHUBS)	1,080	57	190	86	248	836	121	293	474	6,478
SAILFISH	154	18	44	180						1,034
SAND PERCH,DWARF	24	4		23			7			137
SCAD,MACKEREL	31			2,656	12,530	3				15,692
SCADS	155	70	101	675	9,321		57		14	11,368
SCUPS OR PORGIES,UNC	11,038	18,638	30,744	28,431	26,555	34,586	28,863	35,863	35,595	514,053
SHARK,BLUE							9	7	10	42
SHARK,BONITO(SHORTFIN MAKO)	7	219						9	14	249
SHARK,COW	11		25	113		2,002				2,151
SHARK,DOGFISH,SMOOTH			1,005							1,005
SHARK,DUSKY								8		8
SHARK,HAMMERHEAD		15								123

Carib- Table 18 (continued)

Common Name	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total 1983-2002
SHARK,LEMON			34						10	644
SHARK,NURSE		9,002	80		70	20	281		15	9,953
SHARK,REEF					150			2	47	199
SHARK,SCALLOPED HAMMERHEAD										125
SHARK,SEVENGILL BIGEYE						137				221
SHARK,SIXGILL BIGEYE			2	41		80	1,150		25	1,324
SHARK,TIGER			15	68				400		483
SHARK,UNC	37,552	74,612	59,350	61,141	47,181	44,601	41,537	43,084	38,413	679,419
SHARK,WHALE		52	9,002	5,001	25	51				24,268
SHELLFISH,OTHER	6,553	6,018	5,512	4,809	14,240	9,584	8,946	10,245	5,479	106,439
SILVERSIDES				20		17				47
SNAILS(CONCHS)	170,847	214,282	239,866	238,648	260,955	214,100	280,313	244,970	235,697	4,249,111
SNAKE MACKEREL			11							196
SNAPPER,BLACK	32		14		207	672	403	20	505	5,424
SNAPPER,BLACKFIN		89	18	822	3,689	4,342	10,652	9,508	9,502	40,935
SNAPPER,CARIBBEAN RED				3						3
SNAPPER,CUBERA	121	120	59	9						1,232
SNAPPER,DOG	291	48	168	10		78	75	1,537	123	2,949
SNAPPER,GRAY AT (MANGROVE)	767	1,182	52		3	10	85	53	23	2,406
SNAPPER,LANE	135,489	241,892	265,632	270,275	221,030	196,988	204,314	183,363	184,701	3,106,543
SNAPPER,MAHOGONY	88	364	207	978	274	43	41	7		3,836
SNAPPER,MUTTON	39,729	79,935	76,462	76,602	77,437	96,377	84,256	88,646	91,907	1,108,124
SNAPPER,QUEEN	27,765	34,138	36,685	38,778	46,073	66,695	82,828	102,138	110,061	666,509
SNAPPER,SCHOOLMASTER	35		84	15	107	146	10	29		949
SNAPPER,SILK	338,852	363,300	311,324	285,787	209,384	224,818	187,639	267,025	198,190	5,287,747
SNAPPER,VERMILION	7,512	18,246	10,189	14,022	16,585	17,240	22,177	44,813	23,144	196,729
SNAPPER,YELLOWTAIL	186,459	291,892	273,828	273,088	252,087	279,467	360,624	317,330	291,145	3,910,882
SNAPPERS,UNC	39,579	48,828	50,753	66,957	55,989	62,110	48,934	56,688	56,786	892,023
SNOOK	34,642	49,066	49,208	57,842	44,989	49,808	40,169	46,759	45,163	725,629
SPADEFISH	134	536	214	56	160		7	87	9,109	10,449
SPANISH FLAG		8	25			14		43		90
SQUIRRELFISHES	8,999	14,138	15,662	21,604	19,007	14,703	15,816	17,553	16,106	247,050
STINGRAYS	1,299	1,121	1,427	549	1,260	1,229	1,209	1,571	252	12,313
SUNFISHES	1,074	616	1,739	213	255	793	51	490	980	16,303
SURGEONFISHES		7	225		4	13		20	6	647
SWORDFISH	11	96	140	28	318	39	728	54	621	17,369
TARPON	4,702	3,148	490	2,489	2,343	2,374	354	2,193	4,492	70,011

Carib- Table 18 (continued)

Common Name	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total 1983-2002
TENPOUNDER	133	190	102	240		108			67	5,102
THREADFIN	214	53		12				34	69	1,269
TILAPIAS				46				9	13	280
TILEFISH,BLACKLINE	247	337	269	9	156	996	209	105	26	2,452
TILEFISH,SAND	13		52	463	464	12	18		18	1,358
TILEFISH,UNCLASSIFIED				131			10			253
TRIGGERFISH,GRAY										67
TRIGGERFISH,OCEAN	11		34	82		293	5			428
TRIGGERFISH,QUEEN	46,668	69,067	63,671	73,200	64,448	49,591	40,810	59,803	53,574	985,364
TRIGGERFISHES	85	103	69	52	20	120	833	71	58	1,854
TRIPLETAIL	223	364	18	229	195	165	42	6	54	1,809
TUNA,ALBACORE	2,703	188	98	8,592	24,380	24,210	15,981	9,073	9,622	95,365
TUNA,BLACKFIN	12,291	13,262	14,309	7,002	450	982	3,277	23,994	27,122	142,599
TUNA,LITTLE (TUNNY)	8,738	16,856	8,795	39,723	21,084	18,315	17,174	20,146	14,891	209,034
TUNA,SKIPJACK	5,670	5,885	12,560	19,323	51,938	40,328	32,057	36,478	38,456	310,258
TUNA,UNC	59,043	77,343	100,222	95,675	59,354	22,417	21,878	16,279	11,062	1,314,179
TUNA,YELLOWFIN	2,459	1,659	603	45,520	41,654	48,921	46,636	33,045	19,308	429,126
WAHOO	1,274	1,041	971	5,290	1,154	6,697	2,160	5,026	1,095	28,616
WENCHMAN				542	2,303	3,645	4,953	7,164	6,199	25,384
Total	2,715,815	3,697,086	3,590,399	3,812,015	3,462,676	3,336,740	3,260,906	3,399,589	3,282,512	

Carib-Table 19. Estimated reported landings (lbs) for St. Thomas/St. John and St. Croix, years 1974-2002.

Reported Total Landings

Year	STT/STJ	STX	TOTAL
1974	57,656	0	57,656
1975	264,787	38,208	302,995
1976	224,631	59,850	284,481
1977	266,236	66,511	332,747
1978	478,023	77,859	555,883
1979	500,965	78,047	579,012
1980	506,347	53,040	559,387
1981	518,385	110,360	628,744
1982	499,814	170,358	670,171
1983	606,387	245,296	851,682
1984	606,540	317,770	924,311
1985	616,349	175,621	791,970
1986	568,083	126,736	694,819
1987	282,113	118,134	400,247
1988	9,401	58,200	67,601
1989	110,279	235,725	346,004
1990	568,491	385,395	953,885
1991	1,813,362	1,123,416	2,936,778
1992	1,023,831	822,151	1,845,982
1993	778,693	415,286	1,193,979
1994	707,145	567,185	1,274,329
1995	655,956	312,041	967,996
1996	626,085	466,728	1,092,813
1997	703,365	614,555	1,317,920
1998	597,987	366,995	964,982
1999	590,795	537,499	1,128,293
2000	589,072	748,373	1,337,444
2001	747,943	893,773	1,641,717
2002	410,212	515,437	925,649

Carib-Table 20. U.S. Virgin Islands. Number of licensed and reporting fishers by year, percent reporting and estimates of Expansion Factor 1 from annual reports (DFW, 1981-2001). The expansion factor 1 for years 1974-1979 was assumed constant and equal to the first year of reported information (1979-80). The raw data from 1974-1979 are shown (shaded) and were not used.

FISHING YEAR	No.Licensed Fishers			No.Fishers Reporting			% Fishers Reporting			Expansion Factor1		
	STT/STJ	STX	TOTAL	STT/STJ	STX	TOTAL	STT/STJ	STX	TOTAL	STT/STJ	STX	TOTAL
1974-75	230	227	457	72		72	31%		31%	2.35	3.13	
1975-76	312	197	509	30	41	71	10%	21%	14%	2.35	3.13	
1976-77	621	225	846	74	48	122	12%	21%	14%	2.35	3.13	
1977-78	162	103	265	111	19	130	69%	18%	49%	2.35	3.13	
1978-79	161	121	282	131	48	179	81%	40%	63%	2.35	3.13	
1979-80	212	143	355	143	20	163	67%	14%	46%	2.35	3.13	
1980-81	258	163	421	110	52	162	43%	32%	37%	2.35	3.13	2.60
1981-82	256	322	578	122	94	216	48%	29%	38%	2.10	3.43	2.68
1982-83	259	195	454	132	91	223	51%	47%	49%	1.96	2.14	2.04
1983-84	255	182	437	149	139	288	58%	76%	67%	1.71	1.31	1.52
1984-85	255	182	437	159	160	319	62%	88%	75%	1.60	1.14	1.37
1985-86	330	206	536	137	139	276	42%	67%	54%	2.41	1.48	1.94
1986-87	329	200	529	135	88	223	41%	44%	43%	2.44	2.27	2.37
1987-88	306	217	523	131	113	244	43%	52%	47%	2.34	1.92	2.14
1988-89	237	188	425	165	123	288	70%	65%	68%	1.44	1.53	1.48
1989-90	198	206	404	106	84	190	54%	41%	47%	1.87	2.45	2.13
1990-91	182	188	370	131	93	224	72%	49%	61%	1.39	2.02	1.65
1991-92	231	197	428	160	116	276	69%	59%	65%	1.44	1.70	1.55
1992-93	212	197	409	186	170	356	88%	86%	87%	1.14	1.16	1.15
1993-94	233	241	474	149	188	337	64%	78%	71%	1.56	1.28	1.41
1994-95	204	193	397	163	188	351	80%	97%	89%	1.25	1.03	1.13
1995-96	182	180	362	149	174.6	323.6	82%	97%	89%	1.22	1.03	1.12
1996-97	131	212	343	124	210	334	95%	99%	97%	1.06	1.01	1.03
1997-98	153	216	369	138	208	346	90%	96%	93%	1.11	1.04	1.07
1998-99	143	206	349	136	200	336	95%	97%	96%	1.05	1.03	1.04

Carib-Table 21. U.S. Virgin Islands. Expansion Factor 2 estimated from compliance reports for years 1974-1986 and taken from annual reports for years 1993-99 (DFW, 1997-2001). Estimates for FY 87-92 were not available. ExpReports = expected number of reports (Nreports) from reporting fishermen (Nfishers) (ExpReports= 12 months* Nfishers per fishing year). This expansion factor was not used in calculating total estimated landings in Table 22.

Expansion Factor 2 (EF2)						
District	Year	Nfishers	Nreports	ExpReports (12*Nfishers)	% of Exp Reports	EF2
STT/STJ	74-75	72	463	864	53.6%	1.87
	75-76	30	146	360	40.6%	2.47
	76-77	74	666	888	75.0%	1.33
	77-78	111	953	1332	71.5%	1.40
	78-79	131	1065	1572	67.7%	1.48
	79-80	143	1284	1716	74.8%	1.34
	80-81	118	1059	1416	74.8%	1.34
	81-82	122	1078	1464	73.6%	1.36
	82-83	161	1455	1932	75.3%	1.33
	83-84	138	1445	1656	87.3%	1.15
	84-85	157	1568	1884	83.2%	1.20
	85-86	189	1994	2268	87.9%	1.14
	93-94					1.17
	94-95					1.22
	95-96					1.10
96-97					1.03	
97-98					1.20	
98-99					1.20	
STX	75-76	41	393	492	79.9%	1.25
	76-77	48	558	576	96.9%	1.03
	77-78	19	168	228	73.7%	1.36
	78-79	48	462	576	80.2%	1.25
	79-80	20	131	240	54.6%	1.83
	80-81	31	314	372	84.4%	1.18
	81-82	64	626	768	81.5%	1.23
	82-83	98	930	1176	79.1%	1.26
	83-84	104	1118	1248	89.6%	1.12
	84-85	124	1266	1488	85.1%	1.18
	85-86	23	38	276	13.8%	7.26
	93-94					1.24
	94-95					1.37
	95-96					1.59
	96-97					1.37
97-98					1.23	
98-99					1.80	

Carib- Table 22. Estimated expanded total landings (lbs) for St. Thomas/St. John and St. Croix, years 1974-2002 (derived from the data in Table 19 and the expansion factors in Table 20)..

Expanded Total Landings

Year	STT/STJ	STX	TOTAL
1974	135,492	0	135,492
1975	622,248	119,591	741,839
1976	527,883	187,329	715,212
1977	625,653	208,180	833,834
1978	1,123,355	243,700	1,367,055
1979	1,177,267	244,287	1,421,554
1980	1,189,916	166,015	1,355,931
1981	1,163,691	367,105	1,530,796
1982	1,013,348	471,329	1,484,677
1983	1,111,520	403,117	1,514,637
1984	1,005,335	389,577	1,394,912
1985	1,247,034	200,208	1,447,242
1986	1,377,587	286,996	1,664,582
1987	685,001	265,826	950,827
1988	21,898	96,496	118,393
1989	158,965	423,884	582,850
1990	844,319	826,939	1,671,258
1991	2,545,186	2,021,897	4,567,083
1992	1,349,784	1,334,222	2,684,006
1993	1,054,504	519,710	1,574,214
1994	989,270	667,864	1,657,134
1995	812,140	321,402	1,133,542
1996	710,172	473,173	1,183,345
1997	763,064	627,007	1,390,072
1998	647,125	380,150	1,027,275
1999	620,334	553,624	1,173,958
2000	618,525	770,824	1,389,349
2001	785,341	920,586	1,705,927
2002	430,722	530,900	961,623

Carib-Table 23. Assemblage identification of the deep-water snapper/grouper complex for the Caribbean region, as defined by Cummings and Zweifel (in preparation).

NODC Species Code	Scientific Name	Common Name
8835360201	<i>Apsilus dentatus</i>	Snapper,black
8835360106	<i>Lutjanus buccanella</i>	Snapper,blackfin
8835360301	<i>Etelis oculatus</i>	Snapper,queen
8835360113	<i>Lutjanus vivanus</i>	Snapper,silk
8835360701	<i>Pristipomoides aquilon</i>	Snapper,wenchman
8835020502	<i>Mycteroperca bonaci</i>	Grouper,black
8835020440	<i>Epinephelus inermis</i>	Grouper,marbled
8835020409	<i>Epinephelus mystacinus</i>	Grouper,misty
8835020412	<i>Epinephelus striatus</i>	Grouper,nassau
8835020506	<i>Mycteroperca venenosa</i>	Grouper,yellowfin
8835020411	<i>Epinephelus niveatus</i>	Grouper,snowy
8835020411	<i>Epinephelus niveatus</i>	Grouper,snowy
8835020550	<i>Mycteroperca tiguiri</i>	Grouper,tiger
8835020509	<i>Mycteroperca tigris</i>	Grouper,tiger
8835020410	<i>Epinephelus nigritus</i>	Grouper,warsaw
8835020405	<i>Epinephelus flavolimbatus</i>	Grouper,yellowedge
8835020504	<i>Mycteroperca interstita</i>	Grouper,yellowmouth

Comments: Work by Cummings and Zweifel in progress.

Carib-Table 24. The nominal CPUE, relative nominal CPUE, proportion positive trips, relative abundance index, confidence intervals and coefficients of variance associated with the relative abundance index for silk snapper, 1984-1991.

YEAR	Nominal CPUE	Rel Nominal CPUE	Prop. Pos Trips	Positive Trips	Relative Index	Lower 95% CI	Upper 95% CI	CV Index
1984-1985	18.04	1.41	0.67	18	1.93	1.04	3.57	0.32
1986	18.46	1.44	0.68	13	2.14	1.03	4.46	0.38
1987	7.71	0.60	0.31	17	0.39	0.20	0.78	0.36
1988	12.02	0.94	0.58	53	0.86	0.56	1.32	0.22
1989	7.17	0.56	0.53	29	0.41	0.23	0.72	0.29
1990	22.14	1.73	0.61	14	1.36	0.63	2.91	0.40
1991	13.96	1.09	0.61	14	0.97	0.46	2.06	0.39

Carib-Table 25. The nominal CPUE, relative nominal CPUE, proportion positive trips, relative abundance index, confidence intervals and coefficients of variance associated with the relative abundance index for queen snapper, 1984-1991.

YEAR	Nominal CPUE	Rel Nominal CPUE	Prop. Pos Trips	Positive Trips	Relative Index	Lower 95% CI	Upper 95% CI	CV Index
1984-85	6.37	0.52	0.33	9	0.17	0.06	0.50	0.57
1986	3.38	0.28	0.16	3	0.08	0.02	0.38	0.92
1987	19.08	1.56	0.80	43	1.95	1.25	3.04	0.22
1988	9.24	0.76	0.74	67	1.21	0.84	1.73	0.18
1989	9.71	0.79	0.69	38	1.44	0.92	2.25	0.23
1990	10.61	0.87	0.61	14	1.29	0.65	2.53	0.35
1991	27.16	2.22	0.48	11	2.15	0.99	4.67	0.40

Carib-Table 26. Number of trips interviewed (Puerto Rico TIP) by gear type and year.

YEAR	Hook and Line	Fish Pots/Traps	Gill/Trammel Net	Trolling	Long Line	Siene	Lobster Traps	Other	Grand Total
1980	0	11	0	0	0	0	16	7	34
1981	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0
1983	0	16	0	0	0	0	1	12	29
1984	0	163	0	0	0	0	4	89	256
1985	0	720	0	0	0	0	162	29	911
1986	0	31	0	0	0	0	11	0	42
1987	19	257	35	2	0	0	9	10	332
1988	0	9	0	0	0	0	0	13	22
1989	37	208	105	20	14	0	5	85	474
1990	563	698	685	106	110	41	0	310	2513
1991	2470	1371	377	116	88	45	27	339	4833
1992	1690	765	211	55	84	88	33	242	3168
1993	1383	703	217	99	4	69	30	195	2700
1994	451	228	126	71	0	41	1	71	989
1995	698	353	129	38	7	14	0	201	1440
1996	215	246	206	26	6	16	10	182	907
1997	215	233	166	12	0	16	4	83	729
1998	2	402	372	91	381	65	23	254	1590
1999	273	553	470	153	229	65	12	309	2064
2000	353	479	416	91	6	129	5	279	1758
2001	350	480	678	30	18	156	47	388	2147
2002	487	350	538	56	2	189	42	287	1951
2003	7	0	1	0	0	0	0	0	8
Grand Total	9213	8276	4732	966	949	934	442	3385	28897

Carib-Table 27. Annual percent frequency of the top ten species sampled for length by the Puerto Rico trip interview program (TIP) for hook and line trips.

YEAR	Coney	Tiger Grouper	White Grunt	Red Hind	King Mackerel	Hammerhead Shark	Lane Snapper	Silk Snapper	Vermilion Snapper	Yellowtail Snapper	Other
1987	0.00	0.00	5.08	1.13	0.00	0.00	64.41	8.47	0.56	2.26	18.08
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
1989	9.34	0.00	19.58	5.72	0.00	0.00	5.12	7.53	1.51	7.53	43.67
1990	2.17	0.00	0.00	8.35	0.74	14.84	7.52	6.32	10.39	23.71	25.96
1991	6.65	0.23	0.00	9.17	0.28	5.84	6.06	6.13	10.87	38.44	16.33
1992	7.24	0.00	5.79	12.32	0.18	0.00	4.65	2.77	5.60	44.86	16.59
1993	4.87	0.00	6.35	2.82	2.90	0.00	5.08	2.98	7.14	52.11	15.76
1994	1.61	1.15	3.13	3.99	0.07	0.00	1.70	3.73	4.11	71.78	8.72
1995	2.38	13.17	9.40	3.50	0.78	0.00	5.37	3.62	1.10	49.79	10.88
1996	3.60	32.86	2.09	2.97	2.43	0.00	3.84	11.72	0.15	21.83	18.52
1997	2.85	22.27	3.95	9.60	8.72	0.00	1.92	4.55	4.06	31.60	10.48
1998	0.00	0.00	0.00	0.00	12.50	0.00	0.00	0.00	0.00	0.00	87.50
1999	1.56	0.00	2.13	5.71	3.10	0.00	5.41	2.76	3.51	62.73	13.10
2000	1.40	0.07	0.59	4.94	9.70	0.00	3.07	9.51	1.99	57.49	11.25
2001	3.92	0.02	1.08	8.30	21.05	0.00	3.58	12.83	2.10	32.97	14.16
2002	1.62	0.00	1.90	5.70	13.83	0.00	11.07	9.69	1.64	41.75	12.80
2003	0.71	0.00	0.00	36.43	0.00	0.00	0.00	57.14	0.00	0.00	5.71

Carib-Table 28. Annual percent frequency of the top ten species sampled for length by the Puerto Rico trip interview program (TIP) for trips that used fish pots and traps.

YEAR	Coney	Spotted Goatfish	Yellow Goatfish	White Grunt	Red Hind	Spiny Lobster	Redtail Parrotfish	Lane Snapper	Silk Snapper	Yellowtail Snapper	Other
1984	0.76	0.23	0.15	0.83	0.38	55.30	0.00	0.38	0.00	0.53	41.44
1985	7.60	6.15	1.43	18.95	6.26	6.87	0.00	6.47	0.63	1.94	43.70
1986	0.00	0.00	0.00	0.00	0.00	88.65	0.00	0.00	0.00	0.00	11.35
1987	7.86	1.44	1.28	14.97	3.33	11.79	0.60	6.20	1.21	2.72	48.60
1988	14.58	0.00	0.00	2.08	4.17	29.17	0.00	4.17	0.00	0.00	45.83
1989	5.05	6.24	0.00	17.20	6.30	11.46	2.50	10.16	1.08	1.65	38.37
1990	1.90	9.15	1.99	0.00	2.70	0.72	6.22	9.70	5.75	4.15	57.72
1991	3.20	2.28	0.85	0.00	5.94	4.02	5.77	9.06	6.41	3.65	58.82
1992	4.55	2.21	0.64	21.34	9.04	3.13	3.43	10.56	2.98	4.57	37.54
1993	3.02	7.46	1.09	21.24	3.22	2.31	7.33	8.20	4.14	4.57	37.43
1994	3.05	1.49	2.56	22.69	3.22	6.68	5.36	6.44	7.34	5.78	35.40
1995	2.54	3.31	0.50	27.19	8.44	3.86	7.83	10.81	1.32	5.57	28.63
1996	2.33	1.77	2.51	17.23	1.21	4.66	10.71	9.40	5.68	8.47	36.03
1997	4.10	4.26	1.10	13.10	2.37	5.60	7.18	14.13	8.60	10.73	28.81
1998	2.19	15.39	1.74	13.20	3.60	3.33	5.88	12.09	7.62	3.54	31.41
1999	2.34	10.51	0.29	13.86	4.90	5.10	4.58	17.43	6.90	6.90	27.18
2000	2.54	5.64	0.26	22.20	4.31	1.68	4.66	6.36	18.19	4.37	29.78
2001	2.97	2.70	0.69	13.10	4.43	1.61	3.22	12.87	29.41	4.83	24.16
2002	3.04	2.02	0.58	18.36	4.68	5.18	3.01	10.06	24.61	3.56	24.90

Carib-Table 29. Annual percent frequency of the top ten species sampled for length by the Puerto Rico trip interview program (TIP) for trips that used gill and trammel nets.

Year	Bar Jack	Bluestriped Grunt	White Grunt	Princess Parrotfish	Redtail Parrotfish	Stoplight Parrotfish	Jolthead Porgy	Pluma Porgy	Hammer-head Shark	Yellowtail Snapper	Other
1987	3.09	3.09	13.58	8.64	5.56	20.99	0.00	0.00	0.00	3.09	41.98
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
1989	0.48	4.73	21.82	0.00	7.15	8.61	2.06	0.61	0.00	0.97	53.58
1990	2.69	0.00	0.00	0.22	7.15	11.76	4.67	0.63	23.98	2.20	46.68
1991	5.86	0.00	0.00	2.29	11.75	23.39	5.97	0.94	32.78	1.24	15.77
1992	2.99	1.37	35.62	1.78	11.63	14.78	3.39	0.57	0.00	2.67	25.20
1993	2.98	2.03	33.69	1.96	15.90	20.64	4.80	0.61	0.00	0.61	16.78
1994	1.29	6.22	17.25	2.35	19.60	18.19	16.90	0.35	0.00	1.17	16.67
1995	2.21	3.75	24.53	1.36	13.80	12.61	3.58	0.68	0.00	4.60	32.88
1996	7.36	3.62	8.21	0.21	21.32	22.81	0.75	3.30	0.00	5.01	27.40
1997	6.67	1.64	5.96	0.00	17.54	20.47	0.35	3.16	0.00	12.16	32.05
1998	10.86	4.65	16.57	0.35	11.92	17.31	0.85	6.73	0.00	6.73	24.01
1999	6.54	4.06	17.13	0.99	17.09	19.98	1.01	4.23	0.00	1.86	27.11
2000	8.12	5.29	13.52	3.02	15.79	26.00	0.22	2.77	0.00	5.29	19.98
2001	8.45	9.42	14.45	4.72	14.28	16.79	1.49	7.93	0.00	2.44	20.05
2002	4.58	6.23	16.15	2.01	22.05	26.23	0.62	4.01	0.00	2.55	15.58

Carib-Table 30. Annual percent frequency of the top ten species sampled for length by the Puerto Rico trip interview program (TIP) for trips that used trolling gears.

YEAR	Dolphin-fish	Cero Mackerel	King Mackerel	Silk Snapper	Yellowtail Snapper	Blackfin Tuna	Little Tuna (Tunny)	Skipjack Tuna	Yellowfin Tuna	Wahoo	Other
1989	0.00	21.74	4.35	0.00	0.00	6.09	23.48	6.96	4.35	0.00	33.04
1990	17.55	14.98	23.90	0.00	8.17	9.53	3.93	6.20	3.93	1.66	10.14
1991	8.00	15.06	46.23	4.06	0.70	4.98	2.55	8.92	0.58	0.23	8.69
1992	11.68	31.62	7.12	17.95	0.28	3.70	1.71	1.42	1.14	0.00	23.36
1993	17.06	7.36	7.02	0.00	0.33	26.09	2.01	15.38	15.38	2.34	7.02
1994	1.64	38.03	3.61	0.00	13.77	0.66	0.00	8.85	1.31	0.66	31.48
1995	9.09	28.48	41.21	0.00	3.03	0.00	0.61	0.00	2.42	0.00	15.15
1996	5.79	0.00	14.88	25.62	9.09	10.74	0.00	0.83	0.00	0.00	33.06
1997	53.49	23.26	9.30	0.00	2.33	4.65	0.00	0.00	0.00	0.00	6.98
1998	20.11	9.24	8.42	0.27	1.63	4.08	3.53	10.60	14.13	6.25	21.74
1999	20.94	7.82	5.52	1.99	0.00	9.28	13.88	8.82	10.12	7.52	14.11
2000	21.12	1.37	7.54	0.00	0.14	15.64	8.50	16.60	22.09	3.84	3.16
2001	30.88	0.49	2.45	0.00	0.00	10.29	10.29	23.04	0.98	19.12	2.45
2002	36.95	2.77	2.54	0.00	0.00	22.17	6.24	15.24	10.62	3.00	0.46

Carib-Table 31. Annual percent frequency of the top ten species sampled for length by the Puerto Rico trip interview program (TIP) for trips that used longlines.

YEAR	Coney	Tiger Grouper	White Grunt	Red Hind	Cero Mackerel	Lane Snapper	Mutton Snapper	Silk Snapper	Vermillion Snapper	Yellowtail Snapper	Other
1989	0.00	0.00	16.67	0.00	0.00	42.42	0.00	0.00	0.00	15.15	25.76
1990	0.45	0.00	0.00	1.06	0.08	76.44	1.51	0.15	0.23	9.52	10.57
1991	0.09	0.00	0.00	1.48	0.09	77.50	2.35	0.00	0.00	13.38	5.13
1992	0.14	0.00	2.39	0.07	0.00	88.03	1.23	0.00	0.27	4.72	3.15
1993	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
1995	0.00	0.00	8.25	0.00	0.00	75.26	0.00	0.00	0.00	10.31	6.19
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.35	67.65
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
1998	3.60	10.28	2.73	5.03	5.57	5.12	2.41	7.24	3.29	37.86	16.88
1999	3.26	0.98	1.75	11.59	0.33	6.41	0.69	10.44	3.79	43.74	17.01
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.30	0.00	0.00	13.70
2001	1.09	0.00	0.00	0.00	0.00	15.30	0.55	64.48	9.84	0.55	8.20
2002	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00

Carib-Table 32. Annual percent frequency of the top ten species sampled for length by the Puerto Rico trip interview program (TIP) for trips that used seines.

YEAR	Bar Jack	Big Eye Scad	White Grunt	Cero Mackerel	Silver Mullet	Pluma Porgy	Lane Snapper	Yellowtail Snapper	Little Tuna (Tunny)	Other
1990	3.75	0.00	0.00	22.84	0.00	0.41	6.44	34.91	5.46	26.18
1991	1.70	0.00	0.00	3.41	0.24	0.24	0.00	0.49	26.76	67.15
1992	1.60	0.00	14.67	1.07	0.00	2.53	18.67	44.00	0.00	17.47
1993	5.47	0.00	14.74	2.53	0.00	7.16	8.63	47.16	0.00	14.32
1994	2.95	0.00	18.29	0.00	0.00	5.90	12.98	43.36	0.00	16.52
1995	1.82	0.00	18.18	3.64	0.00	5.45	5.45	36.36	0.00	29.09
1996	0.00	0.00	6.32	0.00	0.00	6.84	12.63	37.89	0.00	36.32
1997	6.74	0.00	2.07	0.00	0.00	6.22	1.04	13.99	5.70	64.25
1998	8.93	12.96	2.77	5.53	0.00	5.28	4.15	24.15	7.55	28.68
1999	0.00	10.56	2.23	8.59	0.00	3.74	1.97	28.39	17.77	26.75
2000	21.47	6.43	3.32	0.16	16.23	3.27	1.24	8.14	7.88	31.85
2001	3.55	1.25	2.50	0.17	0.00	14.31	6.80	40.38	0.79	30.25
2002	10.49	3.42	9.57	0.04	0.61	5.61	6.65	21.63	15.75	26.24

Carib-Table 33. The number of records (each record is an individual fish) that contain length and weight measurements for all species reported in the Puerto Rico TIP data.

Common Name	Scientific Name	Number of Length-Weight Observations
AFRICAN POMPAÑO	ALECTIS CILIARIS	20
ALMACO JACK	SERIOLA RIVOLIANA	698
ANCHOVY,SLOUGH	ANCHOA DELICATISSIMA	7
ANCHOVY,STRIPED	ANCHOA HEPSETUS	9
ANCHOVY, WHALEBONE	CETENGRAULIS EDENTULUS	16
ANGELFISH,FRENCH	POMACANTHUS PARU	8
ANGELFISH,GRAY	POMACANTHUS ARCUATUS	17
ANGELFISH,QUEEN	HOLACANTHUS CILIARIS	102
BALLOONFISH	DIODON HOLACANTHUS	1
BALLYHOO	HEMIRAMPHUS BRASILIENSIS	120
BAR JACK	CARANX RUBER	2998
BARBU	POLYDACTYLUS VIRGINICUS	25
BARRACUDA	SPHYRAENIDAE	30
BARRACUDA,GREAT	SPHYRAENA BARRACUDA	22
BASS,LARGEMOUTH	MICROPTERUS SALMOIDES	1
BATFISH,SHORTNOSE	OGCOEPHALUS NASUTUS	1
BEARDFISH	POLYMIXIA LOWEI	2
BIGEYE	PRIACANTHUS ARENATUS	90
BIGEYE SCAD	SELAR CRUMENOPHTHALMUS	108
BIGEYES	PRIACANTHIDAE	2
BIGEYES	PRIACANTHUS	2
BLACK JACK	CARANX LUGUBRIS	31
BLUE RUNNER	CARANX CRYOS	528
BLUE TANG	ACANTHURUS COERULEUS	5
BLUEGILL	LEPOMIS MACROCHIRUS	33
BONEFISH	ALBULA VULPES	11
BONEFISHES	ALBULIDAE	3
BOXFISH	OSTRACIIDAE	49
BUMPER,ATLANTIC	CHLOROSCOMBRUS CHRYSURUS	51
BURRFISH,WEB	CHILOMYCTERUS ANTILLARUM	2
BUTTERFISH	PEPRILUS TRIACANTHUS	463
BUTTERFLY FISH	CHAETODONTIDAE	6
BUTTERFLYFISH,BANDED	CHAETODON STRIATUS	26
BUTTERFLYFISH,FOUREYE	CHAETODON CAPISTRATUS	6
BUTTERFLYFISH,SPOTFIN	CHAETODON OCELLATUS	1
CARDINAL SNAPPER	PRISTIPOMOIDES MACROPTHA	97
CATFISH,BERMUDA	PROMETHICHTHYS PROMETHEU	1
CATFISH,CHANNEL	ICTALURUS PUNCTATUS	8

Carib-Table 33. (continued)

CHROMIS,BROWN	CHROMIS MULTILINEATUS	4
CHUB,BERMUDA	KYPHOSUS SECTATRIX	15
CHUB,YELLOW	KYPHOSUS INCISOR	3
CLAM,UNC		
COBIA	RACHYCENTRON CANADUM	1
COBIAS	RACHYCENTRIDAE	1
CONCH,QUEEN	STROMBUS GIGAS	33
CONEY	EPINEPHELUS FULVUS	6815
CORNETFISH,BLUESPOTTE	FISTULARIA TABACARIA	4
COWFISH,HONEYCOMB	LACTOPHRYS POLIGONIUS	1079
COWFISH,SCRAWLED	LACTOPHRYS QUADRICORNIS	1605
COWFISH,SCRAWLED	LACTOPHRYS QUADRICORNIS	1605
CRAB,BLUE LAND	CARDISOMA GUANHUMI	64
CRAB,SPECKLED SWIMMIN	ARENAEUS CRIBRARIUS	37
CRAB,UNC	DECAPODA	3
CREOLE-FISH	PARANTHIAS FURCIFER	13
CREVALLE	CARANX HIPPOS	93
CROAKER,REEF	ODONTOSCION DENTEX	382
CUTLASSFISH,ATLANTIC	TRICHIURUS LEPTURUS	13
CUTLASSFISHES	TRICHIURIDAE	12
DICK,SLIPPERY	HALICHOERES BIVITTATUS	1
DOCTORFISH	ACANTHURUS CHIRURGUS	10
DOLPHINFISH	CORYPHAENA HIPPURUS	113
DOLPHINS	CORYPHAENIDAE	75
DRUM,SAND	UMBRINA COROIDES	9
DRUM,SPOTTED	EQUETUS PUNCTATUS	4
DRUMMER,GROUND	BAIRDIELLA RONCHUS	54
DRUMMER,MONGOLAR	CYNOSCION JAMAICENSIS	22
DRUMMER,WHITEMOUTH	MICROPOGONIAS FURNIERI	17
DRUMS	SCIAENIDAE	33
DURGON,BLACK	MELICHTHYS NIGER	36
EAGLE RAY,SPOTTED	AETOBATIS NARINARI	3
EEL,MORAYS	MURAENIDAE	2
FILEFISH	BALISTIDAE	12
FILEFISH,ORANGESPOT	CANTHERHINES PULLUS	4
FILEFISH,PYGMY	MONACANTHUS SETIFER	8
FILEFISH,SCRAWLED	ALUTERUS SCRIPTUS	2
FILEFISH,WHITESPOTTED	CANTHERHINES MACROCERUS	15
FINFISHES,MARINE,OTHE	OSTEICHTHYES	126
FLOUNDER,PEACOCK	BOTHUS LUNATUS	2

Carib-Table 33. (continued)

GLASSEYE SNAPPER	PRIACANTHUS CRUENTATUS	2
GOATFISH,SPOTTED	PSEUDUPENEUS MACULATUS	3359
GOATFISH,YELLOW	MULLOIDICHTHYS MARTINICU	687
GOBY,SIRAJO	SICYDIUM PLUMIERI	11
GOLDFISH	CARASSIUS AURATUS	1
GOLIATH GROUPER	EPINEPHELUS ITAJARA	28
GRAYSBY	EPINEPHELUS CRUENTATUS	1129
GREATER AMBERJACK	SERIOLA DUMERILI	41
GROUPE, TIGER	MYCTEROPERCA TIGRIS	3040
GROUPE,BLACK	MYCTEROPERCA BONACI	137
GROUPE,MARbled	EPINEPHELUS INERMIS	2
GROUPE,MISTY	EPINEPHELUS MYSTACINUS	28
GROUPE,NASSAU	EPINEPHELUS STRIATUS	279
GROUPE,RED	EPINEPHELUS MORIO	15
GROUPE,YELLOWEDGE	EPINEPHELUS FLAVOLIMBATU	2
GROUPE,YELLOWFIN	MYCTEROPERCA VENENOSA	140
GROUPE,YELLOWMOUTH	MYCTEROPERCA INTERSTITIA	5
GROUPERS	SERRANIDAE	14
GRUNT, COTTONWICK	HAEMULON MELANURUM	2
GRUNT, SMALLMOUTH	HAEMULON CHRYSARGYREUM	10
GRUNT,BARRED	CONODON NOBILIS	121
GRUNT,BLACK	HAEMULON BONARIENSE	6
GRUNT,BLUESTRIPEd	HAEMULON SCIURUS	2016
GRUNT,BURRO	POMADASYS CROCRO	4
GRUNT,CAESAR	HAEMULON CARBONARIUM	310
GRUNT,FRENCH	HAEMULON FLAVOLINEATUM	605
GRUNT,SAILORS CHOICE	HAEMULON PARRAI	226
GRUNT,SPANISH	HAEMULON MACROSTOMUM	27
GRUNT,TOMTATE	HAEMULON AUROLINEATUM	141
GRUNT,WHITE	HAEMULON PLUMIERI	15378
GRUNTS	HAEMULIDAE	26
GUANCHANCHE	SPHYRAENA GUACHANCHO	99
GUPPY	POECILIA RETICULATA	1
HALFBEAK,SILVERSTRIPE	HYPORHAMPHUS UNIFASCIATU	2
HAMLET,MUTTON	EPINEPHELUS AFER	19
HAMLET,MUTTON	ALPHESTES AFER	19
HARVESTFISH,LG	PEPRILUS ALEPIDOTUS	2
HERRING,ATLANTIC THRE	OPISTHONEMA OGLINUM	32
HERRINGS,UNC	CLUPEIDAE	170
HIND,RED	EPINEPHELUS GUTTATUS	11481

Carib-Table 33. (continued)

HIND,ROCK	EPINEPHELUS ADSCENSIONIS	184
HOGFISH	LACHNOLAIMUS MAXIMUS	2218
HOGFISH,SPANISH	BODIANUS RUFUS	72
HORSE-EYE JACK	CARANX LATUS	776
HOUNDFISH	TYLOSURUS CROCODILUS	11
JACK, YELLOW	CARANX BARTHOLOMAEI	245
JACK,COTTONMOUTH	URASPIS SECUNDA	1
JACKS	CARANGIDAE	23
LEATHERJACK	OLIGOPLITES SAURUS	1
LIZARDFISH,SAND DIVER	SYNODUS INTERMEDIUS	1
LIZARDFISHES	SYNODONTIDAE	1
LOBSTER,SPANISH SLIP.	SCYLLARIDES AEQUINOCTIA.	41
LOBSTER,SPINY	PANULIRUS ARGUS	15089
LOBSTER,SPOTTED SPINY	PANULIRUS GUTTATUS	14
MACKEREL,BULLET	AUXIS ROCHEI	2
MACKEREL,CERO	SCOMBEROMORUS REGALIS	1460
MACKEREL,KING	SCOMBEROMORUS CAVALLA	2132
MACKERELS & TUNAS	SCOMBRIDAE	27
MARGATE	HAEMULON ALBUM	112
MARGATE,BLACK	ANISOTREMUS SURINAMENSIS	115
MARLIN,BLUE	MAKAIRA NIGRICANS	1
MOJARRA,RHOMBOID	DIAPTERUS RHOMBEUS	3
MOJARRA,STRIPED	DIAPTERUS PLUMIERI	51
MOJARRA,YELLOWFIN	GERRES CINEREUS	129
MOJARRAS	GERREIDAE	473
MOONFISH,ATLANTIC	SELENE SETAPINNIS	3
MORAY,SPOTTED	GYMNOTHORAX MORINGA	8
MORAY,VIPER	ENCHELYCORE NIGRICANS	3
MULLET WITH (ROE RED)	MUGIL LIZA	14
MULLET, MUGIL DUSSUMI	MUGIL DUSSUMIERI	19
MULLET,SILVER	MUGIL CUREMA	582
MULLETS	MUGILIDAE	55
OYSTER,MANGROVE CUPED	CRASSOSTREA RHIZOPHORAE	1
PALOMETA	TRACHINOTUS GOODEI	79
PARROTFISH	SCARIDAE	700
PARROTFISH	EUSCARUS CRETENSIS	700
PARROTFISH,BLUE	SCARUS COERULEUS	52
PARROTFISH,MIDNIGHT	SCARUS COELESTINUS	8
PARROTFISH,PRINCESS	SCARUS TAENIOPTERUS	799
PARROTFISH,QUEEN	SCARUS VETULA	549

Carib-Table 33. (continued)

PARROTFISH,RAINBOW	SCARUS GUACAMAIA	38
PARROTFISH,REDBAND	SPARISOMA AUROFRENATUM	149
PARROTFISH,REDFIN	SPARISOMA RUBRIPINNE	76
PARROTFISH,REDTAIL	SPARISOMA CHRYSOPTERUM	7232
PARROTFISH,STOPLIGHT	SPARISOMA VIRIDE	7416
PERMIT	TRACHINOTUS FALCATUS	43
PIPEFISHES	SYNGNATHIDAE	14
POMPANO DOLPHIN	CORYPHAENA EQUISETIS	1
PORCUPINEFISHES	DIODONTIDAE	2
PORCUPINEFISHES	DIODON	2
PORGY,G:CALAMUS	CALAMUS SPP	57
PORGY,JOLTHEAD	CALAMUS BAJONADO	2292
PORGY,LITTLEHEAD	CALAMUS PRORIDENS	33
PORGY,PLUMA	CALAMUS PENNATULA	2771
PORGY,SAUCEREYE	CALAMUS CALAMUS	39
PORGY,SHEEPSHEAD	CALAMUS PENNA	15
PORKFISH	ANISOTREMUS VIRGINICUS	616
PUDDINGWIFE (WRASSE)	HALICHOERES RADIATUS	50
PUFFER,BANDTAIL	SPHOEROIDES SPENGLERI	3
PUFFER,SMOOTH	LAGOCEPHALUS LAEVIGATUS	3
RAINBOW RUNNER	ELAGATIS BIPINNULATA	50
RAYS,UNC	RAJIFORMES	1
RAZORFISH, PEARLY	XYRICHTHYS NOVACULA	4
ROCK BEAUTY	HOLACANTHUS TRICOLOR	1
SAILFISH	ISTIOPHORUS PLATYPTERUS	1
SARDINE,SCALED	HARENGULA JAGUANA	2
SARGASSUMFISH	HISTRIO HISTRIO	1
SCAD,ROUND	DECAPTERUS PUNCTATUS	1
SCUPS OR PORGIES,JUMB	SPARIDAE	1408
SEA BREAM	ARCHOSARGUS RHOMBOIDALIS	30
SENNET,SOUTHERN	SPHYRAENA PICUDILLA	97
SERGEANT MAJOR	ABUDEFDUF SAXATILIS	2
SHARK,BLUE	PRIONACE GLAUCA	2
SHARK,COW	HEXANCHIDAE	9
SHARK,HAMMERHEAD	SPHYRNIDAE	7273
SHARK,LEMON	NEGAPRION BREVIROSTRIS	21
SHARK,NURSE	GINGLYMOSTOMA CIRRATUM	3
SHARK,REEF	CARCHARHINUS PEREZI	1
SHARK,SCALLOP HAMMERH	SPHYRNA LEWINI	2
SHARK,SEVENGILL	NOTORYNCHUS CEPEDIANUS	1

Carib-Table 33. (continued)

SHARK,SHORTFIN MAKO	ISURUS OXYRINCHUS	25
SHARK,TIGER	GALEOCERDO CUVIER	2
SHARKS,CARPET	ORECTOLOBIDAE	1
SHARKS,MACKEREL	LAMNIDAE	2
SHARKS,REQUIEM	CARCHARHINIDAE	15
SHARKS,WHALE	RHINCODONTIDAE	3
SHARKSUCKER	ECHENEIS NAUCRATES	11
SLEEPER,FAT	DORMITATOR MACULATUS	3
SNAPPER,BLACK	APSILUS DENTATUS	21
SNAPPER,BLACKFIN	LUTJANUS BUCCANELLA	1127
SNAPPER,CUBERA	LUTJANUS CYANOPTERUS	275
SNAPPER,DOG	LUTJANUS JOCU	491
SNAPPER,GRAY	LUTJANUS GRISEUS	156
SNAPPER,LANE	LUTJANUS SYNAGRIS	15048
SNAPPER,MAHOGONY	LUTJANUS MAHOGONI	844
SNAPPER,MUTTON	LUTJANUS ANALIS	2308
SNAPPER,QUEEN	ETELIS OCULATUS	832
SNAPPER,SCHOOLMASTER	LUTJANUS APODUS	2263
SNAPPER,SILK	LUTJANUS VIVANUS	9023
SNAPPER,VERMILION	RHOMBOPLITES AURORUBENS	6934
SNAPPER,YELLOWTAIL	OCYURUS CHRYSURUS	48781
SNAPPERS,UNC	LUTJANIDAE	46
SNOOK	CENTROPOMIDAE	122
SNOOK, COMMON	CENTROPOMUS UNDECIMALIS	75
SNOOK,FAT	CENTROPOMUS PARALLELUS	79
SNOOK,SWORDSPINE	CENTROPOMUS ENSIFERUS	17
SOAPFISH,GREATER	RYPTICUS SAPONACEUS	4
SOLDIERFISH,BLACKBAR	MYRIPRISTIS JACOBUS	46
SPADEFISH	EPHIPPIDAE	27
SPADEFISH,ATLANTIC	CHAETODIPTERUS FABER	4
SPINY LOBSTERS, PALIN	PALINURIDAE	3049
SPOTTED SCORPIONFISH	SCORPAENA PLUMIERI	7
SQUIRRELFISH	HOLOCENTRUS ASCENSIONIS	1334
SQUIRRELFISH, LONGSPIN	HOLOCENTRUS RUFUS	103
SQUIRRELFISHES	HOLOCENTRIDAE	266
SQUIRRELFISHES	HOLOCENTRUS	266
STINGRAY,SOUTHERN	DASYATIS AMERICANA	1
SUNFISH,REDEAR	LEPOMIS MICROLOPHUS	2
SURGEON,OCEAN	ACANTHURUS BAHIANUS	123
SURGEONFISHES	ACANTHURIDAE	27

Carib-Table 33. (continued)

SWORDFISH	XIPHIAS GLADIUS	28
TARPON	MEGALOPS ATLANTICUS	57
TATTLER	SERRANUS PHOEBE	9
TENPOUNDER	ELOPS SAURUS	42
TENPOUNDER	ELOPS HAWAIIENSIS	42
TILAPIA,BLUE	TILAPIA AUREA	1
TILEFISH,BLACKLINE	CAULOLATILUS CYANOPS	27
TILEFISH,GOLDFACE	CAULOLATILUS CHRYSOPS	2
TILEFISH,SAND	MALACANTHUS PLUMIERI	119
TOBACCOFISH	SERRANUS TABACARIUS	11
TRIGGERFISH,GRAY	BALISTES CAPRISCUS	101
TRIGGERFISH,OCEAN	CANTHIDERMIS SUFFLAMEN	22
TRIGGERFISH,QUEEN	BALISTES VETULA	2790
TRIGGERFISH,SARGASS	XANTHICHTHYS RINGENS	2
TRIPLETAIL	LOBOTES SURINAMENSIS	125
TRUNKFISH	LACTOPHRYS TRIGONUS	262
TRUNKFISH,SMOOTH	LACTOPHRYS TRIQUETER	416
TRUNKFISH,SPOTTED	LACTOPHRYS BICAUDALIS	566
TUNA,ALBACORE	THUNNUS ALALUNGA	4
TUNA,BLACKFIN	THUNNUS ATLANTICUS	101
TUNA,LITTLE (TUNNY)	EUTHYNNUS ALLETTERATUS	670
TUNA,SKIPJACK	EUTHYNNUS PELAMIS	181
TUNA,YELLOWFIN	THUNNUS ALBACARES	98
WAHOO	ACANTHOCYBIUM SOLANDRI	26
WARMOUTH	LEPOMIS GULOSUS	3
WENCHMAN	PRISTIPOMOIDES AQUILONAR	200
WEST INDIAN FIGHTING	STROMBUS PUGILIS	39
WHITE CATFISH	AMEIURUS CATUS	4
WRASSES	LABRIDAE	1

Carib-Table 34. Number of individuals by species in the TIP dataset with weight and length measurements and maximum and minimum measured length in the records from A) St. Croix and B) St. John/St. Thomas district.

A) ST. Croix

SPECIES	max_length	min_length	Number of animals
ALMACO JACK	320	170	31
AMBERJACKS	420	420	1
ANGELFISH,FRENCH	435	140	228
ANGELFISH,GRAY	605	162	241
ANGELFISH,QUEEN	386	150	271
ANGELFISHES	106	106	1
BAR JACK	525	105	1064
BARRACUDA	1112	508	32
BARRACUDA,GREAT	1850	23	382
BEARDFISH	425	205	17
BIGEYE	297	175	6
BIGEYE SCAD	272	100	1569
BIGEYES	330	330	1
BLACK JACK	910	283	47
BLUE RUNNER	480	176	142
BLUE TANG	757	18	29245
BLUEFISH	389	173	91
BONITO,ATLANTIC	508	400	4
BUTTERFISH	305	137	365
BUTTERFLYFISH	140	140	2
BUTTERFLYFISH,BANDED	155	124	4
BUTTERFLYFISH,FOUREYE	121	118	2
BUTTERFLYFISH,SPOTFIN	158	158	1
CHUB,BERMUDA	370	210	23
CHUBS	430	345	3
CONEY	400	105	10213
COWFISH,HONEYCOMB	405	134	7065
COWFISH,SCRAWLED	525	152	442
CREOLE-FISH	210	210	3
CREVALLE	525	480	2
DICK,SLIPPERY	265	265	1
DOCTORFISH	410	113	10368
DOLPHINFISH	1600	36	676
DRUM,SPOTTED	238	238	3
DURGON,BLACK	320	220	55
FILEFISH	290	290	1
FILEFISH,ORANGE	350	230	20
FILEFISH,ORANGESPOT	640	151	1523
FILEFISH,SCRAWLED	540	205	34
FILEFISH,WHITESPOTTED	493	155	567

Carib-Table 34A (continued)

SPECIES	max_length	min_length	Number of animals
FLOUNDER,PEACOCK	300	265	8
FLYINGFISHES	400	250	48
GLASSEYE SNAPPER	330	180	5
GOATFISH,RED	275	185	19
GOATFISH,SPOTTED	275	160	146
GOATFISH,YELLOW	350	100	4069
GOATFISHES	563	100	1992
GRAYSBY	435	187	55
GREATER AMBERJACK	406	406	1
GROUPE, TIGER	645	270	26
GROUPE,BLACK	402	402	1
GROUPE,GAG	227	180	4
GROUPE,MISTY	1135	250	71
GROUPE,NASSAU	1320.8	63	150
GROUPE,RED	546	546	1
GROUPE,YELLOWFIN	1574	61	269
GROUPE,YELLOWMOUTH	572	195	30
GROUPERS	570	352	14
GRUNT, COTTONWICK	280	157	185
GRUNT, SMALLMOUTH	205	160	3
GRUNT,BARRED	245	190	37
GRUNT,BLUESTRIPED	305	125	632
GRUNT,BURRO	310	164	986
GRUNT,CAESAR	290	157	1472
GRUNT,FRENCH	395	102	5475
GRUNT,SAILORS CHOICE	295	240	7
GRUNT,SPANISH	310	297	3
GRUNT,STRIPED	270	160	145
GRUNT,TOMTATE	297	160	106
GRUNT,WHITE	2000	100	18428
GRUNTS	315	150	1410
GUPPY	298	222	28
HALFBEAKS	325	325	1
HAMLET,BARRED	207	207	1
HIND,RED	835	120	5466
HIND,ROCK	480	160	169
HOGFISH	569	206	61
HOGFISH,SPANISH	350	173	217
HORSE-EYE JACK	668	167	47
HOUNDFISH	810	735	4
JACK, YELLOW	700	237	60

Carib-Table 34A (continued)

SPECIES	max_length	min_length	Number of animals
JACKS	579	575	2
LIZARDFISHES	390	390	1
MACKEREL,CERO	838.2	400	27
MACKEREL,KING	1498.6	54	76
MACKERELS & TUNAS	660	660	1
MARGATE	602	280	32
MARGATE,BLACK	480	310	7
MARLIN,BLUE	3759	1727.2	10
MARLIN,WHITE	2438	1854	3
MOJARRA,RHOMBOID	203	203	1
MOJARRA,YELLOWFIN	220	195	5
MOJARRAS	210	200	4
NEEDLEFISH,KEELTAIL	970	605	14
NEEDLEFISHES	480	480	1
PARROTFISH	355	117	3382
PARROTFISH,MIDNIGHT	580	580	1
PARROTFISH,PRINCESS	420	120	3479
PARROTFISH,QUEEN	410	195	699
REDBAND	375	109	7965
PARROTFISH,REDFIN	670	190	1160
PARROTFISH,REDTAIL	770	132	31562
PARROTFISH,STOPLIGHT	808	161	23536
PARROTFISH,STRIPED	255	190	21
PERMIT	485	220	5
PIGFISH	223	190	4
POMFRET,BIGSCALE	360	337	2
POMPANO DOLPHIN	925	648	12
POMPANO,AFRICAN	350	157	7
PORGY,G:CALAMUS	440	191	30
PORGY,G:PAGRUS	496	175	34
PORGY,JOLTHEAD	372	175	72
PORGY,PLUMA	268	162	28
PORGY,SHEEPSHEAD	246	232	3
PORKFISH	285	170	73
PUDDINGWIFE (WRASSE)	365	215	55
RAINBOW RUNNER	680	290	37
ROCK BEAUTY	405	110	604
SARDINE,REDEAR	113	113	1
SEA BREAM	320	320	1
SHARK,CARIBBEAN REEF	680	680	1
SHARK,NURSE	1390	620	100
SHARK,REEF	1480	745	15
SHARK,TIGER	875	875	3
SHARKSUCKER	740	740	1

Carib-Table 34A (continued)

SPECIES	max_length	min_length	Number of animals
SNAPPER, BLACK	495	205	222
SNAPPER, BLACKFIN	520	140	2371
SNAPPER, CUBERA	329	250	8
SNAPPER, DOG	780	204	103
SNAPPER, GRAY	580	280	4
SNAPPER, LANE	390	149	233
SNAPPER, MAHOGONY	350	137	456
SNAPPER, MUTTON	698.5	183	364
SNAPPER, RED	295	242	2
SNAPPER, SCHOOLMASTER	560	177	1586
SNAPPER, VERMILION	380	380	1
SNAPPER, VERMILION, LAR	262	262	1
SNAPPER, VERMILION, MED	272	272	1
SNAPPER, VERMILION, SMA	485	177	342
SNAPPER, YELLOWTAIL	670	120	5482
SNAPPERS, UNC	410	235	30
SOLDIERFISH, BLACKBAR	255	125	198
SPADEFISH, ATLANTIC	322	195	36
SQUIRRELFISH	257	172	217
SQUIRRELFISH, LONGSPIN	340	100	3449
SQUIRRELFISHES	250	170	29
STINGRAYS	410	185	99
SURGEON, OCEAN	290	103	4262
SWORDFISH	1065	1065	1
TILEFISH	310	310	1
TILEFISH, EXTRA LARGE	342	342	1
TILEFISH, GOLDFACE	830	830	1
TILEFISH, LARGE	342	342	1
TILEFISH, MEDIUM	342	342	1
TILEFISH, SAND	410	290	17
TILEFISH, SMALL	342	342	1
TILEFISH, UNCLASSIFIED	435	263	48
TRIGGERFISH, OCEAN	840	280	155
TRIGGERFISH, QUEEN	484	111	7240
TRIGGERFISHES	585	180	523
TRUNKFISH	362	138	109
TRUNKFISH, SMOOTH	385	115	882
TRUNKFISH, SPOTTED	363	125	265
TUNA, BLACKFIN	1125	203.22	465
TUNA, BLUEFIN, GIANTS	450	450	1
TUNA, BLUEFIN, MEDIUM	486	486	1
TUNA, BLUEFIN, SCHOOL	287	287	1
TUNA, BLUEFIN, UNC	454	454	1
TUNA, BLUEFIN, YOUNG SC	443	443	1

Carib-Table 34A (continued)

SPECIES	max_length	min_length	Number of animals
TUNA,LITTLE (TUNNY)	595	200	108
TUNA,SKIPJACK	850	285	113
TUNA,YELLOWFIN	1587.5	121	112
WAHOO	2243	10.3	392
WENCHMAN	872	115	1222
WRASSES	377	210	60
WRECKFISH	580	219	24

B) ST. John/St. Thomas

SPECIES	max_length	min_length	number
AFRICAN POMPANO	540	240	6
ALMACO JACK	490	157	326
AMBERJACKS	900	870	2
ANGELFISH,FRENCH	430	150	156
ANGELFISH,GRAY	490	97	603
ANGELFISH,QUEEN	495	182	179
BAR JACK	730	95	576
BASS,REDEYE	270	230	4
BIGEYE	320	215	9
BIGEYE SCAD	338	175	9
BLACK JACK	480	400	2
BLUE RUNNER	552	179	308
BLUE TANG	360	75	1117
BONEFISHES	482	320	2
BONITO,ATLANTIC	585	435	5
BOXFISH	254	250	2
CARDINALFISHES	365	260	10
CHUB,BERMUDA	490	220	9
CONEY	475	90	715
COWFISH,HONEYCOMB	350	150	115
COWFISH,SCRAWLED	384	161	82
CREOLE-FISH	230	210	3
CREVALLE	370	180	7
DAMSELFISHES	204	185	4
DOCTORFISH	378	120	555
DOLPHINFISH	1100	540	5
DRUMMER,WHITEMOUTH	230	200	5
DURGON,BLACK	317	310	2
FILEFISH,ORANGE	370	280	21
FILEFISH,ORANGESPOT	400	237	34
FILEFISH,SCRAWLED	651	651	1
FILEFISH,WHITESPOTTED	390	150	26
FINFISHES,MARINE,OTHE	280	280	1
FINFISHES,PELAGIC,OTH	220	220	1
FINFISHES,UNC FOR FOO	210	170	3
FINFISHES,UNC,BAIT,AN	295	295	1
FINFISHES,UNC,GENERAL	265	265	1
FINFISHES,UNC,SPAWN	140	140	1
FISH,MARINE,OTHER	175	175	1
FISHES,ANADROMUS,UNC,	195	195	1
FISHES,FW,OTHER	190	190	1
FLOUNDER,PEACOCK	230	230	1
GLASSEYE SNAPPER	350	225	10
GOATFISH,SPOTTED	260	184	52
GOATFISH,YELLOW	350	160	176
GOATFISHES	265	265	2

Carib-Table 34B (continued)

SPECIES	max_length	min_length	number
GRAYSBY	320	240	6
GROUNDFISHES,OTHER	215	215	1
GROUPEL, TIGER	700	200	40
GROUPEL,BLACK	560	560	1
GROUPEL,MISTY	1220	486	23
GROUPEL,NASSAU	788	220	130
GROUPEL,RED	840	290	75
GROUPEL,YELLOWEDGE	930	715	3
GROUPEL,YELLOWFIN	834	230	275
GROUPEL,YELLOWMOUTH	700	200	27
GROUPEL,G:MYCTEROPER	270	270	1
GRUNT, COTTONWICK	431	115	116
GRUNT,BLUESTRIPEL	360	170	291
GRUNT,CAESAR	278	230	3
GRUNT,FRENCH	293	103	149
GRUNT,SAILORS CHOICE	634	225	5
GRUNT,SPANISH	365	185	6
GRUNT,STRIPED	285	221	3
GRUNT,TOMTATE	350	110	67
GRUNT,WHITE	385	175	769
HAMLET,MUTTON	440	440	1
HERRINGS,UNC	198	156	5
HIND,RED	985	120	1986
HIND,ROCK	568	250	11
HOGFISH	715	189	139
HOGFISH,SPANISH	340	210	22
HORSE-EYE JACK	780	163	11
HOUNDFISH	1050	514	26
JACK, YELLOW	540	235	6
JACKS	592	592	1
MACKEREL,CERO	502	310	20
MACKEREL,KING	1242	405	26
MACKEREL,KING&CERO	400	345	2
MACKERELS & TUNAS	518	303	15
MARGATE	612	225	36
MARGATE,BLACK	563	310	3
MOJARRA,YELLOWFIN	220	177	9
MORAY,VIPER	400	180	10
NEEDLEFISH,FLAT	910	595	16
NEEDLEFISHES	833	262	35
PALOMETA	295	295	1
PARROTFISH	565	240	12
PARROTFISH,BLUE	260	210	3
PARROTFISH,MIDNIGHT	725	566	4
PARROTFISH,PRINCESS	340	155	55

Carib-Table 34B (continued)

SPECIES	max_length	min_length	number
PARROTFISH,QUEEN	350	275	4
PARROTFISH,RAINBOW	745	580	12
PARROTFISH,REDBAND	398	170	138
PARROTFISH,REDFIN	350	205	4
PARROTFISH,REDTAIL	420	165	831
PARROTFISH,STOPLIGHT	463	68	576
PIGFISH	410	360	2
PORGY,G:CALAMUS	467	140	890
PORGY,JOLTHEAD	305	175	16
PORGY,PLUMA	284	181	32
PORGY,SAUCEREYE	382	160	109
PORGY,SHEEPSHEAD	302	203	9
PORKFISH	340	226	29
PUDDINGWIFE (WRASSE)	370	260	10
RAINBOW RUNNER	705	345	31
ROCK BEAUTY	295	100	64
SARDINE,REDEAR	213	171	26
SCUPS OR PORGIES,JUMB	215	215	1
SCUPS OR PORGIES,LG	235	235	1
SCUPS OR PORGIES,MD	245	245	1
SCUPS OR PORGIES,SM	245	245	1
SCUPS OR PORGIES,UNC	245	245	1
SEA BREAM	250	220	7
SHARK,NURSE	891	891	1
SHARK,REEF	315	190	11
SNAPPER,BLACKFIN	610	120	660
SNAPPER,CUBERA	305	275	2
SNAPPER,DOG	710	251	47
SNAPPER,GRAY	780	225	7
SNAPPER,LANE	400	153	554
SNAPPER,MAHOGONY	690	225	47
SNAPPER,MUTTON	710	250	144
SNAPPER,SCHOOLMASTER	442	225	86
SNAPPER,VERMILION,SMA	311	140	277
SNAPPER,YELLOWTAIL	827	60	2131
SPADEFISH	270	235	3
SPADEFISH,ATLANTIC	280	280	1
SQUIRRELFISH	315	125	274
SQUIRRELFISH,LONGSPIN	241	218	10
SQUIRRELFISHES	300	116	336
SURGEON,OCEAN	340	105	380
SURGEONFISHES	300	180	4
TILEFISH,SAND	331	331	1
TRIGGERFISH,GRAY	275	240	2
TRIGGERFISH,OCEAN	505	225	21

Carib-Table 34B (continued)

SPECIES	max_length	min_length	number
TRIGGERFISH,QUEEN	500	110	2498
TRUNKFISH	411	136	20
TRUNKFISH,SMOOTH	330	155	24
TRUNKFISH,SPOTTED	418	135	50
TUNA,LITTLE (TUNNY)	597	268	152
WENCHMAN	490	260	25
WRASSE,YELLOWHEAD	297	297	1
ALMACO JACK	98	98	1
ANGELFISH,FRENCH	580	168	15
ANGELFISH,GRAY	576	155	18
ANGELFISH,QUEEN	300	183	8
BAR JACK	385	180	83
BARRACUDA,GREAT	720	680	4
BLUE RUNNER	425	241	9
BLUE TANG	305	125	331
BONEFISH	576	576	1
BUTTERFLYFISH	105	84	5
CONEY	330	175	308
COWFISH,HONEYCOMB	300	174	26
COWFISH,SCRAWLED	283	192	30
DOCTORFISH	310	142	82
GLASSEYE SNAPPER	260	230	2
GOATFISH,SPOTTED	220	100	16
GOATFISH,YELLOW	276	215	10
GRAYSBY	305	180	16
GROUPE,RED	41	41	1
GROUPE,YELLOWFIN	944	376	7
GROUPE,YELLOWMOUTH	571	571	1
GRUNT, COTTONWICK	230	175	3
GRUNT, SMALLMOUTH	171	146	11
GRUNT,BLACK	280	280	1
GRUNT,BLUESTRIPED	307	160	41
GRUNT,CAESAR	295	155	9
GRUNT,FRENCH	246	141	178
GRUNT,SPANISH	280	280	1
GRUNT,TOMTATE	180	160	11
GRUNT,WHITE	360	120	227
HERRINGS,UNC	207	207	1
HIND,RED	650	205	287
HOGFISH,SPANISH	330	165	22
HORSE-EYE JACK	225	169	6
JACKS	385	212	8
LOBSTER,SPANISH SLIP.	92	92	2
MACKEREL,KING	542	542	1

Carib-Table 34B (continued)

SPECIES	max_length	min_length	number
MARGATE	415	195	13
MARGATE, BLACK	435	285	6
MOJARRA, YELLOWFIN	250	185	7
NEEDLEFISHES	787	658	12
PARROTFISH, PRINCESS	360	215	21
PARROTFISH, QUEEN	360	305	10
PARROTFISH, REDBAND	330	180	211
PARROTFISH, REDFIN	492	220	104
PARROTFISH, REDTAIL	385	180	688
PARROTFISH, STOPLIGHT	600	180	418
PERMIT	296	296	1
PORGY, JOLTHEAD	260	245	6
PORGY, PLUMA	282	163	80
PORGY, SAUCEREYE	320	230	7
PORKFISH	257	245	2
PUDDINGWIFE (WRASSE)	355	175	17
ROCK BEAUTY	220	175	13
SNAPPER, BLACKFIN	340	335	2
SNAPPER, GRAY	360	200	26
SNAPPER, LANE	285	196	22
SNAPPER, MAHOGONY	240	185	21
SNAPPER, MUTTON	620	320	9
SNAPPER, SCHOOLMASTER	440	195	27
SNAPPER, VERMILION, SMA	300	300	1
SNAPPER, YELLOWTAIL	600	190	251
SOLDIERFISH, BLACKBAR	170	140	6
SQUIRRELFISH	250	167	72
SQUIRRELFISH, LONGSPIN	250	144	164
SURGEON, OCEAN	225	150	61
TRIGGERFISH, OCEAN	650	650	1
TRIGGERFISH, QUEEN	403	185	202
TRUNKFISH, SMOOTH	190	150	7
TRUNKFISH, SPOTTED	270	220	3
WENCHMAN	355	200	16

Carib-Table 35. Number of length frequency observations sampled in the commercial silk, queen, and blackfin snappers and sand tilefish annually from 1985 through 2002.

NODCINDV Species Code				
	8835220301	8835360106	8835360113	8835360301
YEAR	Sand Tilefish	Blackfin Snapper	Silk Snapper	Queen Snapper
	N	N	N	N
1985		1	36	
1987		3	31	13
1989		5	44	57
1990		157	646	352
1991	23	483	2032	470
1992	91	171	640	54
1993		120	530	55
1994		22	293	2
1995		16	270	3
1996	1	38	333	117
1997			192	4
1998	2	85	622	59
1999	3	89	816	116
2000	1	127	1609	208
2001		87	2303	53
2002	2	65	1671	220

Carib-Table 36. Number of length frequency observations sampled in the Puerto Rico commercial fisheries for sand tilefish (1985-2002 years combined).

Sand tilefish NODCINDV 8835220301						
YEAR	Unknown	Fish Pot	Longline	Rod & Reel	Scuba	All
1991					23	23
1992					91	91
1996		1				1
1998			1	1		2
1999				3		3
2000					1	1
2002					2	2
All	1	1	4	116	1	123

Carib-Table 37 Number of length frequency observations sampled in the Puerto Rico commercial fisheries for blackfin snapper by type of gear (1985-2002 years combined).

Blackfin snapper NODCINDV 8835360106

YEAR	Unknown	Fish Pot	Haul seine	Longline	Nets	Other Traps/Pots	Rod & Reel	Scuba	Trammel Net	Troll	All
1985	1	0	0	0	0	0	0	0	0	0	1
1987		1	0	0	0	0	2	0	0	0	3
1989	4	1	0	0	0	0	0	0	0	0	5
1990		99	0	0	2	0	56	0	0	0	157
1991		106	0	0	0	0	377	0	0	0	483
1992		32	0	0	0	2	86	0	0	50	170
1993		37	0	0	0	0	81	1	0	0	119
1994		2	0	0	0	0	20	0	0	0	22
1995		0	0	0	0	0	16	0	0	0	16
1996	38	0	0	0	0	0	0	0	0	0	38
1998		43	3	39	0	0	0	0	0	0	85
1999		22	0	7	0	0	58	0	0	2	89
2000		83	0	0	0	0	44	0	0	0	127
2001		13	0	0	0	0	74	0	0	0	87
2002		29	0	0	0	0	34	0	2	0	65
All	43	468	3	46	2	2	848	1	2	52	1467

Carib-Table 38. Number of length frequency observations sampled in the Puerto Rico commercial fisheries for silk snapper by type of gear (1985-2002 years combined).

Silk snapper NODCINDV 8835360113

YEAR	Unknown	Fish Pot	Haul seine	Longline	Nets	Other Traps/Pots	Rod & Reel	Scuba	Troll	All
1985	36	0	0	0	0	0	0	0	0	36
1987		16	0	0	0	0	15	0	0	31
1989	12	7	0	0	0	0	25	0	0	44
1990		294	0	2	33	0	317	0	0	646
1991		597	0	0	0	0	1398	0	35	2030
1992		125	0	0	0	18	393	0	63	599
1993		163	0	0	0	0	367	0	0	530
1994		89	0	0	0	0	203	0	0	292
1995	33	15	0	0	0	0	222	0	0	270
1996	333	0	0	0	0	0	0	0	0	333
1997		109	0	0	0	0	83	0	0	192
1998		254	44	323	0	0	0	0	1	622
1999		380	0	256	0	0	154	0	26	816
2000		832	0	63	0	0	714	0	0	1609
2001		1316	0	118	0	129	739	1	0	2303
2002	414	851	0	0	0	0	817	0	0	2082
All	792	5048	44	762	33	147	5447	1	125	12399

Carib-Table 39. Number of length frequency observations sampled in the Puerto Rico commercial fisheries for queen snapper by type of gear (1985-2002 years combined).

Queen Snapper NODCINDV 8835360301

YEAR	Unknown	Fish Pot	Longline	Rod & Reel	Trammel N Troll	All
1987	6			7		13
1989			17	40		57
1990				352		352
1991		8		462		470
1992				54		54
1993				55		55
1994				2		2
1995				3		3
1996	117					117
1997				4		4
1998			57			59
1999			108	8		116
2000			3	205		208
2001				52	1	53
2002				220		220
All	123	8	185	1464	1	1783

Carib-Table 40. Annual total landings and total sampled weights (kg) from TIP by gear category for a) St. Croix and b) St Thomas/St. John districts. Landings and sampled weights are expressed in kg.

a) Year	GILL		Hook and Line		Pots and traps		Spear	
	Landings	Sampled	Landings	Sampled	Landings	Sampled	Landings	Sampled
1983	--	--	--	--	--	3,794.9	--	--
1984	--	--	574.0	536.1	4,891.5	10,616.1	--	--
1985	--	--	2,188.3	1,770.5	4,573.9	4,726.3	--	--
1986	0.5	0.8	2,189.8	2,005.8	3,169.2	3,358.8	--	--
1987	--	--	3,065.2	2,819.6	7,726.4	9,407.5	--	8.8
1988	--	--	5,055.5	3,874.5	10,724.3	11,267.8	--	--
1989	--	--	1,772.6	1,689.2	6,311.7	6,611.8	--	--
1990	--	--	2,441.7	2,338.3	2,920.4	3,036.7	--	--
1991	--	--	1,607.2	2,035.9	936.7	2,226.2	2.3	139.1
1992	--	--	--	163.0	--	--	--	--
1993	--	259.9	--	274.4	--	795.3	--	--
1994	211.6	505.8	300.3	450.9	2,307.6	2,682.5	329.3	325.1
1995	1,003.8	1,027.4	360.6	383.6	1,390.3	1,449.8	101.9	113.4
1996	376.9	443.6	139.5	122.5	1,135.2	1,130.4	152.2	155.6
1997	125.9	123.8	38.1	37.5	1,685.6	1,715.3	222.4	234.4
1998	405.0	409.0	--	--	1,150.2	1,075.7	373.7	376.3
1999	--	--	--	--	1,335.4	1,348.2	286.3	287.9
2000	222.9	224.2	31.7	31.4	383.2	384.7	213.8	217.2
2001	744.7	753.8	68.4	70.4	287.2	307.8	291.7	296.6
2002	823.6	838.1	18.1	17.7	913.7	902.7	411.8	438.3

b) Year	GILL		Hook and Line		Pots and traps		Spear		Seine	
	Landings	Sampled	Landings	Sampled	Landings	Sampled	Landings	Sampled	Landings	Sampled
1983	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	--	--	--
1985	377.3	41.6	2270.4	1485.9	5453.2	4387.9	--	--	--	--
1986	--	--	275.0	284.4	1373.8	1334.1	--	--	--	--
1987	--	--	43.5	43.4	764.5	729.4	--	--	--	--
1988	--	--	--	--	--	--	--	--	--	--
1989	--	--	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--	--
1992	--	--	--	89.7	--	919.3	--	--	--	185.6
1993	--	--	68.0	253.2	--	2197.8	--	--	--	372.4
1994	--	--	--	208.7	--	642.7	--	--	--	53.1
1995	--	--	--	79.8	--	131.1	--	--	--	--
1996	--	--	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--	--	--
2002	--	--	--	54.0	--	1725.1	--	--	--	--

Carib-Table 41. Annual total reported and expanded landings, and total landings (Landings) and sampled weights (Sample) from TIP, and percentage sampled by district. All weight units correspond to Kg.

Year	District	Landing	Sample	Total reported	Total expanded	% to reported	% to expanded
1984	StCroix	5,465.4	11,152.1	143,949.9	176,478.2	7.7	6.3
1985	StCroix	6,762.3	6,496.8	79,556.3	90,694.2	8.2	7.2
1986	StCroix	5,359.4	5,365.4	54,463.3	123,316.9	9.9	4.4
1987	StCroix	10,791.5	12,235.9	50,209.6	113,283.4	24.4	10.8
1988	StCroix	15,779.8	15,142.3	14,704.8	24,499.5	103.0	61.8
1989	StCroix	8,084.3	8,301.0	97,256.4	175,215.1	8.5	4.7
1990	StCroix	5,362.1	5,375.0	163,077.3	350,388.9	3.3	1.5
1991	StCroix	2,546.2	4,401.3	485,185.2	870,023.2	0.9	0.5
1992	StCroix	--	163.0	345,162.9	561,010.7	0.05	0.03
1993	StCroix	--	1,329.6	164,051.7	205,476.1	0.8	0.6
1994	StCroix	3,148.8	3,964.3	233,575.0	274,339.2	1.7	1.4
1995	StCroix	2,856.6	2,974.1	128,990.8	132,860.5	2.3	2.2
1996	StCroix	1,803.8	1,852.1	198,777.7	201,570.5	0.9	0.9
1997	StCroix	2,072.0	2,111.1	246,909.2	251,566.4	0.9	0.8
1998	StCroix	1,928.9	1,861.0	129,249.7	133,804.6	1.4	1.4
1999	StCroix	1,621.7	1,636.1	212,931.7	219,319.7	0.8	0.7
2000	StCroix	851.6	857.5	270,114.9	278,218.5	0.3	0.3
2001	StCroix	1,392.1	1,428.7	317,869.3	327,405.6	0.4	0.4
2002	StCroix	2,167.2	2,196.8	185,466.0	191,030.0	1.2	1.1
1984	StTh/StJo	--	--	274,762.8	455,416.8	--	--
1985	StTh/StJo	8,101.0	5,915.4	279,206.1	564,879.2	2.1	1.0
1986	StTh/StJo	1,648.8	1,618.4	251,392.4	303,623.1	0.6	0.5
1987	StTh/StJo	807.9	772.9	115,598.8	280,996.5	0.7	0.3
1988	StTh/StJo	--	--	3,325.0	7,735.1	--	--
1989	StTh/StJo	--	--	49,902.9	71,911.2	--	--
1990	StTh/StJo	--	--	215,676.6	325,142.2	--	--
1991	StTh/StJo	--	--	694,916.3	976,462.8	--	--
1992	StTh/StJo	--	1,194.6	443,964.1	588,844.4	0.3	0.2
1993	StTh/StJo	68.0	2,823.4	313,089.4	424,626.7	0.9	0.7
1994	StTh/StJo	--	904.5	291,512.4	407,138.4	0.3	0.2
1995	StTh/StJo	--	210.8	266,618.2	330,143.0	0.1	0.1
1996	StTh/StJo	--	--	243,722.8	276,135.1	--	--
1997	StTh/StJo	--	--	277,713.2	301,221.4	--	--
1998	StTh/StJo	--	--	238,355.0	257,900.8	--	--
1999	StTh/StJo	--	--	232,979.8	244,628.8	--	--
2000	StTh/StJo	--	--	232,045.8	243,648.1	--	--
2001	StTh/StJo	--	--	297,713.9	312,599.6	--	--
2002	StTh/StJo	--	1,779.1	159,444.1	167,416.3	1.1	1.1

Carib-Table 42. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Hook and Line catches in the St. Croix District.

SPECIES	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1999	2001	2002
AMBERJACKS						0.12											
ANGELFISH,FRENCH						0.08											
ANGELFISH,QUEEN					0.05												
BAR JACK		0.18			0.03		0.11		2.26								
BARRACUDA	3.84	0.31	1.25	2.79		0.26	0.23	0.25									
BARRACUDA,GREAT	1.58	1.11	0.34	12.35	15.73	5.62	5.37	3.20							16.89		
BEARDFISH					0.44					1.63							
BIGEYE SCAD			12.81			0.88											
BLACK JACK		0.20		0.14	0.14	0.21	0.31	0.14	6.10	16.50	4.70	4.28				10.61	
BLUE RUNNER		0.41	0.45	0.02		1.10											
BLUE TANG						1.30						1.36			9.24		
BONITO,ATLANTIC	0.21		0.93														
CHUBS								0.17									
CONEY		2.09	0.17	4.49	0.94	0.22	0.21	0.35		0.58	3.78	3.14		18.23	18.96		64.06
COWFISH,HONEYCOMB				0.11	0.22	0.30									2.55		
DOCTORFISH						1.00											
DOLPHINFISH	41.74	35.41	6.20	19.25	12.72	7.44	16.71	9.72			25.51						
DURGON,BLACK		0.03			0.24												
FILEFISH,ORANGESPOT					0.23	0.34											
FLYINGFISHES								0.90									
GLASSEYE SNAPPER			0.04														
GOATFISH,YELLOW					0.12	0.05											
GOATFISHES							0.03										
GRAYSBY		0.08													0.56		
GREATER AMBERJACK				0.06													
GROUPEL, TIGER		0.16															
GROUPEL,MISTY		0.86		0.84	0.96	0.42	0.55	0.25		3.21	6.97		2.55				
GROUPEL,NASSAU					0.12	0.14	0.36	0.14									
GROUPEL,YELLOWFIN					0.02	0.11	0.07	0.19			1.70						
GROUPEL,YELLOWMOUTH				0.07		0.17											
GRUNT,BLUESTRIPED															1.43		
GRUNT,BURRO					0.05	0.25											
GRUNT,CAESAR						0.24											
GRUNT,FRENCH					0.11	0.21											2.53
GRUNT,SPANISH				0.03													
GRUNT,STRIPED												0.79			2.79		
GRUNT,WHITE		0.19		0.03	0.65	1.08								1.82	14.26		
HALFBEAKS								0.02									
HIND,RED		13.56	5.29	9.68	14.09	10.95	19.78	15.57	16.70	4.77	1.23	0.35	4.93	9.96	6.45		4.15
HIND,ROCK							0.11										
HORSE-EYE JACK		0.70	0.30	0.42	0.30												
JACKS								0.45									
LIZARDFISHES				0.03													
MACKEREL,CERO	0.31	1.08	0.20	0.37	0.11	0.20	0.09	0.11									

Carib-Table 42 (continued)

SPECIES	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1999	2001	2002
MACKEREL,KING	5.88	1.77	4.95	1.17	4.70	0.92	0.29	0.15									
MACKERELS & TUNAS			0.14														
MARGATE		0.38						0.21			2.47						
MARGATE,BLACK											2.24						
MARLIN,BLUE		0.30															
NEEDLEFISH,KEELTAIL						1.15	0.05										
PARROTFISH,PRINCESS					0.07	0.58									2.41		
PARROTFISH,REDBAND					0.16	0.39											
PARROTFISH,REDFIN												1.60					
PARROTFISH,REDTAIL					1.18	1.74						49.27					
PARROTFISH,STOPLIGHT					1.13	2.41						2.25					
PERMIT					0.11												
POMFRET,BIGSCALE								0.10									
POMPANO DOLPHIN								3.47									
POMPANO,AFRICAN						0.06											
PORGY,G:CALAMUS													10.60				
PUDDINGWIFE (WRASSE)		0.08			0.10												
RAINBOW RUNNER		0.20	0.12	0.44	0.23	0.88	0.14			10.49	1.73						
SARDINE,REDEAR			0.00														
SNAPPER,BLACK					0.52	1.46	3.21	1.55		5.40	10.33	10.61	1.73			6.24	
SNAPPER,BLACKFIN	0.22	3.61	0.42	0.60	6.30	19.20	13.60	10.67	69.41	34.75	20.25	24.27	68.04	69.26		65.78	6.68
SNAPPER,CUBERA		0.06															
SNAPPER,DOG		0.03			0.87	0.15											
SNAPPER,LANE		0.06		0.01	0.01	0.16				0.85							0.56
SNAPPER,MAHOGONY					0.03			0.02		0.56							2.07
SNAPPER,MUTTON		5.31	0.37	2.51	9.04	1.76	0.44	1.83		3.12	0.24	0.92	12.16				
SNAPPER,SCHOOLMASTER					0.59	0.91	0.05	0.09		0.68	0.90						6.77
SNAPPER,VERMILION					0.03												
SNAPPER,VERMILION,LAR					0.01												
SNAPPER,VERMILION,MED								0.02									
SNAPPER,VERMILION,SMA	0.14	0.30	0.44	0.18	0.31	0.32	2.98	3.07		15.19	9.30	0.28					
SNAPPER,YELLOWTAIL		5.77	0.04	3.20	2.46	0.12		0.34	2.03	1.10	0.43	0.88					4.22
SNAPPERS,UNC				0.88	0.08												
SOLDIERFISH,BLACKBAR			0.02														
SQUIRRELFISH				0.03													
SQUIRRELFISH,LONGSPIN		0.21	0.10	0.01	0.08	0.12		0.04	3.50					0.73	7.81		2.76
SWORDFISH						0.12											
TILEFISH		0.03															
TILEFISH,EXTRA LARGE				0.03													
TILEFISH,LARGE				0.03													
TILEFISH,MEDIUM				0.03													
TILEFISH,SAND											0.27						
TILEFISH,SMALL				0.03													
TILEFISH,UNCLASSIFIED		0.02								1.17	2.68						

Carib-Table 42 (continued)

SPECIES	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1999	2001	2002
TRIGGERFISH,OCEAN		2.61		2.64	2.04	0.09											
TRIGGERFISH,QUEEN		2.86	0.47	0.58	2.80	0.25									3.03		
TUNA,BLACKFIN	5.45	2.32	1.23	5.33	3.65	7.14	3.51	6.37									
TUNA,BLUEFIN,GIANTS				0.08													
TUNA,BLUEFIN,MEDIUM				0.12													
TUNA,BLUEFIN,SCHOOL				0.11													
TUNA,BLUEFIN,UNC				0.08													
TUNA,BLUEFIN,YOUNG SC				0.07													
TUNA,LITTLE (TUNNY)	0.07		0.24	0.26	0.50	3.23	2.18	2.07									
TUNA,SKIPJACK		4.11	3.31	4.11	1.89	1.31	3.42	4.56									
TUNA,YELLOWFIN		2.25	24.60	7.23	3.17	3.60	3.64	4.13									
WAHOO	40.57	6.81	35.56	18.70	9.70	17.81	15.66	12.40			5.26						
WENCHMAN		4.54		0.86	0.94	1.41	6.90	17.46								17.37	19.82

Carib-Table 43. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Pots and Traps catches in the St. Croix District.

SPECIES	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2001	2002
ALMACO JACK		0.12							0.10										
ANGELFISH,FRENCH	0.05	0.20	0.64	0.03	0.36	0.21	0.25	0.34	0.22	0.06	0.46	0.19	0.03	0.47	0.03	0.18	0.09		0.37
ANGELFISH,GRAY	0.05	0.56	0.54	0.08	0.44	0.32	0.28	0.44	0.83	0.18	0.27	0.71	0.27	1.70	0.12	0.37			0.84
ANGELFISH,QUEEN	0.03	0.14	0.11	0.14	0.10	0.38	0.37	1.00	0.57	0.03	0.08	0.08	0.11	0.18	0.19				0.54
ANGELFISHES		0.00																	
BAR JACK	0.34	0.54	0.77	0.12	0.59	0.23	0.10	0.09	0.10	0.21	0.50	0.02	0.13	0.41		0.86	0.10	0.26	0.19
BARRACUDA,GREAT	0.23	0.27	0.09		0.81	0.08	0.57	0.16	0.01					0.19					0.30
BEARDFISH	0.05																		
BIGEYE		0.02																	
BIGEYES																			0.06
BLACK JACK		0.12			0.02				0.27			0.35							
BLUE RUNNER	0.03	0.15			0.00		0.08	0.04											
BLUE TANG	7.35	4.75	8.80	3.80	15.43	9.48	5.96	7.36	9.07	14.51	7.33	5.35	6.94	8.20	10.40	7.36	2.50	3.56	12.52
BLUEFISH	0.91																		
BONITO,ATLANTIC		0.01																	
BUTTERFISH	1.96	0.08																	
BUTTERFLYFISH	0.01																		
BUTTERFLYFISH,BANDED																			
BUTTERFLYFISH,FOUREYE		0.00													0.02				0.02
BUTTERFLYFISH,SPOTFIN								0.01											
CHUB,BERMUDA			0.02		0.00									0.40					1.23
CONEY	0.48	5.29	3.75	5.60	4.73	1.96	1.83	0.09	0.11	0.98	2.03	1.81	0.77	2.92	3.40	4.30	1.96	1.45	1.55
COWFISH,HONEYCOMB	0.16	1.05	1.53	1.14	3.41	3.91	3.98	6.56	4.20	6.95	5.18	6.72	6.27	6.15	6.03	4.14	4.54	3.00	8.37
COWFISH,SCRAWLED		0.10	0.06		0.11	0.16	0.26	0.34	0.13	0.14	0.49	0.51	0.54	0.95	0.56	0.92			0.68
CREOLE-FISH		0.00																	
CREVALLE																		0.88	0.20
DICK,SLIPPERY									0.01										
DOCTORFISH	6.24	2.86	1.01	1.21	1.68	7.65	4.81	5.27	4.10	4.94	3.26	1.12	1.44	2.95	8.02	4.11	5.37	1.64	8.96
DOLPHINFISH		3.04	0.04	0.10		0.04													
DRUM,SPOTTED		0.01																	
DURGON,BLACK		0.11			0.02									0.30					0.45
FILEFISH										0.06									
FILEFISH,ORANGE					0.06				0.27		0.01								
FILEFISH,ORANGESPOT	0.12	0.00	0.07	0.35	1.28	2.71	1.71	2.08	2.29	4.85	1.97	2.95	4.16	2.12	3.04	2.71	0.48	0.23	0.99
FILEFISH,SCRAWLED			0.04	0.03	0.03	0.00			0.04	0.06	0.42	0.03		0.04					
FILEFISH,WHITESPOTTED	0.65	0.27	0.31			1.40	0.75	0.84	1.61										0.25
FLOUNDER,PEACOCK		0.01	0.02																
GLASSEYE SNAPPER		0.00																	
GOATFISH,RED						0.01	0.04												
GOATFISH,SPOTTED			0.01				0.02		0.08			0.60	0.08	0.09	0.25	0.05	0.15	0.17	0.19
GOATFISH,YELLOW	0.00	1.79	2.32	2.59	3.02	0.48	0.38	0.02	0.03		0.30	0.11	0.03	0.23	0.10		0.09		1.10
GOATFISHES	4.76	0.91	0.79	2.19	0.51	0.07	0.14												

Carib-Table 43 (continued)

SPECIES	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2001	2002
GRAYSBY		0.02	0.02		0.03	0.00					0.05	0.02		0.01		0.04	0.25		0.15
GROUPE, TIGER		0.22	0.10		0.02				0.02				0.19						
GROUPE, BLACK					0.01														
GROUPE, GAG							0.01												
GROUPE, MISTY	0.04			0.18	0.02						0.18								
GROUPE, NASSAU	0.11	0.38	0.84	1.91	0.39	0.56	0.19	0.17	0.15										
GROUPE, RED		0.02																	
GROUPE, YELLOWFIN	0.06	0.45	1.41	2.67	0.99	0.43	0.33	0.04	0.07		0.29				0.05				0.33
GROUPE, YELLOWMOUTH		0.04	0.01		0.06	0.09													
GROUPERS					0.03	0.16													
GRUNT, COTTONWICK		0.03	0.03		0.23	0.00	0.01	0.02											
GRUNT, SMALLMOUTH			0.00		0.00														
GRUNT, BARRED																0.70			
GRUNT, BLUESTRIPED					0.22	0.22	0.08		0.56	1.65	1.49	0.76	1.49	0.64	1.06	0.71	0.44	0.29	0.85
GRUNT, BURRO	0.16	0.73	1.32	0.69	0.53	0.35	0.20	0.46											
GRUNT, CAESAR		0.12	0.03	0.03	0.32	0.69	1.03	0.83	0.47	1.76	0.43	0.58	0.60	0.48	0.58	0.40	0.34	0.41	0.45
GRUNT, FRENCH	1.23	1.33	0.61	0.03	1.93	1.24	2.34	0.07	0.01	0.52	0.26	0.26	1.01	1.51	1.03	0.37	1.16	0.94	1.68
GRUNT, SAILORS CHOICE			0.03		0.00	0.00	0.01												
GRUNT, SPANISH					0.01			0.02											
GRUNT, STRIPED		0.00									0.16	0.93	0.09		0.11	0.78	0.04		0.03
GRUNT, TOMTATE		0.00			0.06	0.01	0.11			0.03	0.02		0.02			0.03			0.05
GRUNT, WHITE	2.22	7.10	5.57	5.88	6.29	4.63	3.64	5.30	5.00	13.22	11.12	8.56	9.65	10.31	14.28	9.53	11.75	17.14	7.37
GRUNTS	6.95	0.02			0.01	0.01						0.04							
GUPPY											0.47								
HAMLET, BARRED		0.00																	
HIND, RED	2.51	3.36	2.00	9.63	1.78	1.44	1.48	0.94	0.58	0.70	2.21	0.94	1.45	1.52	1.62	1.55	2.30	0.93	0.96
HIND, ROCK	0.82	0.14	0.22	0.17	0.21	0.12	0.08	0.04											
HOGFISH		0.07	0.44	0.01	0.18	0.10	0.07	0.02	0.06										0.08
HOGFISH, SPANISH	0.08	0.13	0.04		0.07	0.04	0.09	0.06	0.01		0.07	0.11	0.05	0.11	0.04				0.40
HORSE-EYE JACK		0.29	0.03		0.04	0.06													
HOUND FISH														0.18					
JACK, YELLOW	0.98	0.16	0.07	0.10	0.11	0.09	0.20			0.10									0.97
LOBSTER, SPINY											0.04								
LOBSTERS, SPINY TAILS				6.79	12.02	4.18	0.90	20.08	12.69		15.05	33.90	37.52	26.12	16.08	20.74	29.11		2.79
MACKEREL, CERO		0.06	0.00		0.01														
MACKEREL, KING		0.53																	
MARGATE		0.10	0.01		0.05	0.07				0.18		0.16							0.85
MARGATE, BLACK	0.17	0.01																	
MARLIN, BLUE		0.41																	
MARLIN, WHITE		0.07																	
MOJARRA, RHOMBOID											0.01								
MOJARRA, YELLOWFIN						0.01													0.03
MOJARRAS		0.01																	
NEEDLEFISHES									0.13										
PARROTFISH	27.91	0.02																	

Carib-Table 43 (continued)

SPECIES	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2001	2002
PARROTFISH,MIDNIGHT			0.08																
PARROTFISH,PRINCESS	0.21	0.93	1.36	0.88	2.50	2.89	3.11	0.58	0.06	0.20	0.70	0.58	0.27	0.34	1.55	0.55		0.14	0.57
PARROTFISH,QUEEN		0.25	0.30	0.27	0.83	0.75	0.97	0.84	0.03		0.34	0.10				0.80			0.11
PARROTFISH,REDBAND	0.73	2.86	0.73	0.32	4.01	2.39	4.19	0.11	0.01	0.18	1.75	0.52	0.29	0.94	1.45	1.63	0.14	0.13	1.15
PARROTFISH,REDFIN		0.06			0.08	0.04	0.01	0.05	0.05		0.08	0.04		0.27	0.07	0.29			1.47
PARROTFISH,REDTAIL	3.15	13.05	20.02	13.88	11.97	17.81	16.23	15.77	17.71	17.90	18.64	18.57	9.09	16.66	9.53	14.94	19.68	22.13	15.61
PARROTFISH,STOPLIGHT	2.55	12.94	23.33	24.27	9.83	21.75	33.77	19.49	31.50	6.29	5.99	3.09	1.30	2.94	2.56	8.13	0.85	0.49	0.94
PARROTFISH,STRIPED		0.04																	
PERMIT												0.02							
PIGFISH						0.00	0.00												
POMPANO,AFRICAN								0.03											
PORGY,G:CALAMUS			0.07								0.04	0.04					0.23		0.04
PORGY,G:PAGRUS		0.09	0.07		0.11														
PORGY,JOLTHEAD		0.04			0.12	0.03	0.04	0.11	0.01										0.10
PORGY,PLUMA									0.33										
PORGY,SHEEPSHEAD									0.04										
PORKFISH		0.09	0.07		0.01	0.01	0.04	0.16	0.04		0.13					0.03	0.14		0.02
PUDDINGWIFE (WRASSE)	0.04	0.05	0.01		0.05	0.05	0.02	0.02											0.07
RAINBOW RUNNER	0.22	0.02	0.05		0.02			0.07											
ROCK BEAUTY	0.56	0.31	0.18	0.05	0.03	0.29	0.28	0.73	0.06	0.08	0.13	0.08	0.12	0.14	0.40	0.22			0.31
SEA BREAM							0.01												
SHARK,CARIBBEAN REEF		0.02																	
SHARK,NURSE	1.82	0.89	1.53	0.67									0.34		0.92		1.56		
SHARK,REEF	1.60	0.07						0.08											
SHARK,TIGER		0.20																	
SHARKSUCKER													0.18						
SNAPPER,BLACK	0.02										0.14								
SNAPPER,BLACKFIN	0.03	0.91	0.21		0.03	0.01	0.01	0.02		0.73	0.91	0.06		0.03					1.60
SNAPPER,CUBERA	0.03	0.06			0.01														
SNAPPER,DOG	0.08	0.32	0.08	0.14	0.14	0.10	0.20	0.03			0.06		0.05			0.03		0.29	
SNAPPER,GRAY					0.00		0.08												0.04
SNAPPER,LANE	0.03	0.07	0.11	0.23	0.10	0.04	0.03	0.09	0.06	0.03	0.21	0.03	0.13	0.04	0.29	0.38	0.38	0.29	0.15
SNAPPER,MAHOGONY	0.16	0.11	0.23	0.01	0.41	0.05	0.14	0.12	0.03	0.06	0.21	0.13	0.04	0.27	0.11	0.33	0.06	0.08	0.32
SNAPPER,MUTTON	1.68	0.64	1.06	1.99	0.57	0.33	0.86	0.70	0.53	0.85	0.36			0.09		0.42	0.45		0.35
SNAPPER,RED						0.01													
SNAPPER,SCHOOLMASTER	0.70	0.62	1.19	0.27	1.21	1.64	1.54	1.41	2.13	1.06	0.83	0.51	1.18	0.94	0.82	1.29	0.69	0.71	1.60
SNAPPER,VERMILION,SMA		0.10									0.07								
SNAPPER,YELLOWTAIL	8.27	8.71	1.47	1.60	1.38	0.72	0.56	0.91	0.73	0.38	1.83	0.54	2.57	1.41	0.91	1.04	3.72	33.27	4.30
SNAPPERS,UNC																	0.13		
SOLDIERFISH,BLACKBAR	0.14	0.01			0.05	0.06	0.12	0.01	0.00										
SPADEFISH,ATLANTIC	0.04	0.04	0.03		0.15	0.01	0.01												
SQUIRRELFISH			0.05		0.39														
SQUIRRELFISH,LONGSPIN	0.91	1.04	0.51	0.08	1.35	0.75	0.64	0.08			0.77	1.16	1.19	0.65	1.35	0.88	4.74	4.85	3.78
SQUIRRELFISHES								0.01	0.26										
STINGRAYS	1.78																		

Carib-Table 43 (continued)

SPECIES	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2001	2002
SURGEON,OCEAN	2.90	0.90	1.54	0.11	1.45	0.48	1.66	0.83	0.82	4.31	1.62	0.44	1.77	0.66	0.76	0.25	0.45	0.24	1.13
TILEFISH,GOLDFACE																	0.26		
TILEFISH,SAND		0.05	0.01											0.02					
TILEFISH,UNCLASSIFIED		0.12									0.04								
TRIGGERFISH,OCEAN	0.12	0.17	0.07		0.06	0.01	0.06	0.05				0.18			0.04				
TRIGGERFISH,QUEEN	3.99	9.30	11.41	7.79	4.57	6.02	2.52	3.98	1.47	9.78	6.73	3.14	4.59	4.48	10.23	7.35	3.89	3.57	10.94
TRIGGERFISHES	0.08				0.00	0.04	0.23			5.54	2.10	4.18	3.69	1.62	1.89	1.21	1.05	0.16	0.13
TRUNKFISH	0.44	0.02	0.06		0.02	0.01			0.22	0.59	0.07	0.10	0.08		0.08				
TRUNKFISH,SMOOTH	0.01	0.09	0.25	0.16	0.20	0.08	0.35	0.51	0.39	0.42	0.88	0.28	0.17	0.08	0.18	0.21		0.37	1.23
TRUNKFISH,SPOTTED		0.09	0.08		0.13	0.02	0.04	0.21	0.10	0.27	0.19	0.04	0.08	0.08	0.08	0.08	0.22	0.39	0.10
TUNA,BLACKFIN		1.50	0.00					0.05											
TUNA,LITTLE (TUNNY)		0.10	0.00	0.04															
TUNA,SKIPJACK	0.25	0.50		0.81															
TUNA,YELLOWFIN		0.10		0.06		0.03													
WAHOO	0.12	2.40	0.01	0.87															
WENCHMAN		1.90	0.16																
WRASSES		0.01								0.07	0.04	0.22					0.66		0.06
WRECKFISH	0.70																		

Carib-Table 44. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Nets catches in the St. Croix District.

SPECIES	1986	1993	1994	1995	1996	1997	1998	2000	2001	2002
BAR JACK				0.91	0.76	1.31	0.07	0.74	0.61	1.04
BIGEYE SCAD	100.00									
BLACK JACK				0.08						
BLUE TANG			0.14	3.40	1.49	1.84	0.69	1.65	6.14	7.10
CONEY				0.27	0.18	0.32	0.39		1.09	0.19
DOCTORFISH				2.45	0.25	1.05		0.20	1.41	0.14
DURGON, BLACK							1.11			0.07
FILEFISH, ORANGESPOT										0.21
GLASSEYE SNAPPER							0.07			
GOATFISH, SPOTTED				0.02					0.03	
GOATFISH, YELLOW				0.40						
GRAYSBY				0.07						
GRUNT, COTTONWICK										0.14
GRUNT, BLUESTRIPED				0.68	0.20				0.13	0.10
GRUNT, CAESAR				1.11	0.06	0.20		0.45		
GRUNT, FRENCH				0.01						0.12
GRUNT, WHITE				1.10	0.46	0.87	0.17		1.08	0.18
HIND, RED				0.09		0.34		0.27		0.18
HOGFISH, SPANISH				0.62	0.23		1.05	0.69	1.29	1.56
HORSE-EYE JACK									0.60	
JACK, YELLOW								0.16		
LOBSTERS, SPINY TAILS					1.53					
MARGATE				0.37						
MOJARRA, YELLOWFIN										0.03
PARROTFISH, PRINCESS							2.29	3.63	1.18	1.85
PARROTFISH, QUEEN		12.05	2.48	2.67	0.15		9.30	1.34	4.39	3.93
PARROTFISH, REDBAND			0.34	0.08	0.32		2.37	4.68	0.16	13.64
PARROTFISH, REDFIN				4.38	27.36	6.20	2.68	7.14	46.99	1.95
PARROTFISH, REDTAIL		25.13	83.26	69.38	59.68	45.33	40.62	70.57	13.66	20.36
PARROTFISH, STOPLIGHT		62.82	13.78	10.26	7.00	41.93	38.97	6.15	17.98	44.09
PERMIT									0.08	0.69
PORGY, G: CALAMUS				0.18	0.08	0.61				0.13
PORGY, JOLTHEAD										0.09
PUDDINGWIFE (WRASSE)										0.68
ROCK BEAUTY							0.04	0.11		0.18
SNAPPER, MAHOGONY				0.04	0.08		0.07			
SNAPPER, SCHOOLMASTER				0.08					0.18	0.05
SNAPPER, YELLOWTAIL				0.10					0.04	0.21
SQUIRRELFISH, LONGSPIN					0.08		0.07	0.29	0.12	
SURGEON, OCEAN				0.05	0.03		0.04	0.25	1.02	0.06
TRIGGERFISH, QUEEN				0.38	0.06				0.25	0.03
TRIGGERFISHES								0.18	1.13	0.19
WRASSES				0.81				1.52	0.44	0.81

Carib-Table 45. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Spear catches in the St. Croix District.

SPECIES	1987	1991	1994	1995	1996	1997	1998	1999	2000	2001	2002
ANGELFISH,FRENCH											0.52
BAR JACK					3.78						4.06
BLUE TANG					0.50		0.49				0.43
CHUB,BERMUDA											0.28
CLAM,UNC			0.28								
CONEY							0.19				
DOCTORFISH					1.30						0.40
GRUNT,BLUESTRIPED											0.11
GRUNT,FRENCH							0.07				
GRUNT,WHITE					0.35						
HIND,RED											0.58
HOGFISH,SPANISH					0.29		0.16				0.40
LOBSTERS,SPINY TAILS	100.00	100.00	99.72	100.00	19.41	100.00	48.30	100.00	100.00	100.00	74.05
PARROTFISH,PRINCESS							8.53				6.84
PARROTFISH,QUEEN							1.50				
PARROTFISH,REDBAND					0.19		11.05				0.27
PARROTFISH,REDFIN					0.63		11.75				0.38
PARROTFISH,REDTAIL					70.42						2.03
PARROTFISH,STOPLIGHT					2.52		16.16				8.90
PORGY,G:CALAMUS					0.26						
SHARK,NURSE							1.43				
SNAPPER,SCHOOLMASTER											0.73
SQUIRRELFISH,LONGSPIN							0.16				
TRIGGERFISH,QUEEN					0.35						
WRASSES							0.21				

Carib-Table 46. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Hook and Line catches in the St. Thomas/St. John district.

SPECIES	1985	1986	1987	1992	1993	1994	1995	2002
AFRICAN POMPANO							19.64	
AMBERJACKS	0.86	3.55						
ANGELFISH,GRAY	0.17							
ANGELFISH,QUEEN	0.12							
BAR JACK	0.63				22.84			
BIGEYE SCAD		0.22						
BLUE RUNNER	0.06	6.35			9.68	38.19		30.34
BLUE TANG	0.21	0.76						
BONITO,ATLANTIC	0.32							
CONEY	0.51	0.24				0.68	0.61	0.67
CREOLE-FISH	0.04							
CREVALLE					1.38			
DOCTORFISH	0.16							
DOLPHINFISH	1.75							
DURGON,BLACK	0.07							
GLASSEYE SNAPPER					0.23			
GOATFISH,YELLOW	0.02							
GROUPE,MISTY	16.96							
GROUPE,NASSAU	0.30							
GROUPE,YELLOWEDGE	1.51							
GROUPE,YELLOWFIN	11.27	0.56						
GRUNT,FRENCH		0.43						
GRUNT,WHITE	0.17	0.67		0.70			1.47	
HIND,RED	5.28	53.04		1.87			0.68	0.47
HIND,ROCK	0.17	0.80						
HOGFISH	0.30					1.66		
HORSE-EYE JACK	0.78				0.19			
HOUNDFISH					2.44			
MACKEREL,CERO	0.10							1.53
MACKEREL,KING	0.57		100.00			3.56		
MACKEREL,KING&CERO	0.05							
MARGATE	0.56							
NEEDLEFISH,FLAT								24.15
NEEDLEFISHES					3.91			
PALOMETA								1.18
PARROTFISH,STOPLIGHT	0.03							
PORGY,G:CALAMUS	0.27							
PORGY,JOLTHEAD	0.05							
RAINBOW RUNNER	0.09				9.48	6.99		2.41
SHARK,BLACKTIP	1.31							
SNAPPER,BLACKFIN	0.08							
SNAPPER,DOG	3.75	1.46						
SNAPPER,GRAY		0.76						
SNAPPER,LANE	0.02							
SNAPPER,MUTTON	0.35							
SNAPPER,VERMILION,SMA		0.04						
SNAPPER,YELLOWTAIL	48.61	21.27		97.43	40.69	44.97	77.59	39.25
SQUIRRELFISH	0.06	0.63						
SQUIRRELFISHES		0.34						
TILEFISH,SAND					0.10			
TRIGGERFISH,OCEAN		8.66						
TRIGGERFISH,QUEEN	0.38	0.22			1.34			
TUNA,LITTLE (TUNNY)	0.57				7.71	3.96		
WENCHMAN	1.49							

Carib-Table 47. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Pots and Traps catches in the St. Thomas/St. John district

SPECIES	1985	1986	1987	1992	1993	1994	1995	2002
ALMACO JACK	0.20		0.72	2.34	3.05	3.29	4.21	
ANGELFISH,FRENCH	0.72	0.87	0.43	1.48	0.75	1.29	7.93	2.95
ANGELFISH,GRAY	4.39	2.58	3.18	4.46	2.41	3.10	1.84	10.34
ANGELFISH,QUEEN	0.55	0.46		2.45	0.75	0.38	1.74	1.79
BAR JACK	0.82	0.15	0.60	0.27	0.19			
BASS,REDEYE								
BIGEYE	0.06				0.01			
BIGEYE SCAD		0.20	0.04					
BLACK JACK	0.02		0.16					
BLUE RUNNER	0.34	0.67	4.58		0.35			
BLUE TANG	2.75	3.06	2.93	1.87	9.72	2.94	3.42	1.09
BONITO,ATLANTIC		0.51						
BOXFISH								0.03
CARDINALFISHES			0.53					
CHUB,BERMUDA	0.07				0.10	0.26		0.37
CONEY	2.16	1.84	1.56	1.24	1.05	1.03		1.21
COWFISH,HONEYCOMB	0.04	0.12	0.44	1.67	0.49		1.58	0.94
COWFISH,SCRAWLED	0.07	0.11	0.03	0.46	0.24	0.72	0.74	0.11
CRAB,UNC								0.05
DAMSELFISHES				0.03				
DOCTORFISH	2.75	1.37	0.04	0.70	4.03	1.42	1.36	0.89
DRUMMER,WHITEMOUTH			0.17					
DURGON,BLACK				0.10				
FILEFISH,ORANGE						0.12		0.81
FILEFISH,ORANGESPOT		0.56	0.07			0.48	1.61	0.42
FILEFISH,SCRAWLED							1.20	
FILEFISH,WHITESPOTTED	0.40	0.01			0.02	0.44		
FINFISHES,MARINE,OTHE			0.09					
FINFISHES,PELAGIC,OTH			0.07					
FINFISHES,UNC FOR FOO			0.13					
FINFISHES,UNC,BAIT,AN			0.09					
FINFISHES,UNC,GENERAL			0.08					
FINFISHES,UNC,SPAWN			0.02					
FISH,MARINE,OTHER			0.02					
FISHES,ANADROMUS,UNC,			0.04					
FISHES,FW,OTHER			0.03					
FLOUNDER,PEACOCK	0.00							
GLASSEYE SNAPPER	0.02		0.15	0.04	0.03			
GOATFISH,SPOTTED	0.04	0.29	0.48	0.03	0.03	0.09		
GOATFISH,YELLOW	0.44	0.34	1.13	0.22	0.16	0.47		
GOATFISHES	0.01							
GRAYSBY	0.05							
GROUNDFISHES,OTHER			0.04					
GROUPE, TIGER	1.47	1.12						
GROUPE,BLACK				0.31				
GROUPE,MISTY		0.99						
GROUPE,NASSAU	8.11	8.72			0.17	0.86		
GROUPE,RED	5.95	0.84	3.81	0.54				
GROUPE,YELLOWEDGE		0.55						
GROUPE,YELLOWFIN	11.93	6.16	0.61	0.77	0.37	2.13		6.91
GROUPE,YELLOWMOUTH	0.61	0.62				1.29		
GROUPERS,G:MYCTEROPER	0.01							
GRUNT, COTTONWICK	0.58	0.12	0.09	0.11	0.16	0.12		
GRUNT,BLUESTRIPED	0.46	0.18	1.66	1.36	0.52	2.01	2.83	1.02
GRUNT,CAESAR								0.04
GRUNT,FRENCH	0.13	0.03	0.98	0.38	0.19	0.56	1.50	
GRUNT,SAILORS CHOICE	0.01						0.18	0.10

Carib-Table 47 (continued)

SPECIES	1985	1986	1987	1992	1993	1994	1995	2002
GRUNT,SPANISH	0.09							
GRUNT,STRIPED								0.06
GRUNT,TOMTATE	0.10		0.65	0.30	0.02	0.23		0.03
GRUNT,WHITE	1.46	0.14	4.74	5.89	13.10	4.74	3.62	2.53
HAMLET,MUTTON								0.05
HIND,RED	10.43	16.22	6.29	4.74	16.93	6.60	0.48	7.43
HIND,ROCK	0.03				0.10	0.42		
HOGFISH	3.29	0.28	0.20	0.76	0.76	2.68	0.92	2.26
HOGFISH,SPANISH	0.12			0.07	0.03	0.09		
HORSE-EYE JACK	0.03							
HOUNDFISH				1.04				
JACK, YELLOW	0.09							
LOBSTERS,SPINY TAILS				27.24	8.84	12.86	18.04	22.83
MACKERELS & TUNAS								0.15
MARGATE	0.89	0.06	0.43		0.14	0.20		0.33
MARGATE,BLACK					0.21			
MORAY,VIPER			0.67					
PARROTFISH	0.01					0.61		0.05
PARROTFISH,BLUE			0.10					
PARROTFISH,MIDNIGHT	0.47							
PARROTFISH,PRINCESS	0.28		0.17	0.41	0.03	0.11		
PARROTFISH,QUEEN				0.43				
PARROTFISH,RAINBOW	0.92							0.78
PARROTFISH,REDBAND	0.24	0.16	0.07	2.13	0.07	1.74		
PARROTFISH,REDFIN	0.03							
PARROTFISH,REDTAIL	1.91	4.19	0.65	3.18	2.95	7.91	6.62	3.36
PARROTFISH,STOPLIGHT	1.85	6.97	0.23	4.02	2.66	4.51	9.24	2.96
PIGFISH	0.05							
PORGY,G:CALAMUS	3.30	3.29	8.64	0.36			2.77	2.55
PORGY,JOLTHEAD	0.07				0.15			
PORGY,PLUMA	0.02			0.78	0.04	0.15		
PORGY,SAUCEREYE	0.26				3.76	3.03		
PORGY,SHEEPSHEAD				0.08		0.45		
PORKFISH	0.09		0.14	0.48	0.11			0.11
PUDDINGWIFE (WRASSE)	0.10	0.08				0.10		
RAINBOW RUNNER				0.14	0.10			
ROCK BEAUTY	0.04	0.01		0.57	0.21	0.40		
SCUPS OR PORGIES,JUMB								0.01
SCUPS OR PORGIES,LG								0.01
SCUPS OR PORGIES,MD								0.02
SCUPS OR PORGIES,SM								0.02
SCUPS OR PORGIES,UNC								0.02
SEA BREAM	0.04							
SHARK,NURSE				0.34				
SHARK,REEF			0.56					
SNAPPER,BLACKFIN	3.22	3.89	2.74	0.30	0.35	2.91	0.66	2.24
SNAPPER,CUBERA	0.01							
SNAPPER,DOG	1.05	0.77		0.43	0.46			
SNAPPER,GRAY	0.22	0.12	0.02					
SNAPPER,LANE	1.48	0.72	7.64	0.46	0.44	2.82	0.58	0.15
SNAPPER,MAHOGONY	0.33	0.05	0.34	0.09	0.59			
SNAPPER,MUTTON	5.00	2.25	1.73	0.40	0.45	1.11		1.18
SNAPPER,SCHOOLMASTER	0.89	0.12	0.71	0.28	0.03			
SNAPPER,VERMILION,SMA	0.21	0.27	4.07					
SNAPPER,YELLOWTAIL	2.27	2.91	0.77	2.41	1.04	1.09	0.48	0.69
SPADEFISH	0.01				0.04			
SPADEFISH,ATLANTIC	0.02							
SQUIRRELFISH	0.26	0.74	0.26	1.37	2.78	2.14		0.05

Carib-Table 47 (continued)

SPECIES	1985	1986	1987	1992	1993	1994	1995	2002
SQUIRRELFISH, LONGSPIN						0.38		
SQUIRRELFISHES	0.15	0.14	6.17	0.79	0.19		1.47	0.62
SURGEON, OCEAN	0.29	0.12	2.54	0.97	8.22	2.32		4.66
SURGEONFISHES	0.02		0.08					
TRIGGERFISH, GRAY			0.12					
TRIGGERFISH, OCEAN	0.07		0.05					
TRIGGERFISH, QUEEN	13.04	23.94	23.33	17.79	9.50	17.05	24.99	15.47
TRUNKFISH	0.03		0.53	0.12	0.05			0.11
TRUNKFISH, SMOOTH	0.03			0.27	0.08			
TRUNKFISH, SPOTTED	0.02	0.09	0.38	0.53	0.38	0.32		0.22
TUNA, LITTLE (TUNNY)					0.40			
WENCHMAN		0.00						
WRASSE, YELLOWHEAD	0.01							

Carib-Table 48. Annual species composition of TIP samples, expressed as percentage of the sampled weight, of Nets catches in the St. Thomas/St. John district

SPECIES	1984	1985	1986	1987	1988	1989	1990	1991
BAR JACK		12.0						
SNAPPER, YELLOWTAIL		88.0						

Carib-Table 49. Total number of silk snapper and queen snapper sampled by TIP by year and district.

YEAR	silk snapper		queen snapper	
	St. Croix	St. Thomas / St. John	St. Croix	St. Thomas / St. John
1983	58	-	122	-
1984	170	-	75	-
1985	82	66	103	75
1986	38	16	29	-
1987	58	1	496	-
1988	555	-	592	-
1989	210	-	398	-
1990	605	-	275	-
1991	310	-	281	-
1992	29	47	99	-
1993	46	29	148	-
1994	265	-	178	-
1995	102	17	119	-
1996	104	140	43	-
1997	9	-	25	-
1998	-	-	-	-
1999	-	-	-	-
2000	-	-	-	-
2001	14	-	2	-
2002	8	11	19	11

Carib-Table 50. Estimated numbers of silk, queen, and blackfin snapper, and sand tilefish caught in the Puerto Rican recreational fishery from 2000-2003, by catch type (retained or released). Source of information: Marine Recreational Fisheries Sampling Survey (MRFSS) database. Data for 2000-2003 are preliminary and data for 2003 are incomplete.

Species	Catch type	Year				TOTAL
		2000	2001	2002	2003	
Silk snapper	Retained	82611	65991	29181	64158	241941
	Released	0	657	1838	0	2495
Queen snapper	Retained	5718	17489	9537	4279	37023
	Released	0	0	0	0	0
Blackfin snapper	Retained	9267	4534	1439	4612	19852
	Released	0	408	0	0	408
Sand tilefish	Retained	1334	5509	2386	4058	13287
	Released	0	0	0	0	0
Total	Retained	98930	93523	42543	77107	312103
	Released	0	1065	1838	0	2903
	All	98930	94588	44381	77107	315006

Carib-Table 51. Estimated sampling intensities of silk, queen, and blackfin snapper, and sand tilefish caught in the Puerto Rican recreational fishery from 2000-2003, by catch type (retained or released). Table contains the number of each species measured each year. Source of information: Marine Recreational Fisheries Sampling Survey (MRFSS) database. Data for 2000-2003 are preliminary and data for 2003 are incomplete.

Catch type	Year				TOTAL
	2000	2001	2002	2003	
Silk snapper	59	70	19	42	190
Queen snapper	2	27	19	8	56
Blackfin snapper	5	8	0	10	23
Sand tilefish	3	7	3	3	16
Total	69	112	41	63	285

Carib-Table 52. Number of silk snapper sampled from the boat-based recreational fishery, categorized by year and size class (TL?). Source of information: Marine Recreational Fisheries Sampling Survey (MRFSS) database. Data for 2000-2003 are preliminary and data for 2003 are incomplete.

Length (5 cm increments)	2000	2001	2002	2003	Total
15	2	9	1	1	13
20	11	16	1	3	31
25	19	32	4	16	71
30	14	10	7	16	47
35	5	3	2	2	12
40	6		1	3	10
45	1		1	1	3
50					
55			1		1
60					
65					
70	1		1		2
Total	59	70	19	42	190

Carib-Table 53. Number of queen snapper sampled from the boat-based recreational fishery, categorized by year and size class (TL?). Source of information: Marine Recreational Fisheries Sampling Survey (MRFSS) database. Data for 2000-2003 are preliminary and data for 2003 are incomplete.

Length (5 cm increments)	2000	2001	2002	2003	Total
15		10			10
20		2		1	3
25		1			1
30		3		4	7
35		6			6
40	1	3	2	1	7
45			4		4
50			5		5
55		2			2
60			2	1	3
65			2		2
70	1				1
75			4	1	5
Total	2	27	19	8	56

Carib-Table 54. Number of blackfin snapper sampled from the boat-based recreational fishery, categorized by year and size class (TL?). Source of information: Marine Recreational Fisheries Sampling Survey (MRFSS) database. Data for 2000-2003 are preliminary and data for 2003 are incomplete.

Length (5 cm increments)	2000	2001	2002	2003	Total
15	1				1
20	3	3		6	12
25	1	4		3	8
30		1			1
35				1	1
Total	5	8		10	23

Carib-Table 55. Number of sand tilefish sampled from the boat-based recreational fishery, categorized by year and size class (TL?). Source of information: Marine Recreational Fisheries Sampling Survey (MRFSS) database. Data for 2000-2003 are preliminary and data for 2003 are incomplete.

Length (5 cm increments)	2000	2001	2002	2003	Total
10	2				2
15					
20	1				1
25		2			2
30		3	2	1	6
35		1	1	2	4
40		1			1
Total	3	7	3	3	16

Carib-Table 56. Caribbean SEAMAP data collection efforts from 1975 to 1984 (1646 total stations). Cruise descriptions indicate vessel/cruise number, the timeframe, and the name of the cruise. Questionable gear codes indicated by a “?”

Cruise Description	Gear Type Used	Number of Stations
28/857	BOTTOM LONGLINE	49
09/22/1975 - 10/30/1975 US Reeffish Survey	MISCELLANEOUS?	11
	OFF-BOTTOM LONGLINE	48
	SHRIMP TRAWL	3
	FISH TRAP	60
04/097	BOTTOM LONGLINE	59
06/13/1979 - 08/03/1979 US Reeffish Habitat/Miami Swordfish	HAND LINE	29
	FISH TRAP	4
	TRAP VIDEO	270
04/108	BOTTOM LONGLINE	105
06/17/1980 - 07/24/1980 US Caribbean Reeffish Survey	CG?	1
	EG?	23
	HAND LINE	23
	SURFACE LONGLINE	1
	FISH TRAP	13
04/119	BOTTOM LONGLINE	13
07/13/1981 - 08/28/1981 US Caribbean Reeffish Survey	HAND LINE	1
	FISH TRAP	1
21/824	CTD	17
06/14/1982 - 07/16/1982 East Coast Cooperative	BOTTOM LONGLINE	28
	IT?	1
	SHRIMP TRAWL	17
	TUMBLER DREDGE	110
	FISH TRAP	4
04/129	BOTTOM LONGLINE	111
09/01/1982 - 09/30/1982 US Deepwater Snapper/Grouper	HAND LINE	4
	OFF-BOTTOM LONGLINE	111
	FISH TRAP	18
04/132	SURFACE LONGLINE	21
01/13/1983 - 02/11/1983 US Deepwater Snapper/Grouper		
21/836	BB?	1
05/25/1983 - 07/20/1983 US Deepwater Snapper/Grouper	BOTTOM LONGLINE	139
	OFF-BOTTOM LONGLINE	138
	PLANKTON, BONGOS	16
	FISH TRAP	12
21/844	BOTTOM LONGLINE	90
04/10/1984 - 05/14/1984 US Deepwater Snapper/Grouper	FA?	2
	HAND LINE	1
	OFF-BOTTOM LONGLINE	90
	FISH TRAP	1

Carib-Table 57. Caribbean SEAMAP data collection efforts from 1991 to 2002 (6432 stations). Cruise description indicates vessel/cruise number, the timeframe, and the name of the cruise. Gear types used were coded as follows: HL, handline; TR, fish trap; TRHL, a combination.

Cruise Description	Gear Type Used	Number of Stations
56/911	HL	78
9/17/91 - 12/19/91 PR Caribbean Survey	TR	339
56/921	HL	158
1/22/92 - 6/24/92 PR Caribbean Survey - Part 1	TR	442
56/922	HL	129
6/24/92 - 10/1/92 PR Caribbean Survey - Part 2	TR	518
56/931	HL	108
3/2/93 - 8/5/93 PR Caribbean Survey - Part 1	TR	492
56/932	HL	95
8/5/93 - 12/22/93 PR Caribbean Survey - Part 2	TR	468
56/941	HL	50
1/18/94 - 2/22/94 PR Caribbean Survey	TR	120
57/912	HL	15
9/17/91 - 9/25/91 PR Caribbean Survey	TR	87
57/922	HL	66
9/8/92 - 11/16/92 PR Caribbean Survey	TR	24
57/932	HL	84
3/16/93 - 5/25/93 PR Caribbean Survey - Part 1	TR	415
57/933	HL	103
5/25/93 - 11/10/93 PR Caribbean Survey - Part 2	TR	458
60/932	HL	6
12/14/93 - 12/24/93 PR Caribbean Survey – Part 3	TR	18
57/942	HL	98
3/3/94 - 6/22/94 PR Caribbean Survey - Part 1	TR	401
57/943	HL	202
6/23/94 - 12/22/94 PR Caribbean Survey - Part 2	TR	393
57/952	HL	82
1/11/95 - 3/30/95 PR Caribbean Survey	TR	268
58/922	HL	15
10/27/92 - 12/1/92 VI Reefish Survey	TR	48
58/931	HL	3
9/21/93 - 9/21/93 VI Reefish Survey	TR	12
59/922	HL	4
10/21/92 - 10/21/92 VI Reefish Survey	TR	12
59/932	HL	6
9/23/93 - 12/15/93 VI Reefish Survey	TR	24
59/941	HL	17
1/18/94 - 3/4/94 VI Reefish Survey	TR	72
60/001	TRHL	127
1/13/00 - 4/4/00 VI Winter/Spring Reefish		
60/941	HL	7
1/3/94 - 2/11/94 VI Reefish Survey	TR	27
60/991	TRHL	86
8/31/99 - 10/14/99 VI Summer Reefish Survey		
70/021	TRHL	149
1/29/02 - 7/9/02 VI Summer Reefish Survey St. Croix		

Carib-Table 58. Caribbean SEAMAP data collection efforts from 1991 to 2002, with the number of stations listed by area, gear type, and year. Gear types used were coded as follows: HL, handline; TR, fish trap; TRHL, a combination. Note minor discrepancies between these numbers and those reported in Ingram (2003) and the fact that the TRHL stations should be distinguished by gear type. Finally, note it would be valuable to separate sampling of St. Croix from sampling of St. Thomas and St. John in the U.S. Virgin Islands.

A. Puerto Rico

Year	HL	TR	TRHL	Total
1991	93	426	0	519
1992	353	984	0	1337
1993	396	1851	0	2247
1994	350	914	0	1264
1995	82	268	0	350
Total	1274	4443	0	5717

B. U.S. Virgin Islands

Year	HL	TR	TRHL	Total
1992	19	60		79
1993	9	36		45
1994	24	99		123
1999			86	86
2000			127	127
2002			149	149
Total	52	195	362	609

Carib-Table 59. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using handlines during surveys around Puerto Rico (1271 stations). The four focal species are also reported even if they were not among the top 20 species and are identified in bold font.

Species	Common Name	Mean Catch Rate	Standard Error
<i>Epinephelus guttatus</i>	red hind	1032.31	41.30
<i>Epinephelus fulvus</i>	coney	560.18	24.90
<i>Malacanthus plumieri</i>	sand tilefish	140.86	7.19
<i>Holocentrus adscensionis</i>	squirrelfish	48.34	3.36
<i>Epinephelus cruentatus</i>	graysby	38.46	3.74
<i>Holocentrus rufus</i>	longspine squirrelfish	20.83	2.06
<i>Lutjanus vivanus</i>	silk snapper	20.25	3.28
<i>Lutjanus buccanella</i>	blackfin snapper	16.95	2.44
<i>Rhoboplites aurorubens</i>	vermilion snapper	16.09	3.82
<i>Caranx lugubris</i>	black jack	13.32	1.75
<i>Melichthys niger</i>	black durgon	12.72	2.14
<i>Calamus pennatula</i>	pluma	11.10	1.46
<i>Canthidermis sufflamen</i>	ocean triggerfish	10.55	2.06
<i>Seriola rivoliana</i>	almaco jack	6.09	1.06
<i>Balistes vetula</i>	queen triggerfish	6.09	1.11
<i>Caranx crysos</i>	blue runner	5.14	0.95
<i>Apsilus dentatus</i>	black snapper	5.03	1.68
<i>Caranx latus</i>	horse-eye jack	4.39	1.08
<i>Sphyraena barracuda</i>	great barracuda	3.39	0.75
<i>Lutjanus synagris</i>	lane snapper	3.17	0.76
<i>Caulolatilus cyanops</i>	blackline tilefish	0.26	0.26
<i>Etelis oculatus</i>	queen snapper	0.17	0.17

Carib-Table 60. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using fish traps during surveys around Puerto Rico (4442 stations). The four focal species are also reported even if they were not among the top 20 species and are identified in bold font.

Species	Common Name	Mean Catch Rate	Standard Error
<i>Epinephelus guttatus</i>	red hind	36.40	2.40
<i>Epinephelus fulvus</i>	coney	19.43	1.18
<i>Chaetodon striatus</i>	banded butterflyfish	12.27	0.99
<i>Balistes vetula</i>	queen triggerfish	6.63	0.73
<i>Holocentrus adscensionis</i>	squirrelfish	3.85	0.56
<i>Chaetodon capistratus</i>	four-eye butterflyfish	3.35	0.60
<i>Holocentrus rufus</i>	longspine squirrelfish	3.29	0.43
<i>Acanthurus bahianus</i>	ocean surgeonfish	2.09	0.42
<i>Scarus taeniopterus</i>	princess parrotfish	1.92	0.48
<i>Rhoboplites aurorubens</i>	vermillion snapper	1.51	0.76
<i>Lutjanus vivanus</i>	silk snapper	1.44	0.66
<i>Pseudupeneus maculatus</i>	spotted goatfish	1.43	0.43
<i>Ocyurus chrysurus</i>	yellowtail snapper	1.39	0.30
<i>Haemulon plumieri</i>	white grunt	1.34	0.27
<i>Lutjanus buccanella</i>	blackfin snapper	1.27	0.71
<i>Calamus pennatula</i>	pluma	1.26	0.34
<i>Epinephelus cruentatus</i>	graysby	0.88	0.23
<i>Lutjanus apodus</i>	schoolmaster	0.83	0.79
<i>Cantherhines macrocerus</i>	whitespotted filefish	0.80	0.20
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	0.59	0.17
<i>Malacanthus plumieri</i>	sand tilefish	0.30	0.14
<i>Caulolatilus cyanops</i>	blackline tilefish	0.00	
<i>Etelis oculatus</i>	queen snapper	0.00	

Carib-Table 61. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using handlines during surveys around the U.S. Virgin Islands (104 stations). The four focal species are also reported even if they were not among the top 20 species and are identified in bold font.

Species	Common Name	Mean Catch Rate	Standard Error
<i>Epinephelus fulvus</i>	coney	1079.32	213.85
<i>Epinephelus guttatus</i>	red hind	212.07	33.88
<i>Malacanthus plumieri</i>	sand tilefish	153.91	37.89
<i>Caranx crysos</i>	blue runner	105.51	30.60
<i>Lutjanus vivanus</i>	silk snapper	56.09	56.09
<i>Balistes vetula</i>	queen triggerfish	51.46	16.36
<i>Epinephelus cruentatus</i>	graysby	33.54	13.01
<i>Holocentrus rufus</i>	longspine squirrelfish	24.29	9.20
<i>Holocentrus sp.</i>	squirrelfishes	19.21	15.58
<i>Canthidermis sufflamen</i>	ocean triggerfish	15.95	8.22
<i>Chaetodon sedentarius</i>	reef butterflyfish	7.73	7.73
<i>Remora remora</i>	remora	7.64	5.45
<i>Alectis ciliaris</i>	African pompano	5.95	4.20
<i>Ocyurus chrysurus</i>	yellowtail snapper	5.90	4.22
<i>Calamus calamus</i>	saucereye porgy	5.27	3.02
<i>Halichoeres poeyi</i>	blackear wrasse	4.98	3.59
<i>Aluterus monoceros</i>	unicorn filefish	4.81	4.81
<i>Haemulon plumieri</i>	white grunt	4.07	2.90
<i>Gymnothorax moringa</i>	spotted moray	3.85	3.85
<i>Melichthys niger</i>	black durgon	3.67	2.59
<i>Lutjanus buccanella</i>	blackfin snapper	1.91	1.91
<i>Caulolatilus cyanops</i>	blackline tilefish	0.00	
<i>Etelis oculatus</i>	queen snapper	0.00	

Carib-Table 62. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using fish traps during surveys around the U.S. Virgin Islands (503 stations). The four focal species are also reported even if they were not among the top 20 species and are identified in bold font.

Species	Common Name	Mean Catch Rate	Standard Error
<i>Epinephelus fulvus</i>	coney	130.48	19.64
<i>Chaetodon capistratus</i>	foureye butterflyfish	34.59	7.58
<i>Balistes vetula</i>	queen triggerfish	30.72	6.79
<i>Epinephelus guttatus</i>	red hind	24.29	3.24
<i>Haemulon flavolineatum</i>	french grunt	17.35	5.94
<i>Ocyurus chrysurus</i>	yellowtail snapper	13.89	4.27
<i>Chaetodon striatus</i>	banded butterflyfish	13.47	3.38
<i>Holocentrus rufus</i>	longspine squirrelfish	12.68	4.51
<i>Holocentrus adscensionis</i>	squirrelfish	8.54	3.56
<i>Acanthurus bahianus</i>	ocean surgeonfish	7.66	3.47
<i>Acanthurus coeruleus</i>	blue tang	7.46	2.61
<i>Malacanthus plumieri</i>	sand tilefish	6.31	6.31
<i>Pseudupeneus maculatus</i>	spotted goatfish	5.16	2.04
<i>Scarus taeniopterus</i>	princess parrotfish	4.72	1.55
<i>Epinephelus cruentatus</i>	graysby	4.51	1.70
<i>Acanthurus chirurgus</i>	doctorfish	4.27	1.76
<i>Chaetodon sedentarius</i>	reef butterflyfish	3.23	1.51
<i>Calamus calamus</i>	saucereye porgy	3.05	1.21
<i>Mycteroperca venenosa</i>	yellowfin grouper	2.71	0.96
<i>Pomacanthus arcuatus</i>	gray angelfish	1.66	1.10
<i>Lutjanus buccanella</i>	blackfin snapper	1.57	1.02
<i>Caulolatilus cyanops</i>	blackline tilefish	0.00	
<i>Etelis oculatus</i>	queen snapper	0.00	
<i>Lutjanus vivanus</i>	silk snapper	0.00	

Carib-Table 63. Fishery-independent data collection efforts from Puerto Rico, 1988 to 2001, with the number of stations listed by gear type and year. Gear types used were coded as follows: HL, handline; TR, fish trap.

A. By Gear

Year	HL	TR	Total
1988	66	65	131
1989	80	73	153
1990	103		103
1991	57	31	88
1992	118	82	200
1993	108	102	210
1994	106	61	167
1995	99	52	151
1996	26		26
1997	58		58
1998	63	23	86
1999	72	36	108
2000	27	9	36
2001	18	1	19
Total	1001	535	1536

B. By Species

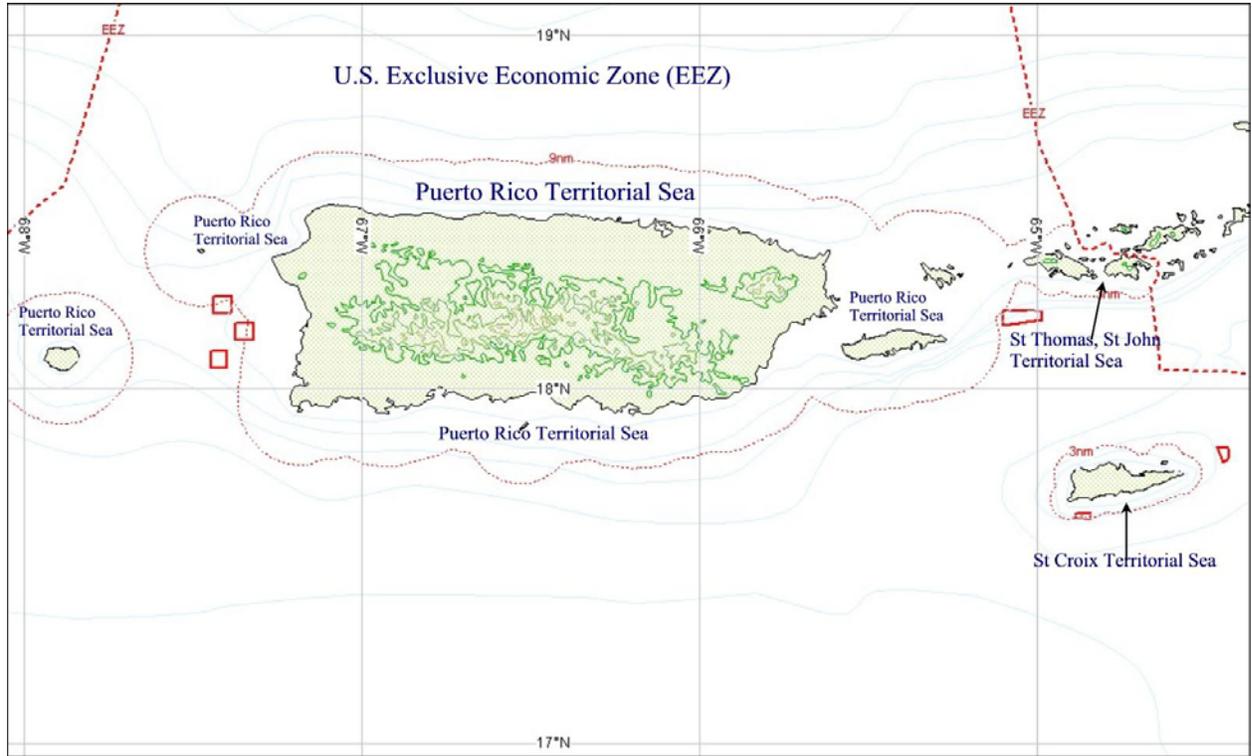
Year	Silk snapper	Queen snapper	Blackfin snapper	Sand tilefish	Total
1988	139	0	135	441	715
1989	349	0	270	422	1041
1990	218	27	115	517	877
1991	4	1	24	155	184
1992	49	0	3	203	255
1993	73	0	48	347	468
1994	23	1	73	190	287
1995	46	0	61	243	350
1996	8	0	16	164	188
1997	9	0	32	110	151
1998	4	0	31	160	195
1999	0	0	9	111	120
2000	0	0	0	96	96
2001	0	0	0	123	123
Total	922	29	817	3282	5050

Carib-Table 64. Availability of information which might be used for assessment of silk, queen and blackfin snapper and sand tilefish.

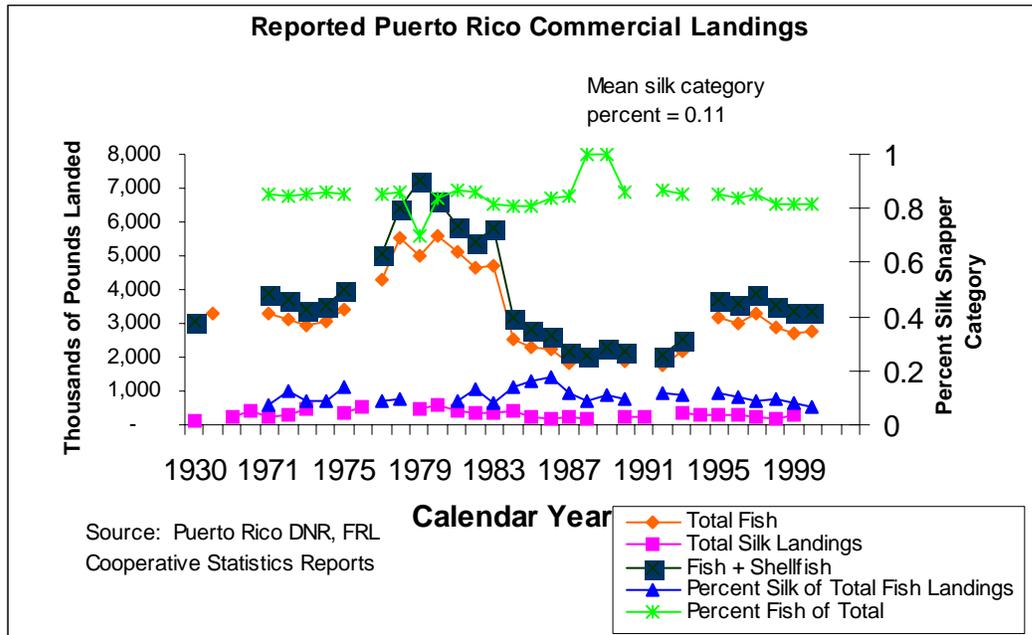
		Puerto Rico			
		silk snapper	queen snapper	blackfin snapper	sand tilefish
catch	comm landings				tiny reported catch
	reported expansion factors	1997+	1997+	1997+	
	TIP species composition	maybe, requires consultation and analysis	maybe, requires consultation and analysis	maybe, requires consultation and analysis	
	commercial discards	no data	no data	no data	no data
	recreational landings recreational discards	2000+ 2000+	2000+ 2000+	2000+ 2000+	2000+ 2000+
size composition	commercial landings	available	available	available	very limited
	recreational landings	limited	extremely limited	extremely limited	extremely limited
	fishery independent	possibly	very limited	possibly	available
catch rates	commercial				
	dockside sampling (TIP) landings reports	unclear crude w assumpti	unclear crude w assumpti	unclear crude w assumpti	extremely limited extremely limited
	recreational fishery independent	possibly	very limited	possibly	available

Carib-Table 65. (continued)

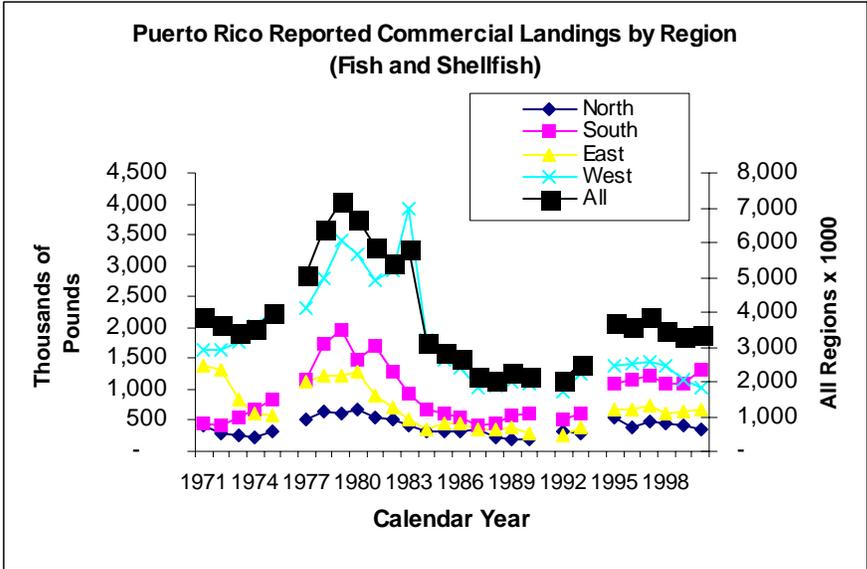
		St Thomas & St John					British VI
		lumped landings	silk snapper	queen snapper	blackfin snapper	sand tilefish	
catch	comm landings						no data
	reported expansion factors	most years work needed	not available	not available	not available	not available	no data no data
	TIP species composition	few years					no data
	commercial discards		no data	no data	no data	no data	no data
	recreational landings recreational discards		no data no data	no data no data	no data no data	no data no data	no data no data
size composition	commercial landings		very limited	extremely limited	unknown	none	no data
	recreational landings		no data	no data	no data	no data	no data
	fishery independent		to be determined	to be determined	to be determined	to be determined	no data
catch rates	commercial						
	dockside sampling (TIP) landings reports		very limited no data	extremely limited no data	unknown no data	no data no data	no data no data
	recreational fishery independent		to be determined	to be determined	to be determined	to be determined	no data



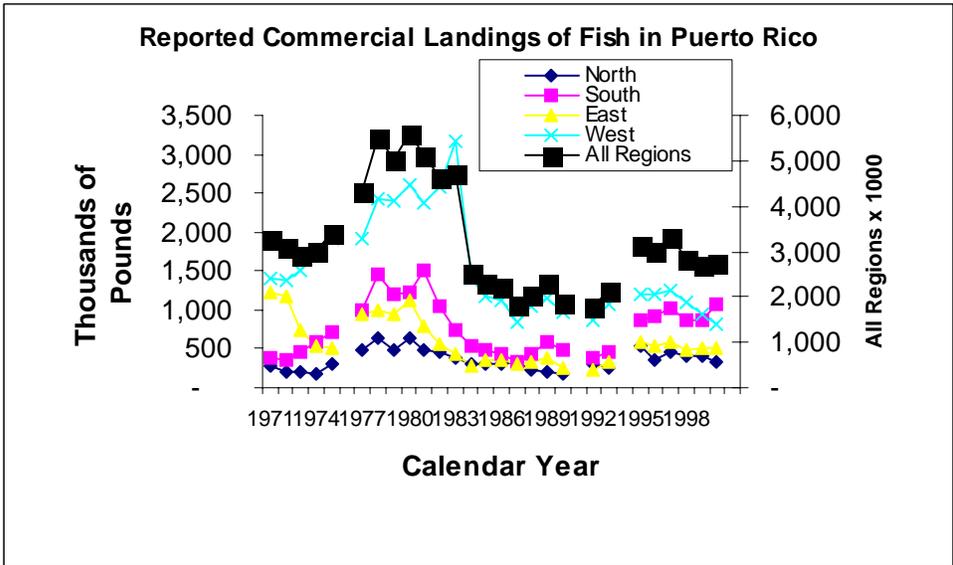
Carib -Figure 1. Map of Puerto Rico and the U.S. Virgin Islands.



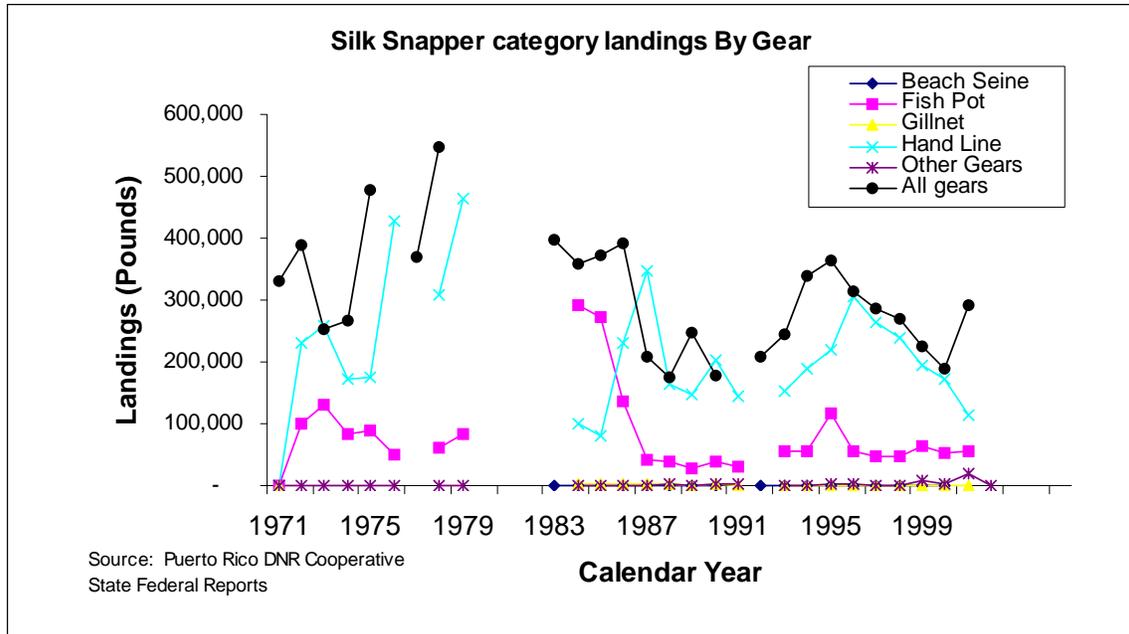
Carib- Figure 2. Historical reported commercial landings of fish and shellfish in Puerto Rico, 1930 through 2000.



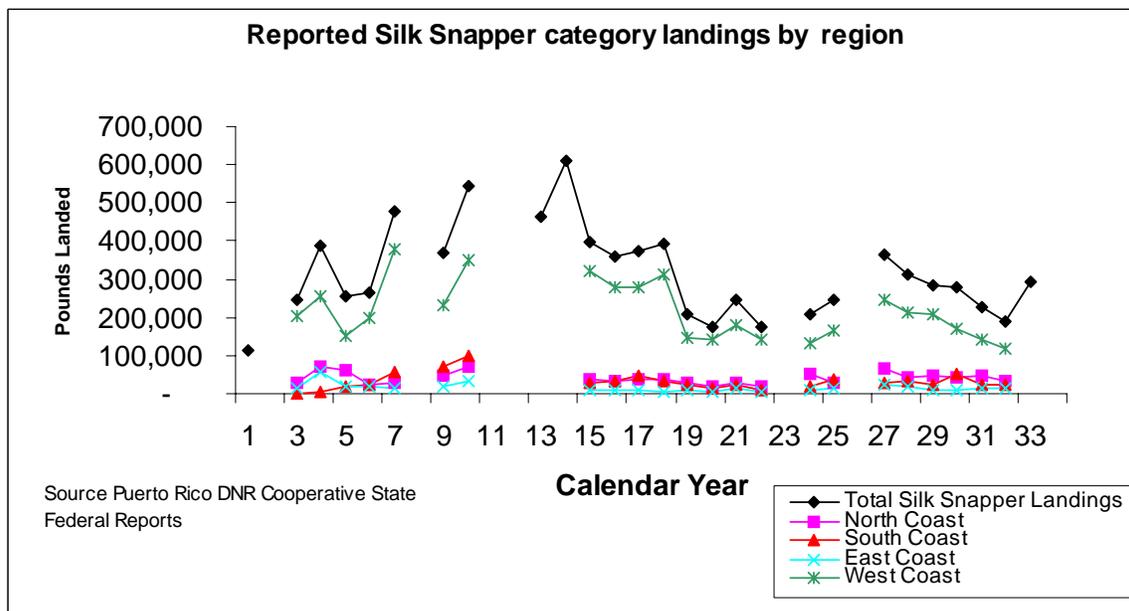
Carib- Figure 3. Historical reported commercial landings of fish and shellfish in Puerto Rico, 1971-2000, by region.



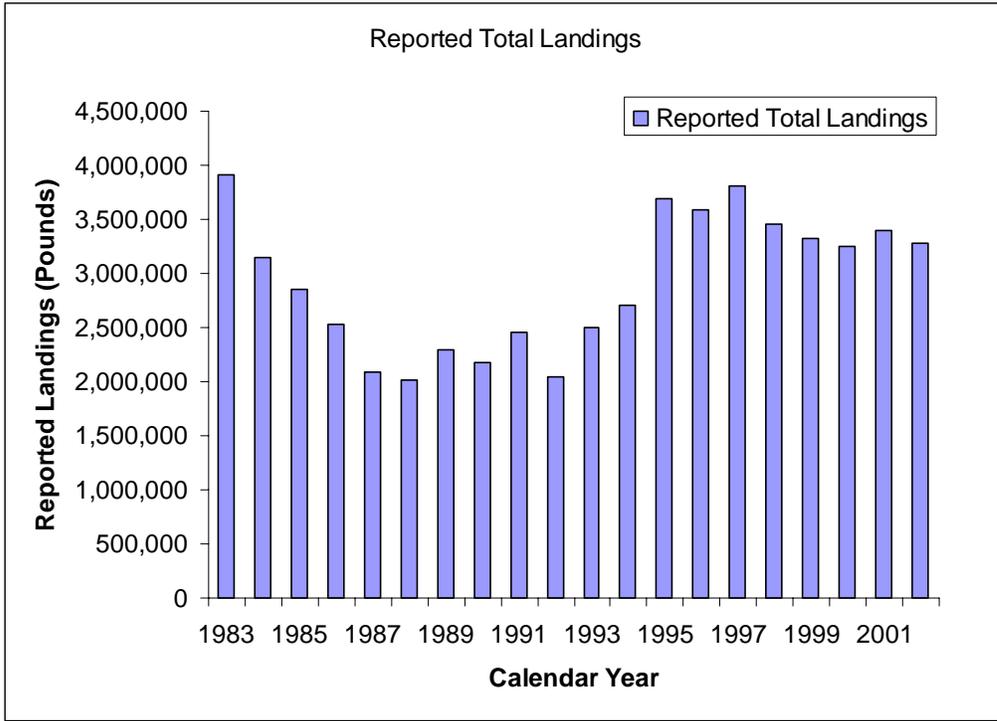
Carib- Figure 4. Historical reported commercial landings of fish in Puerto Rico, 1971-2000, by region



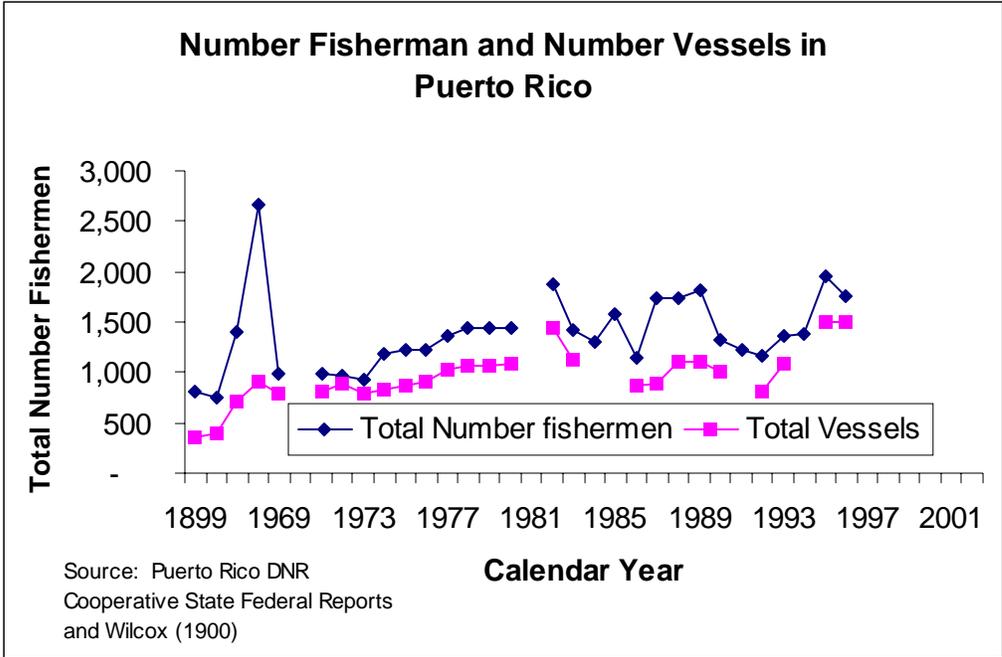
Carib- Figure 5. Reported commercial landings of silk snapper category by gear, 1971 through 2001.



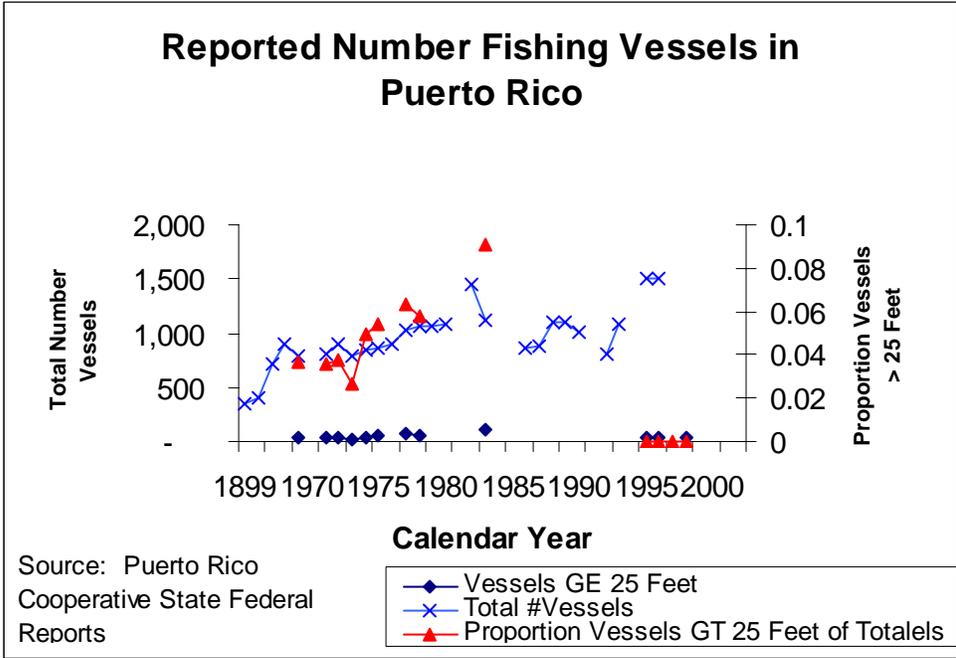
Carib- Figure 6. Reported commercial landings of silk snapper by coastal region, 1969-2001.



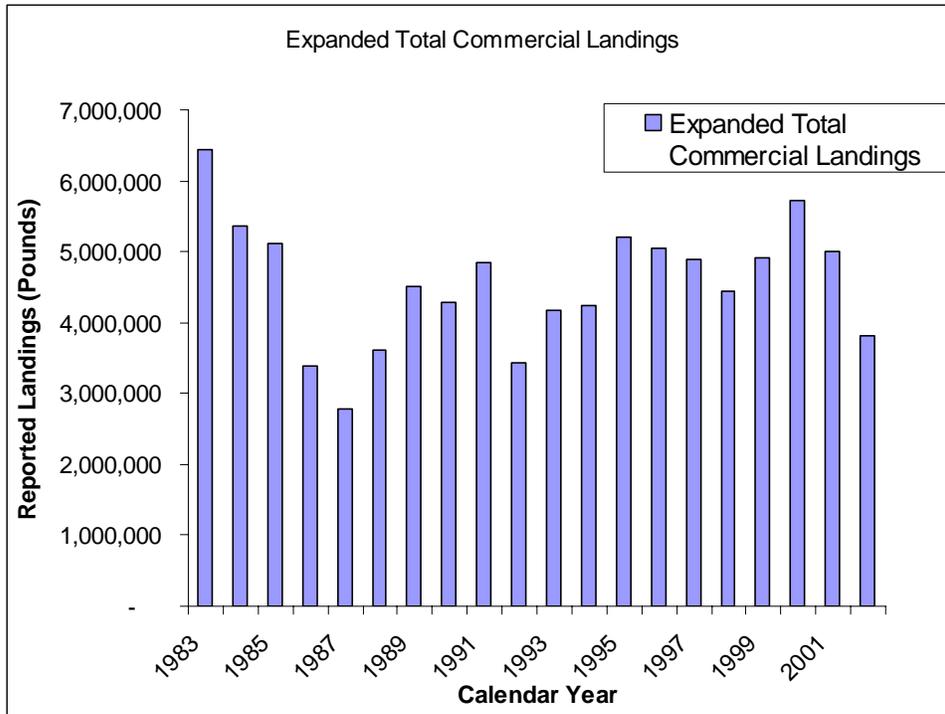
Carib- Figure 7. Reported commercial landings from Puerto Rico 1983-2002.



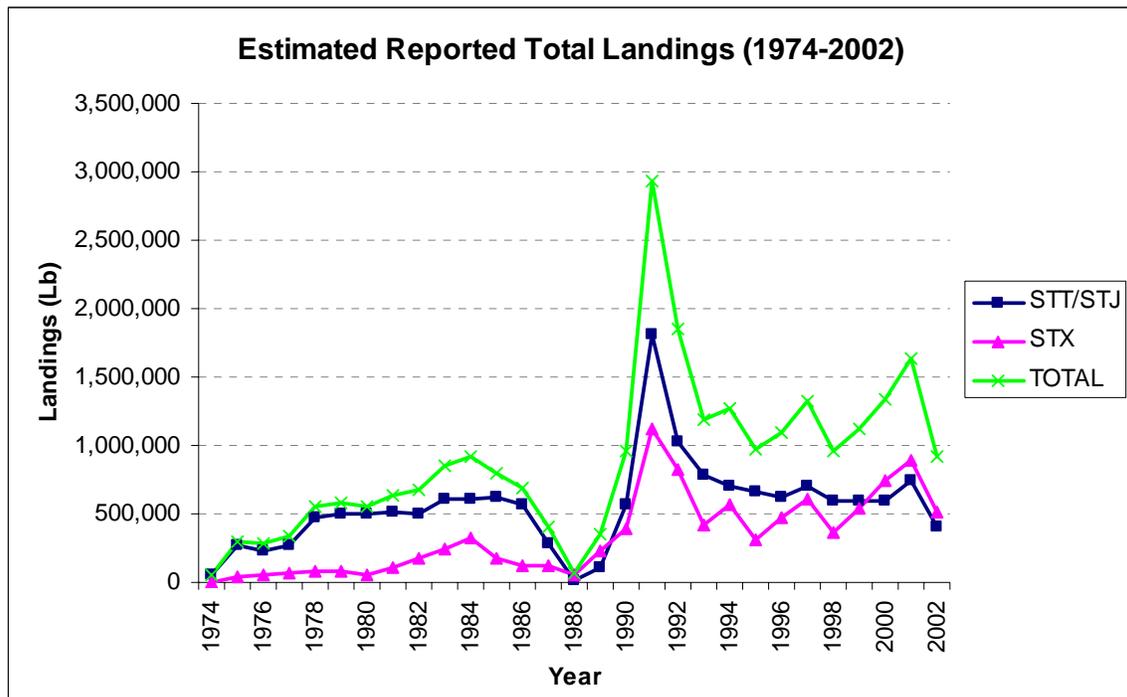
Carib- Figure 8. Total number of fishermen and vessels in the Puerto Rico fisheries from 1969 through 1996.



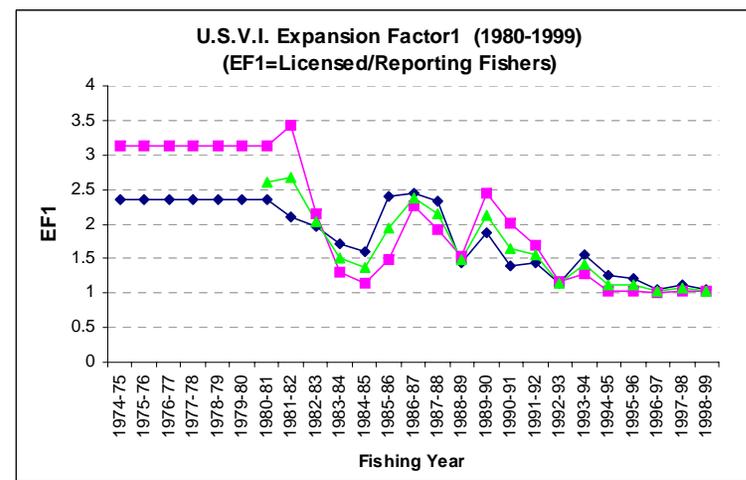
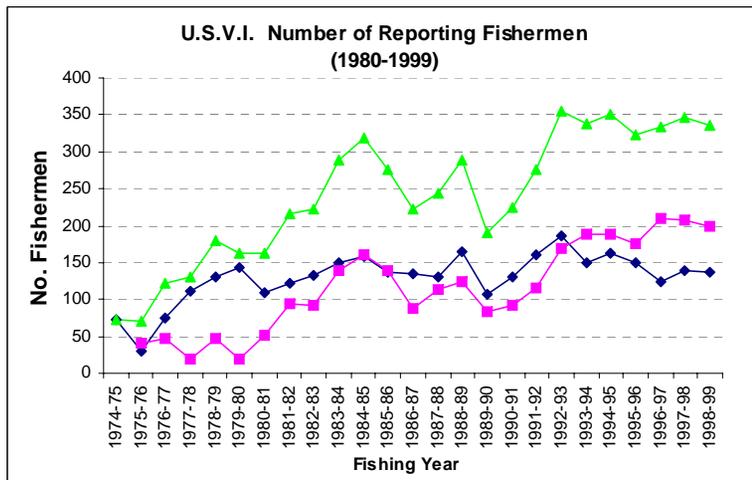
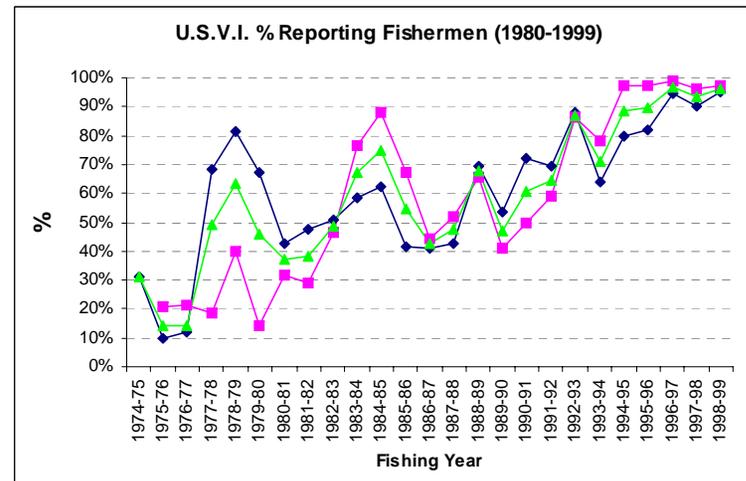
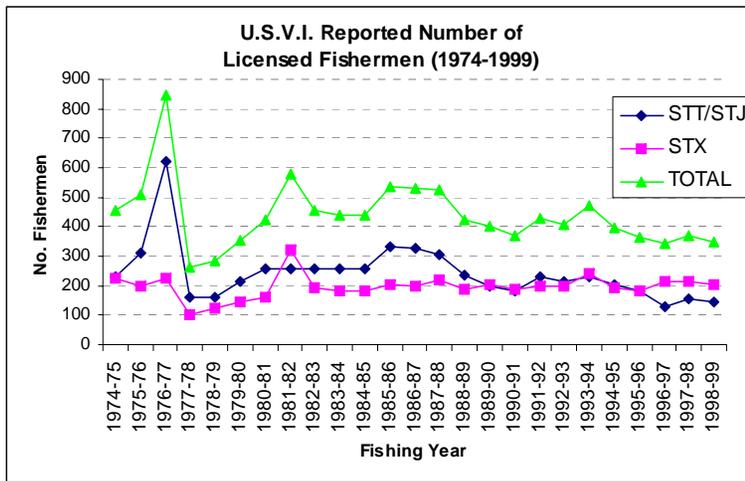
Carib- Figure 9. Number of vessels in the Puerto Rico fisheries for two vessel length groups.



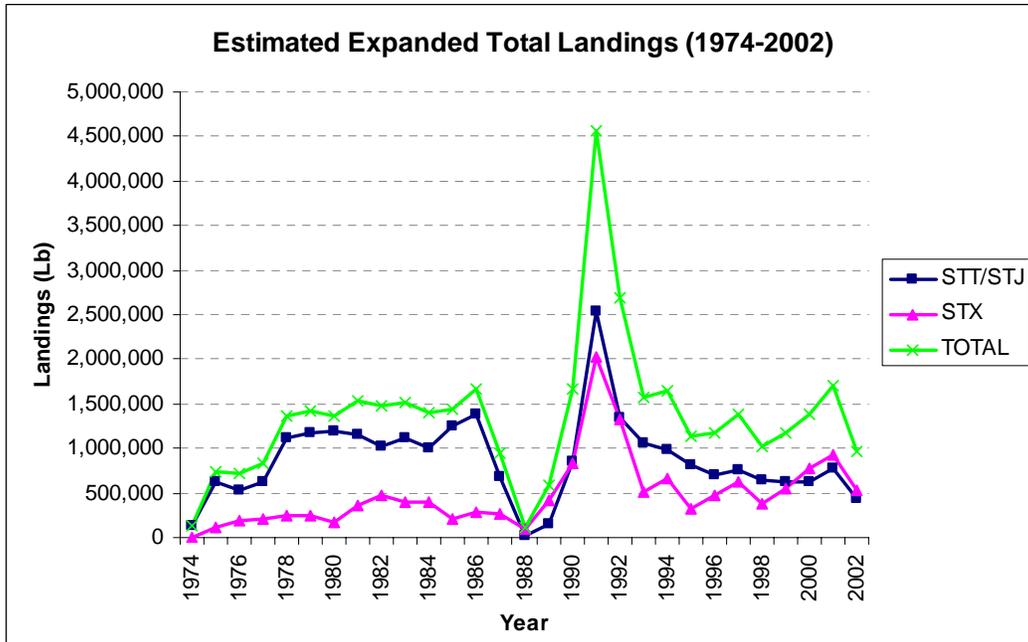
Carib- Figure 10. Expanded (total) commercial landings from Puerto Rico 1983-2002.



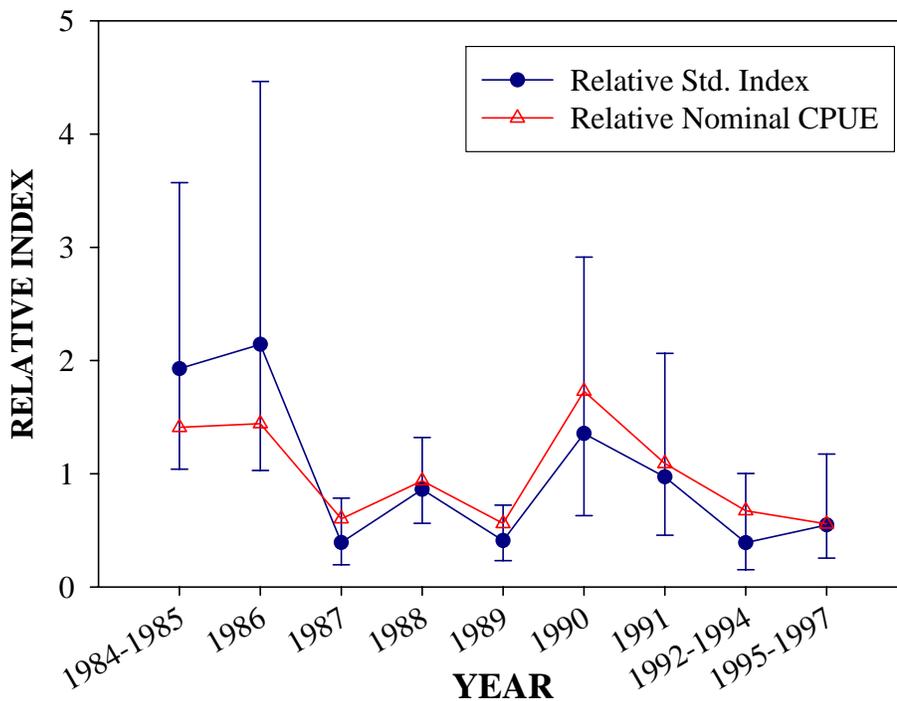
Carib- Figure 11. U.S. Virgin Islands. Reported commercial landings for St. Thomas/St. John and St. Croix, years 1974-2002.



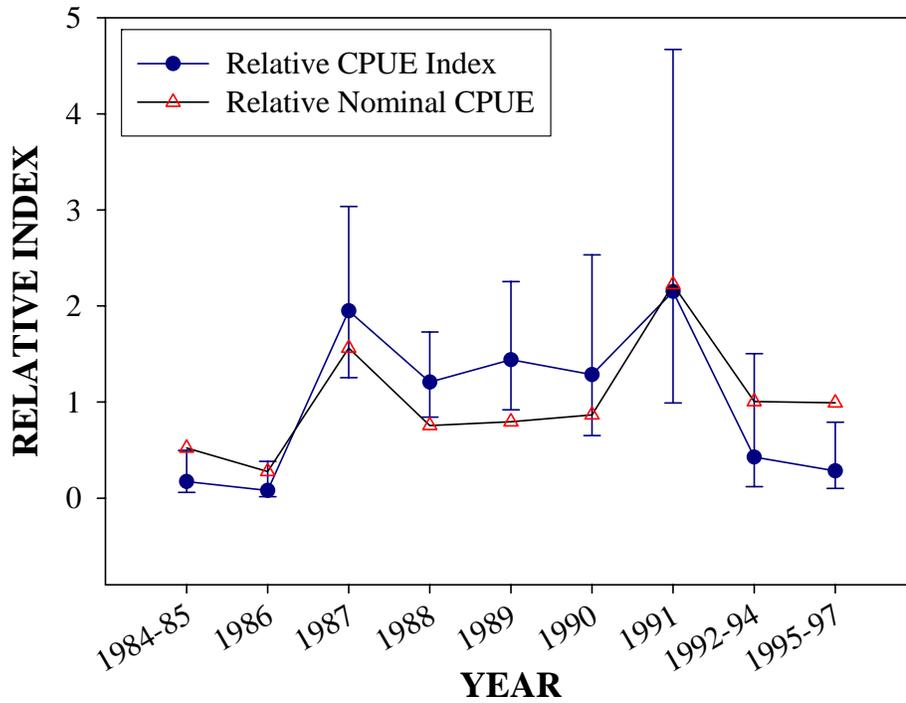
Carib- Figure 12. U.S. Virgin Islands. Number of licensed and reporting fishermen by year, percent reporting and estimates of Expansion Factor 1 from annual reports (DFW, 1981-2001). Data for years 1974-1979 was not available in annual reports; EF1 for those years was assumed constant and equal EF1 1980-81.



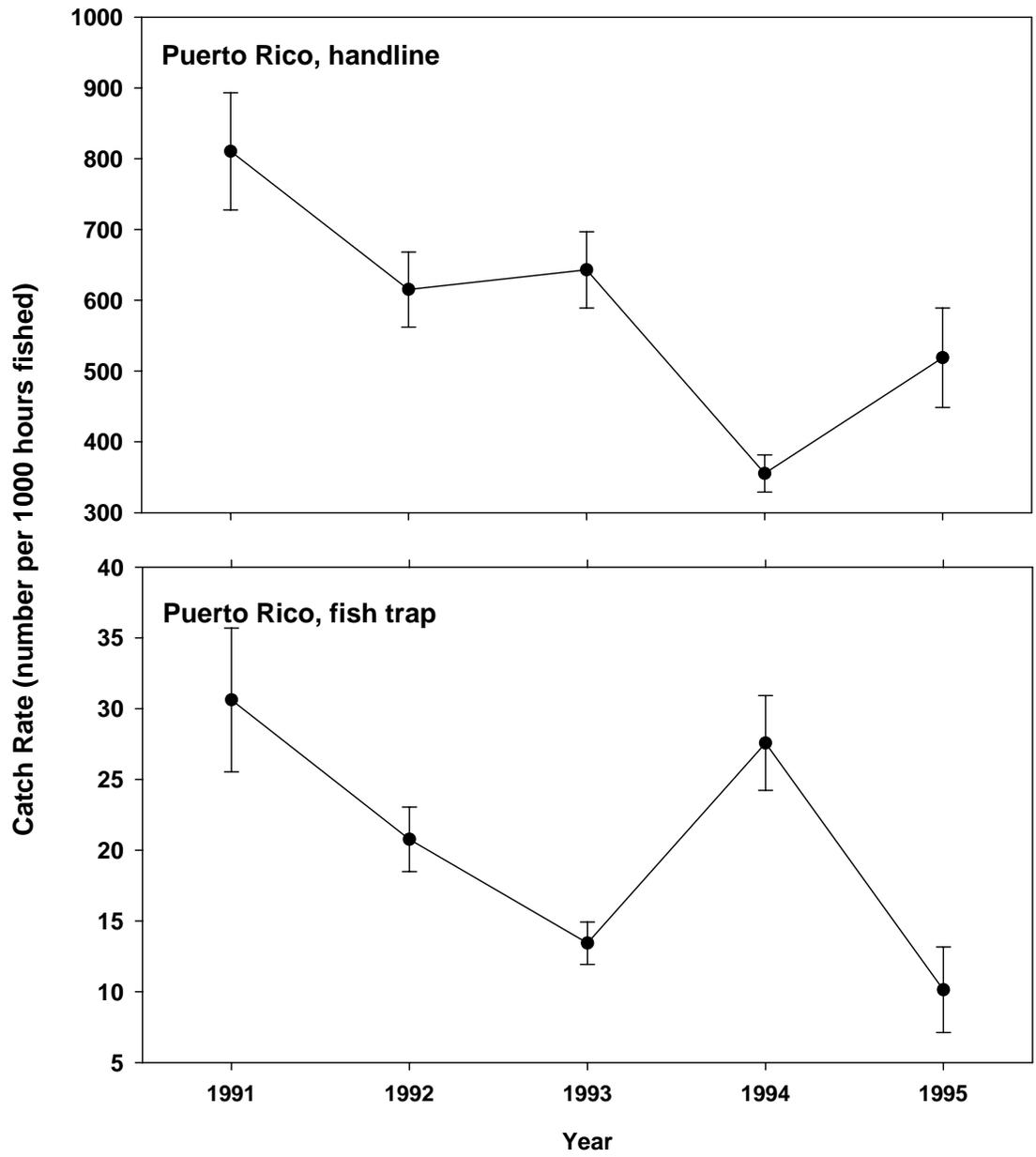
Carib- Figure 13. U.S. Virgin Islands. Expanded commercial landings for St. Thomas/St. John and St. Croix, years 1974-2002.



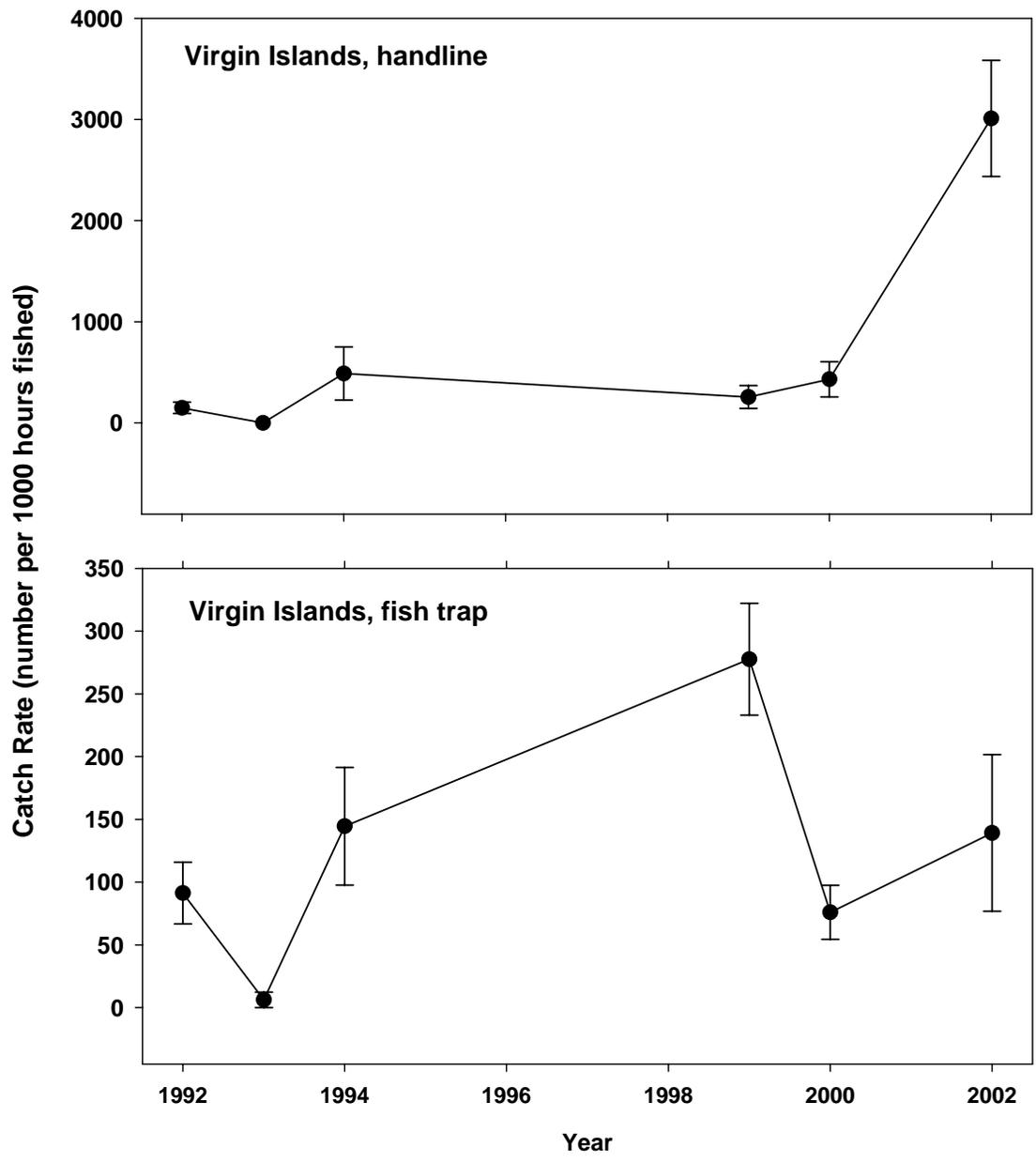
Carib- Figure 14. Relative nominal CPUE (open red triangle), relative standardized CPUE index (solid blue circle) and upper and lower 95% confidence limits of the index for silk snapper 1984-1997.



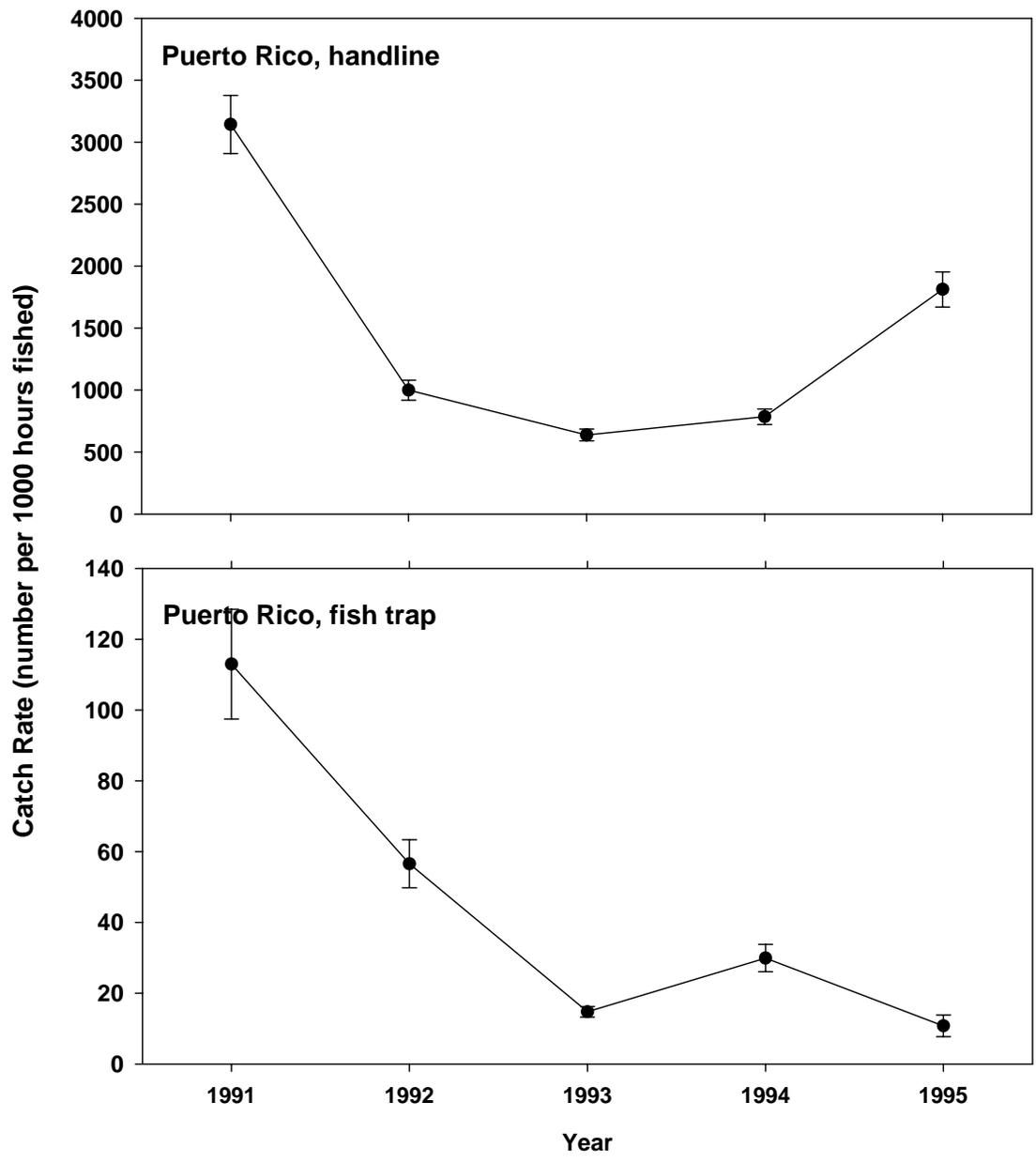
Carib- Figure 15. Relative nominal CPUE (open red triangle), relative standardized CPUE index (solid blue circle) and upper and lower 95% confidence limits of the index for queen snapper 1984-1997.



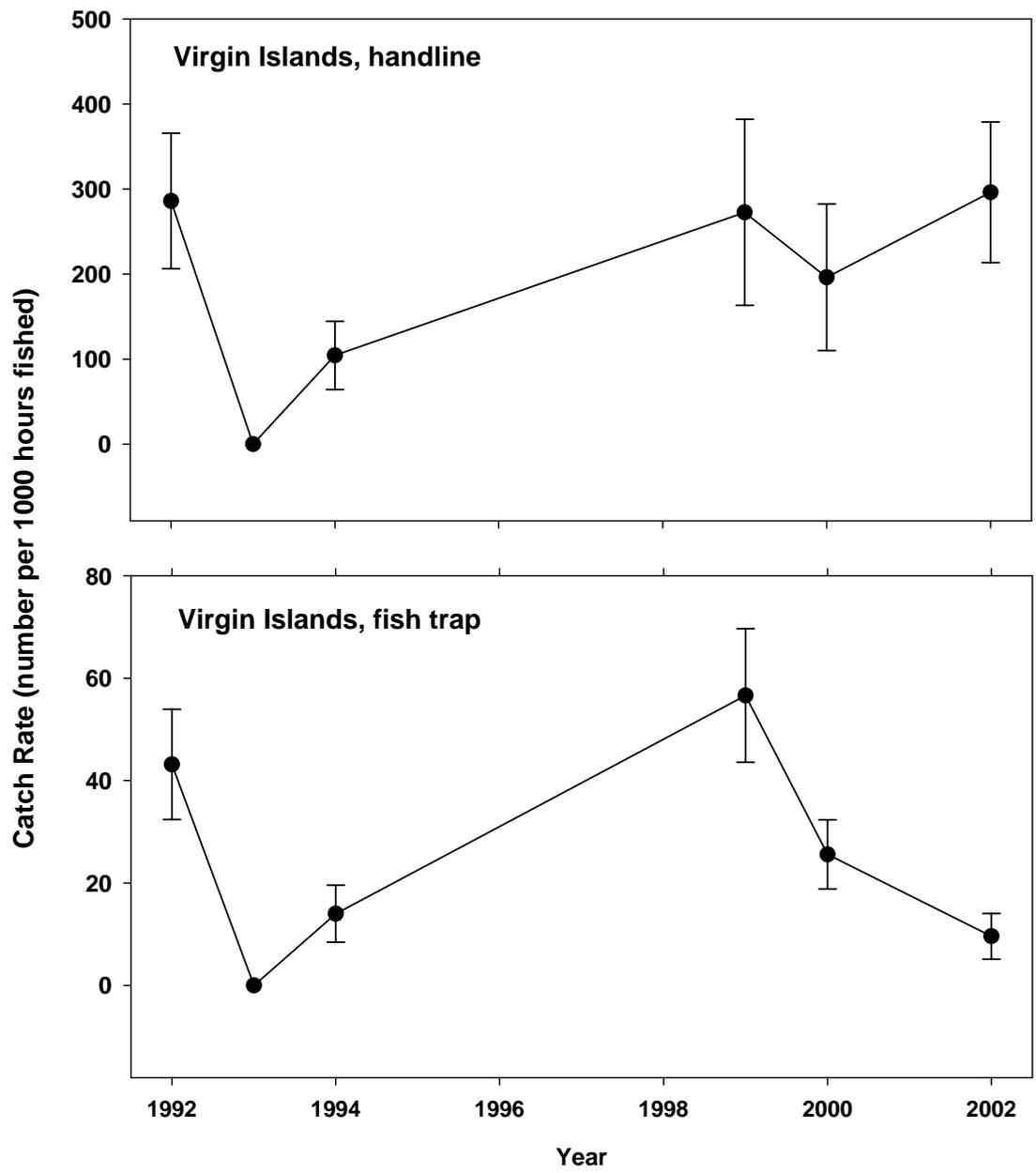
Carib- Figure 16. Yearly catch rates for coney from Puerto Rico sampling efforts. Error bars represent one standard error.



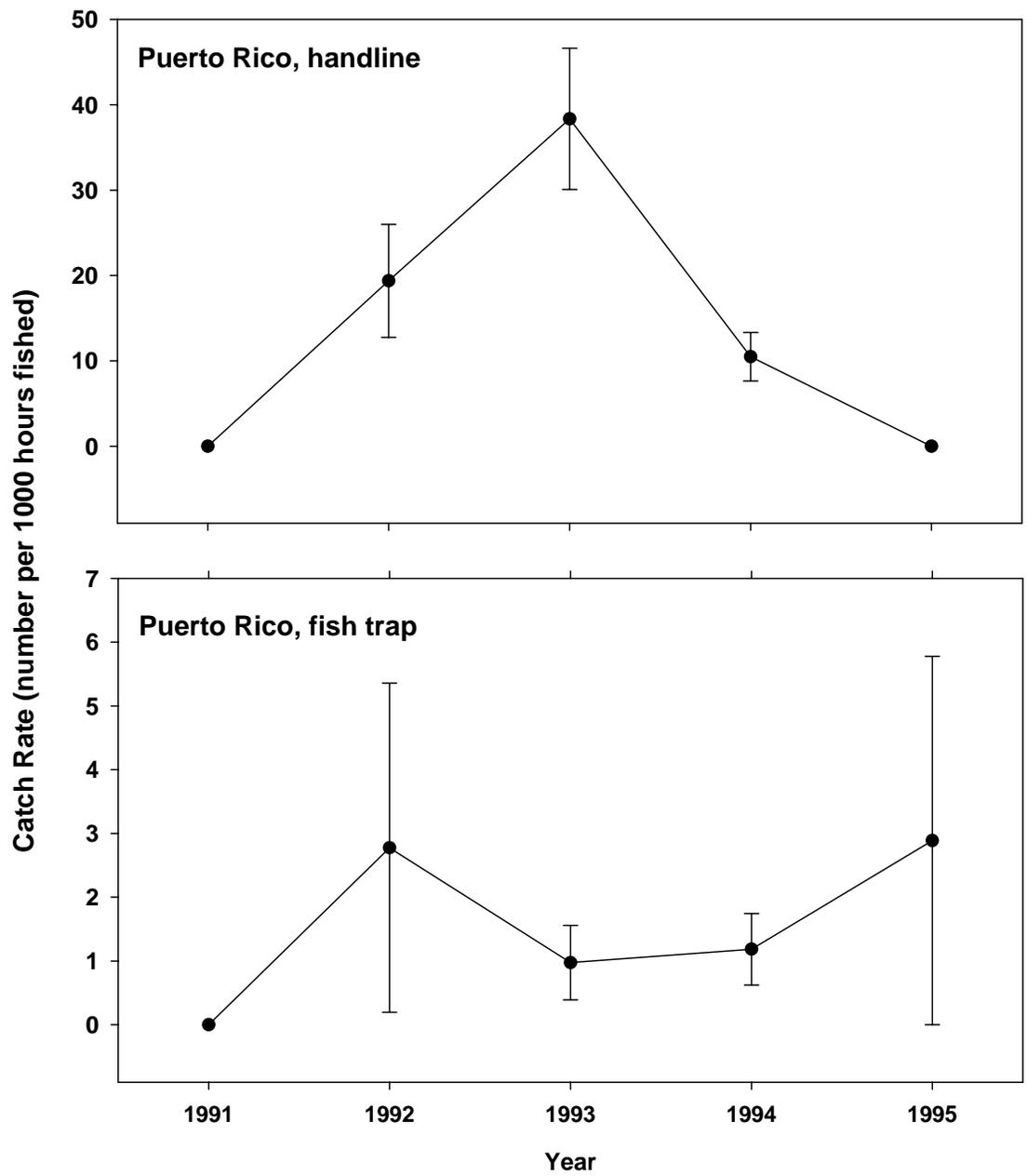
Carib- Figure 17. Yearly catch rates for coney from U.S. Virgin Islands sampling efforts. Error bars represent one standard error.



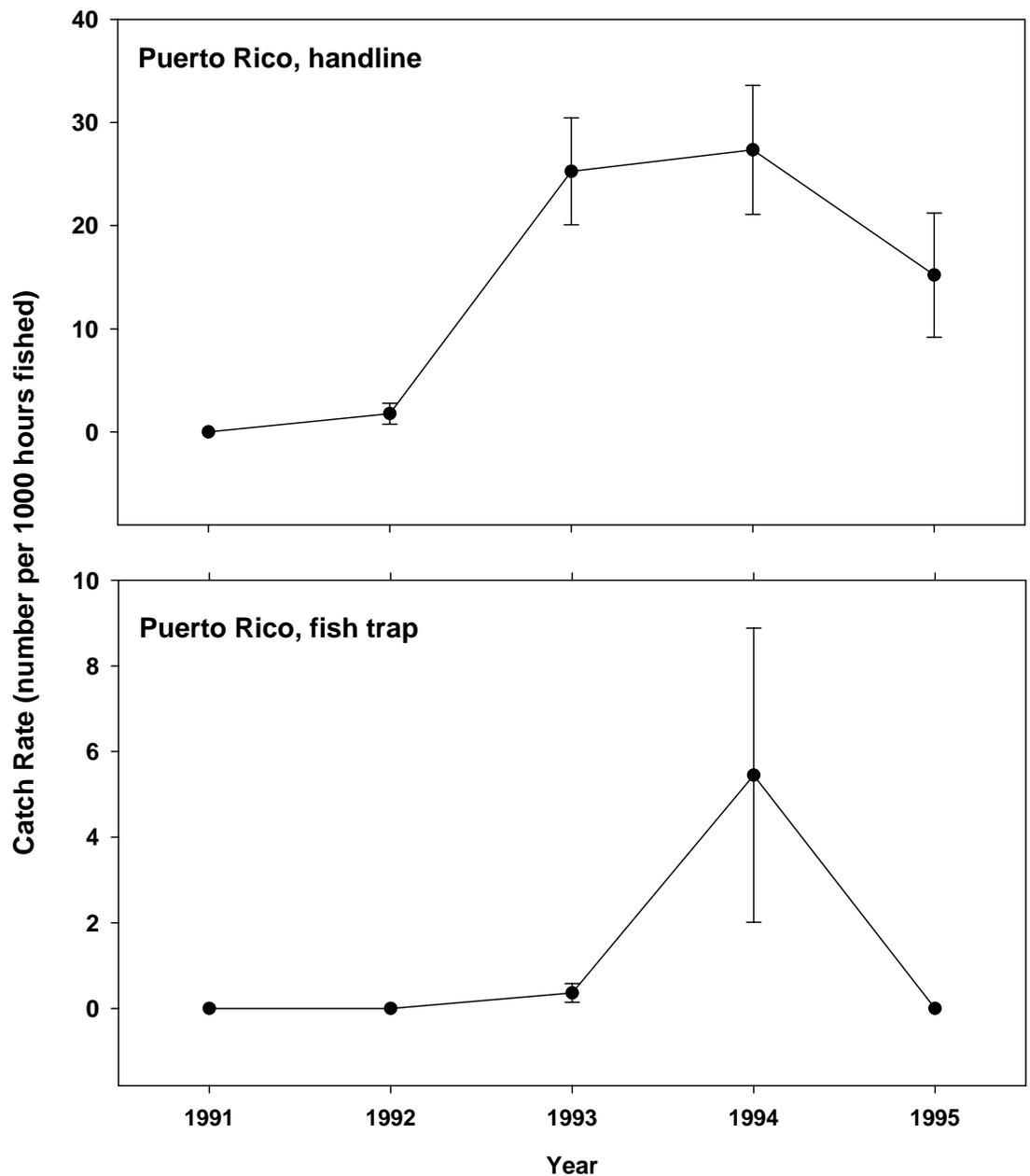
Carib- Figure 18. Yearly catch rates for red hind from Puerto Rico sampling efforts. Error bars represent one standard error.



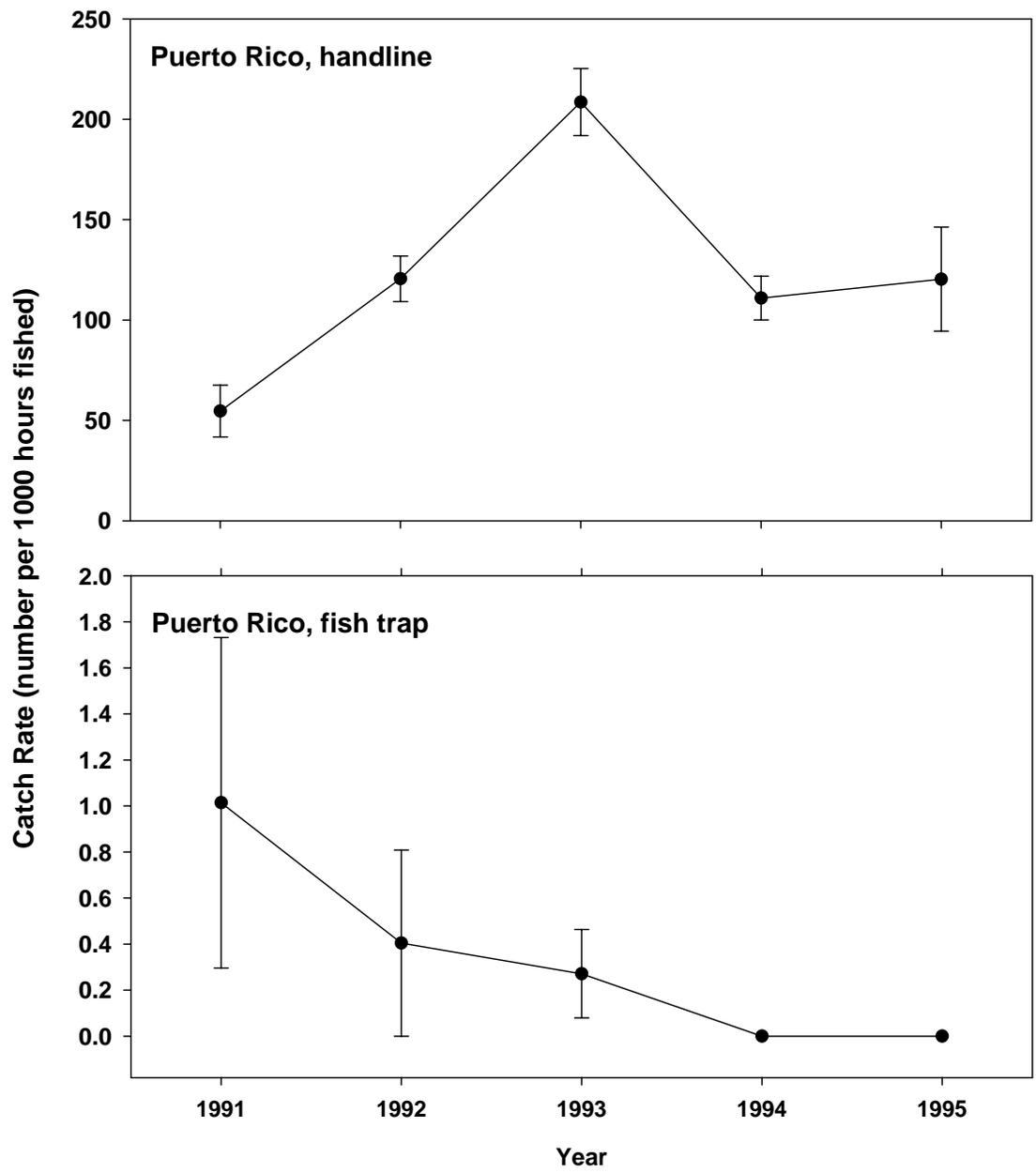
Carib- Figure 19. Yearly catch rates for red hind from U.S. Virgin Islands sampling efforts. Error bars represent one standard error.



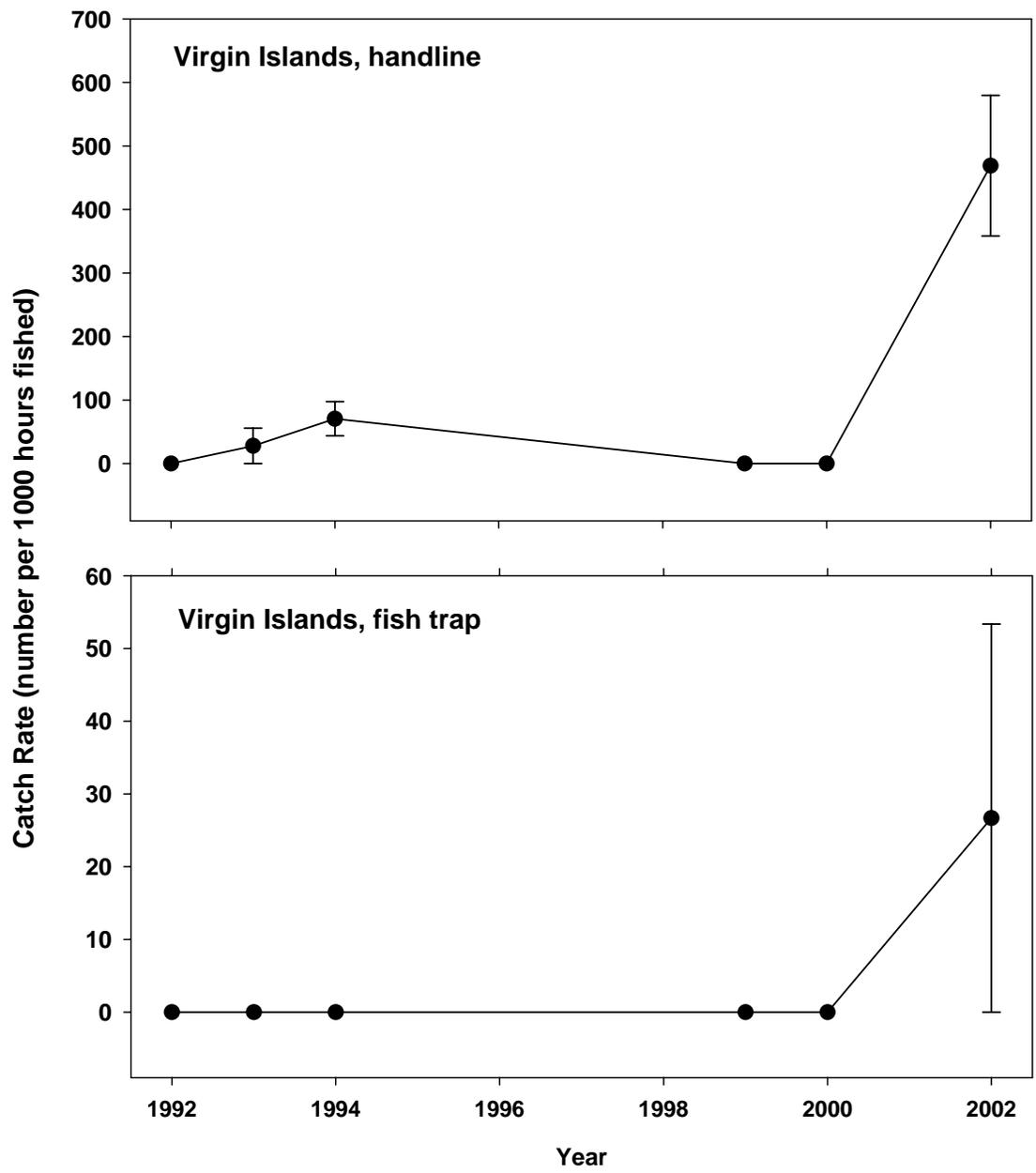
Carib- Figure 20. Yearly catch rates for silk snapper from Puerto Rico sampling efforts. Error bars represent one standard error.



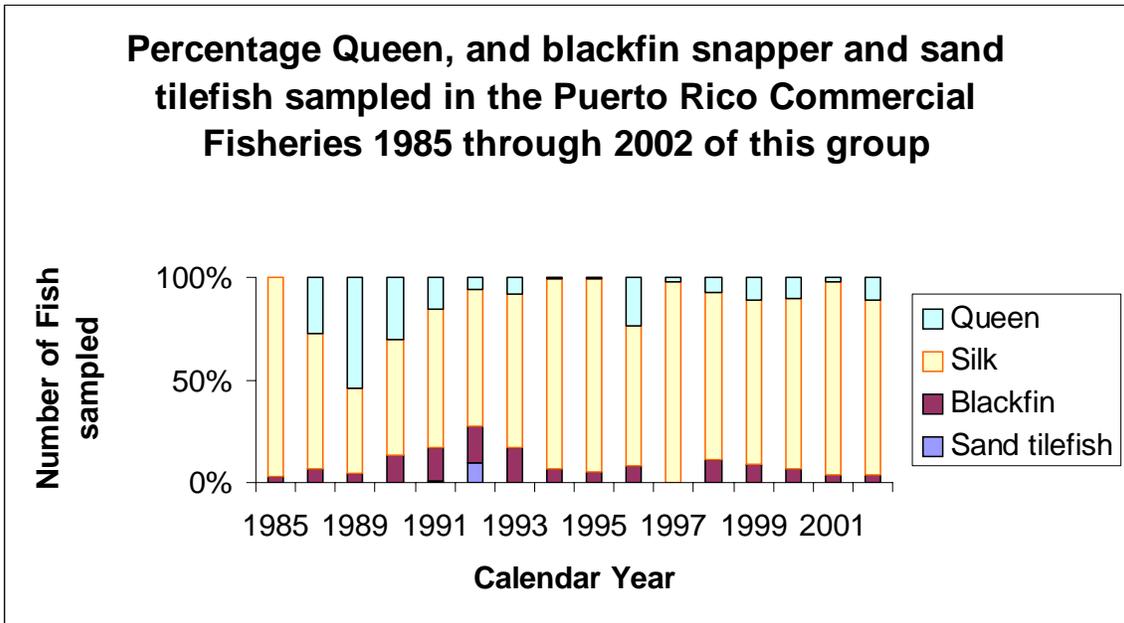
Carib- Figure 21. Yearly catch rates for blackfin snapper from Puerto Rico sampling efforts. Error bars represent one standard error.



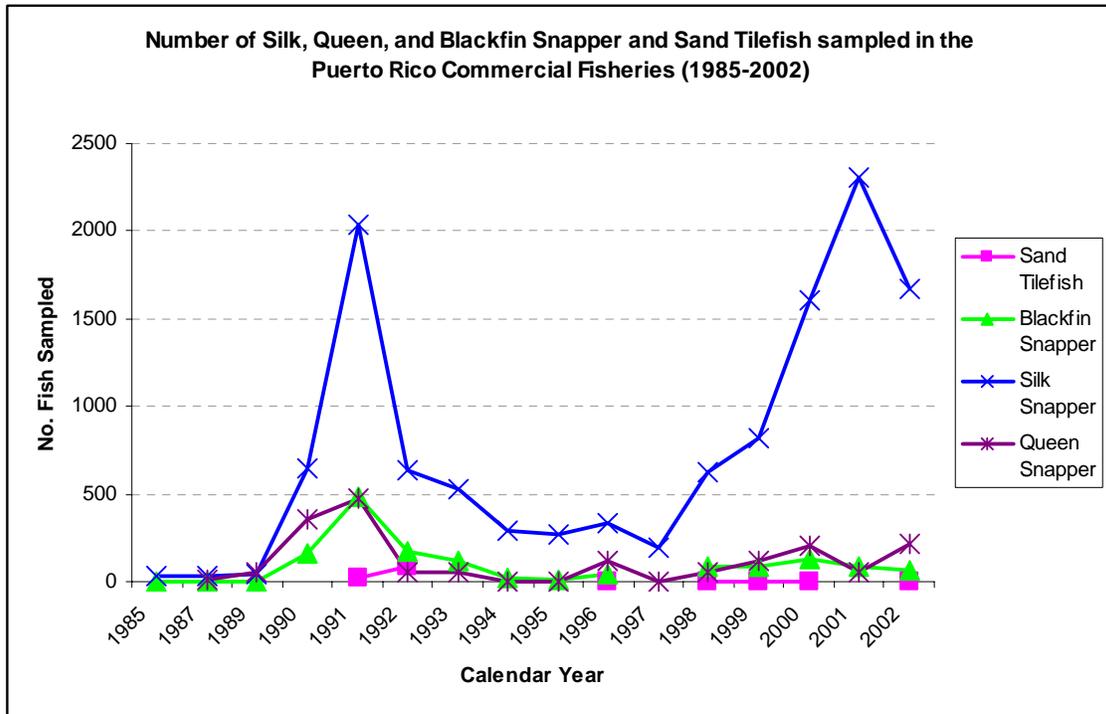
Carib- Figure 22. Yearly catch rates for sand tilefish from Puerto Rico sampling efforts. Error bars represent one standard error.



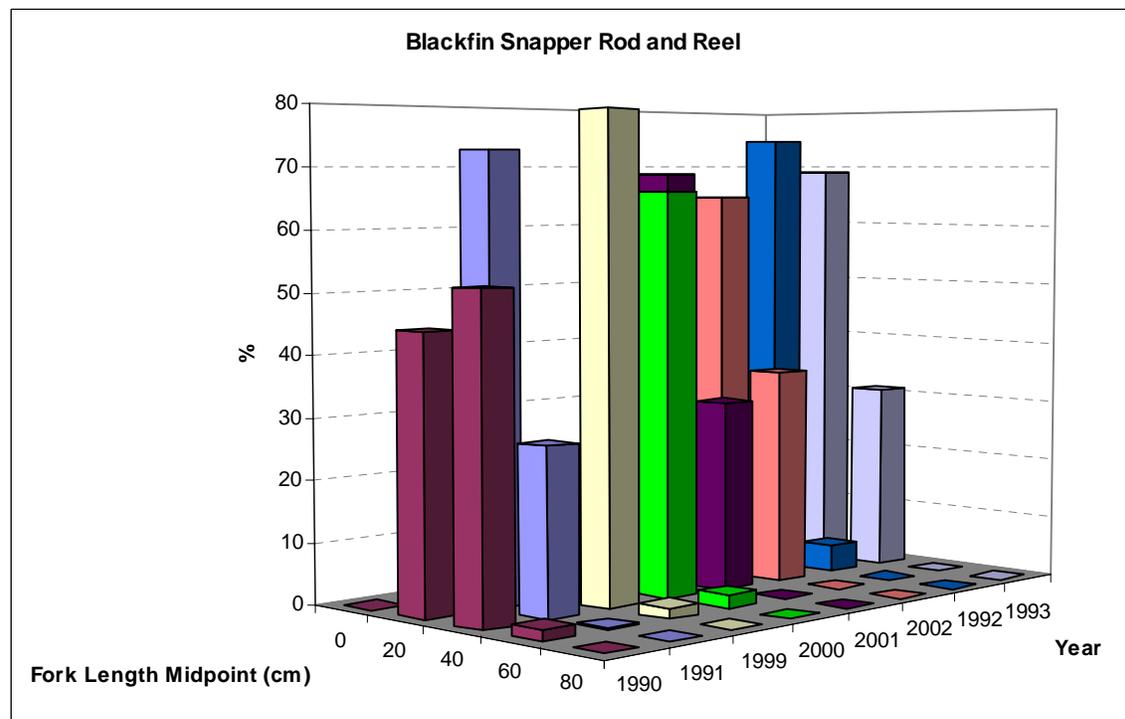
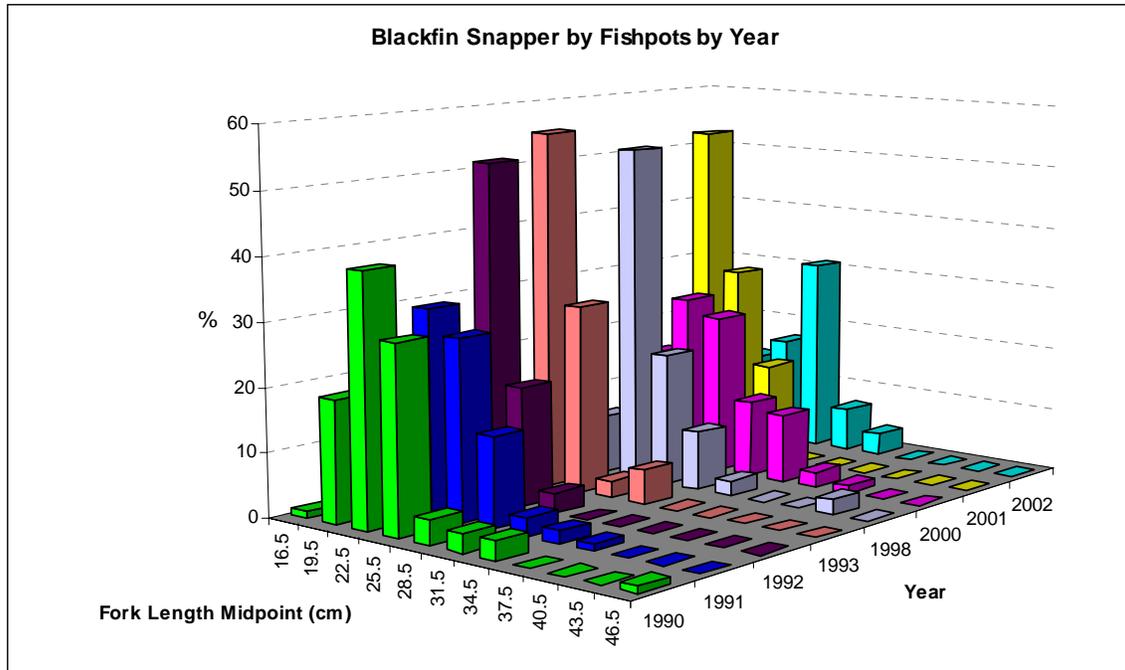
Carib- Figure 23. Yearly catch rates for sand tilefish from U.S. Virgin Islands sampling efforts. Error bars represent one standard error.



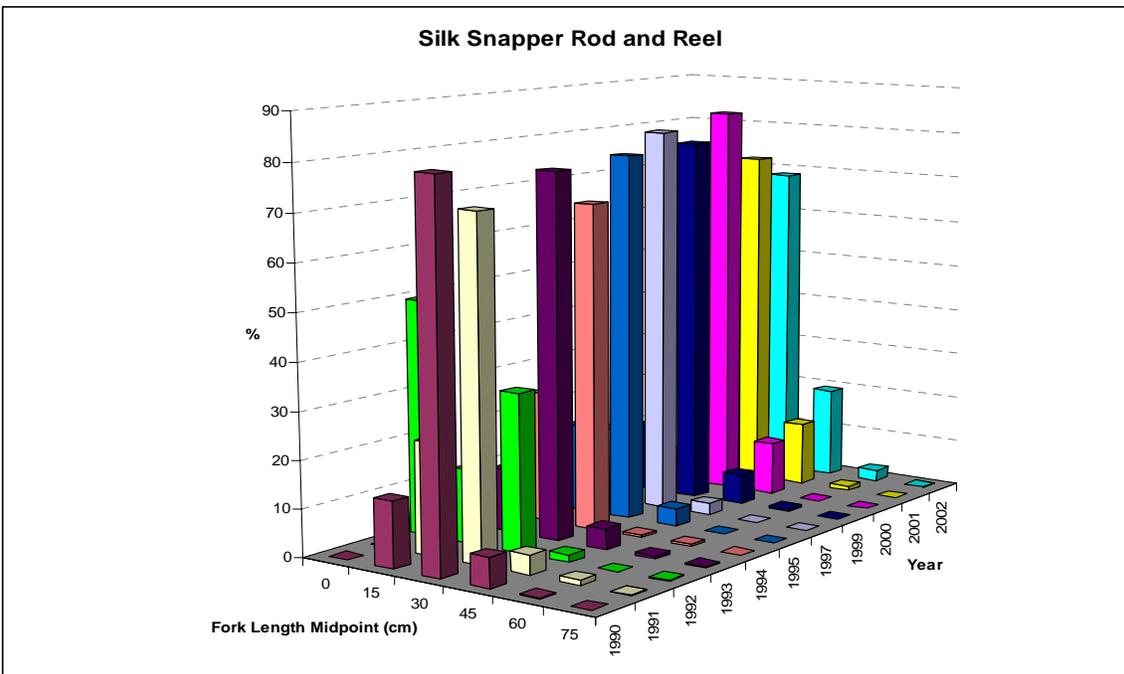
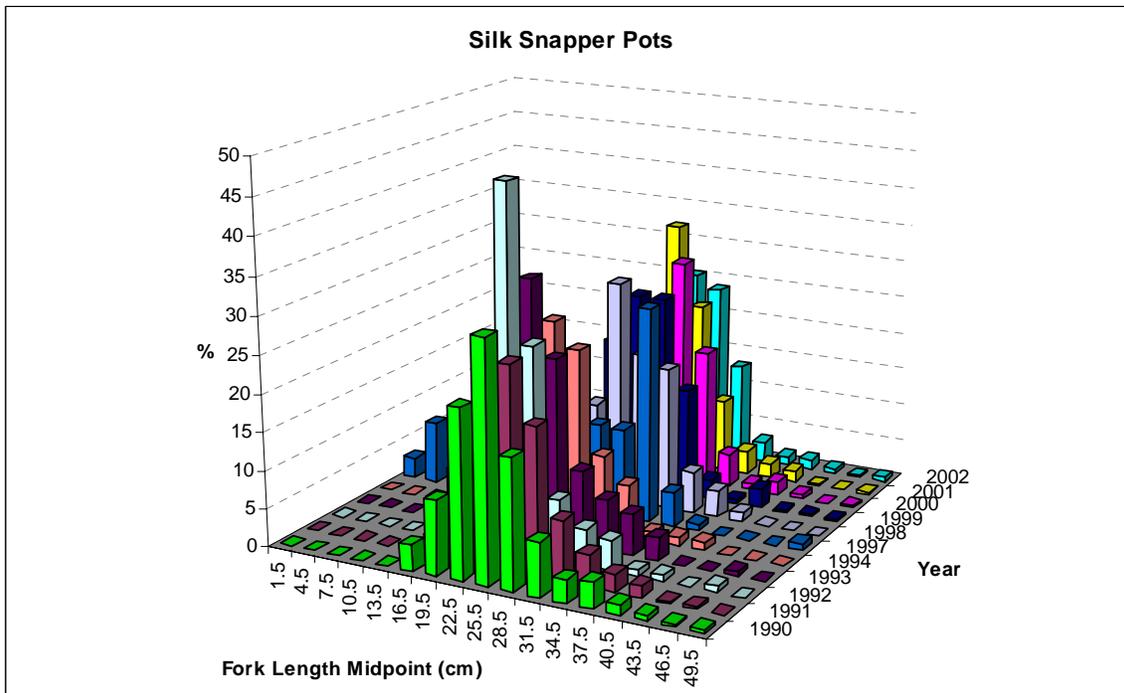
Carib- Figure 24. Percentage of silk, blackfin, and queen snapper sampled of the 'silk snapper' landing category.



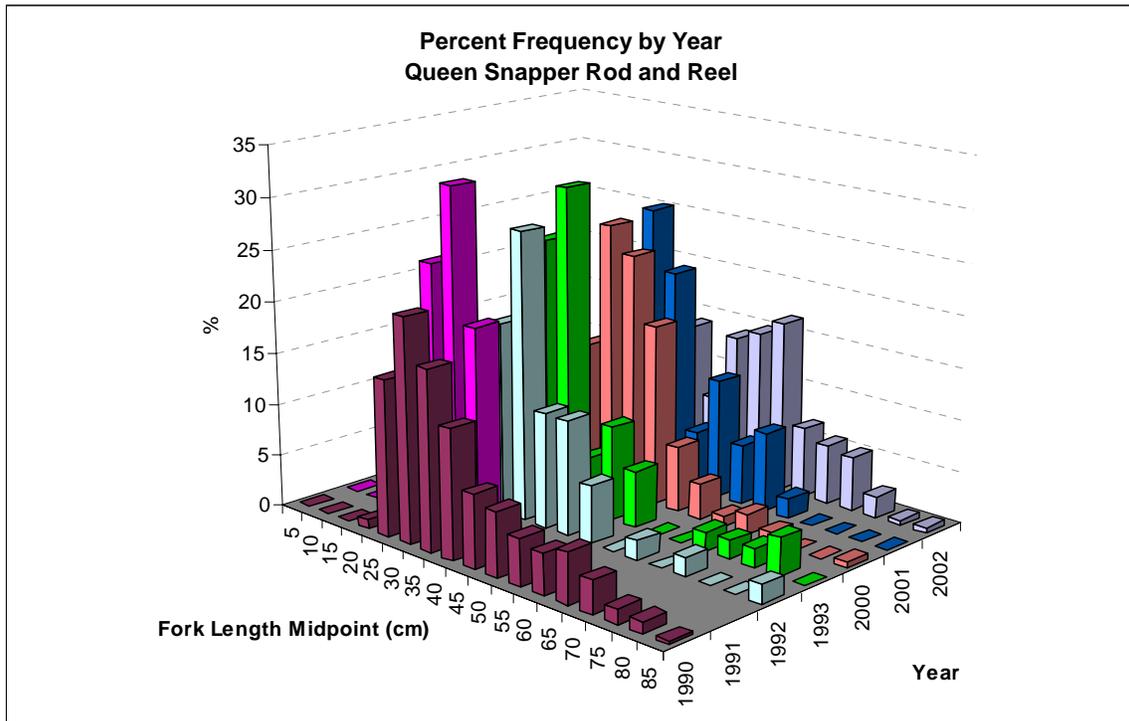
Carib- Figure 25. Number of individual length observations for silk, queen and blackfin snapper in Puerto Rico, 1985 through 2002



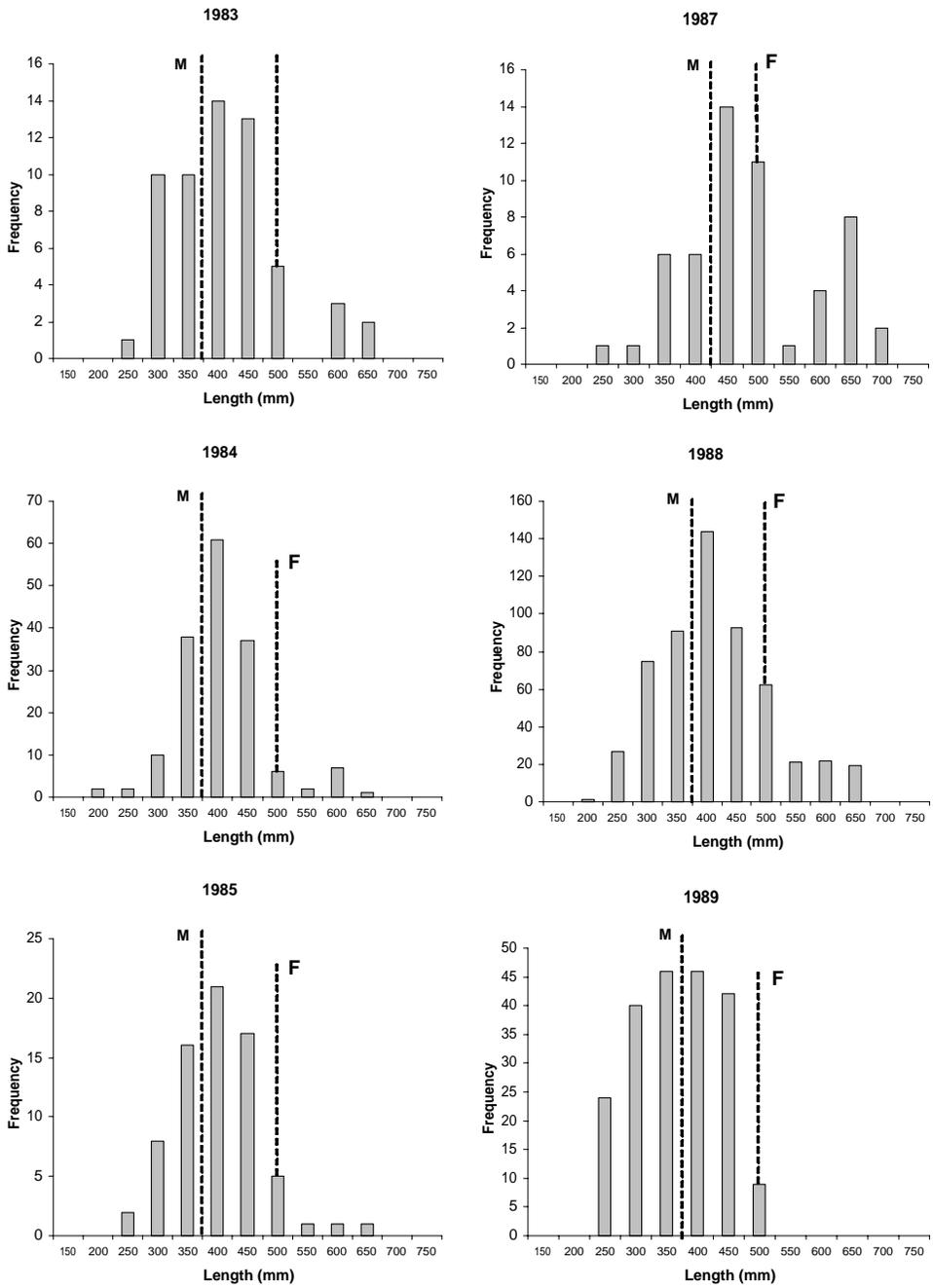
Carib- Figure 26. Percent length frequency distribution of blackfin snapper by gear (fishpots and rod and reel) and year, 1985-2002. Only years with N>30 are shown.



Carib- Figure 27. Percent length frequency distribution of silk snapper by gear (fishpots and rod and reel) and year, 1985-2002. Only years with N>30 are shown.

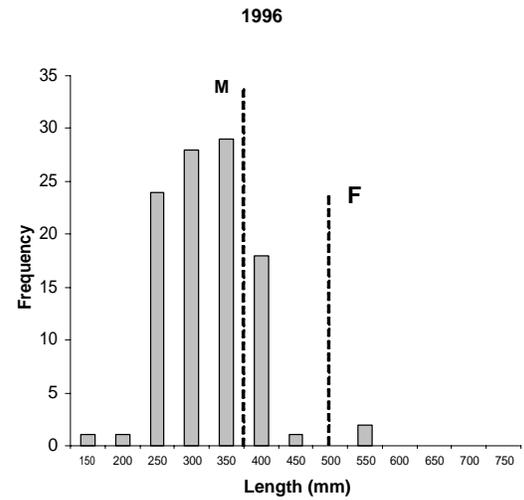
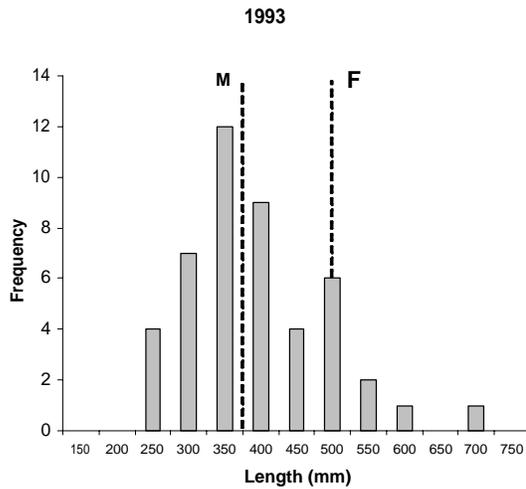
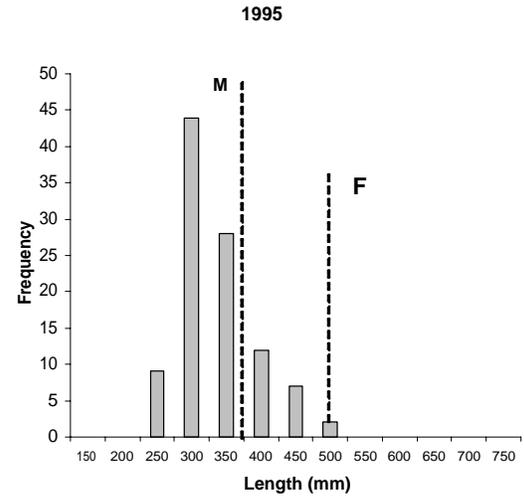
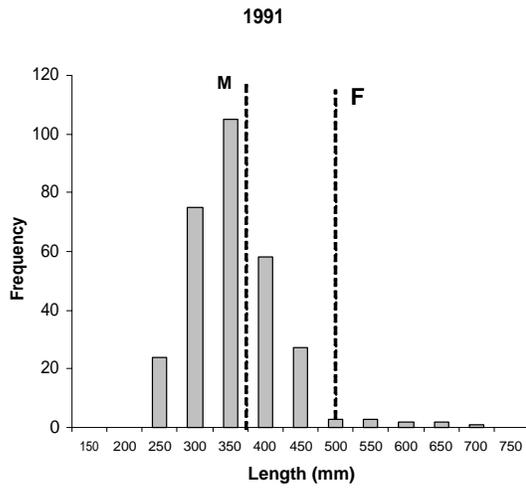
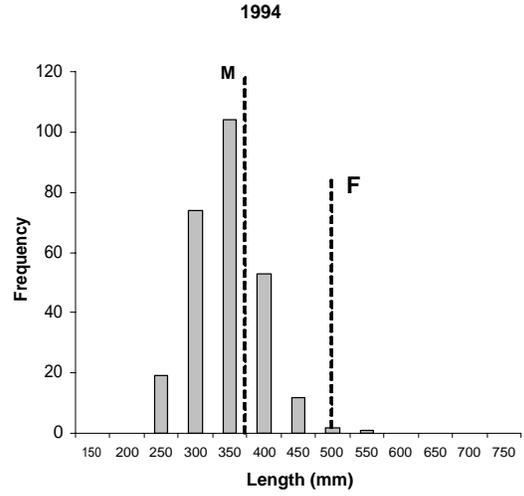
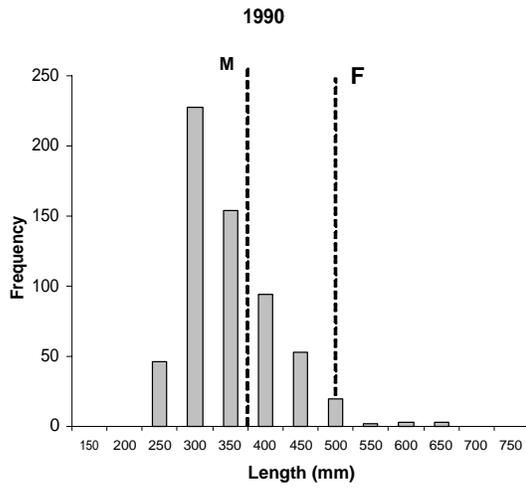


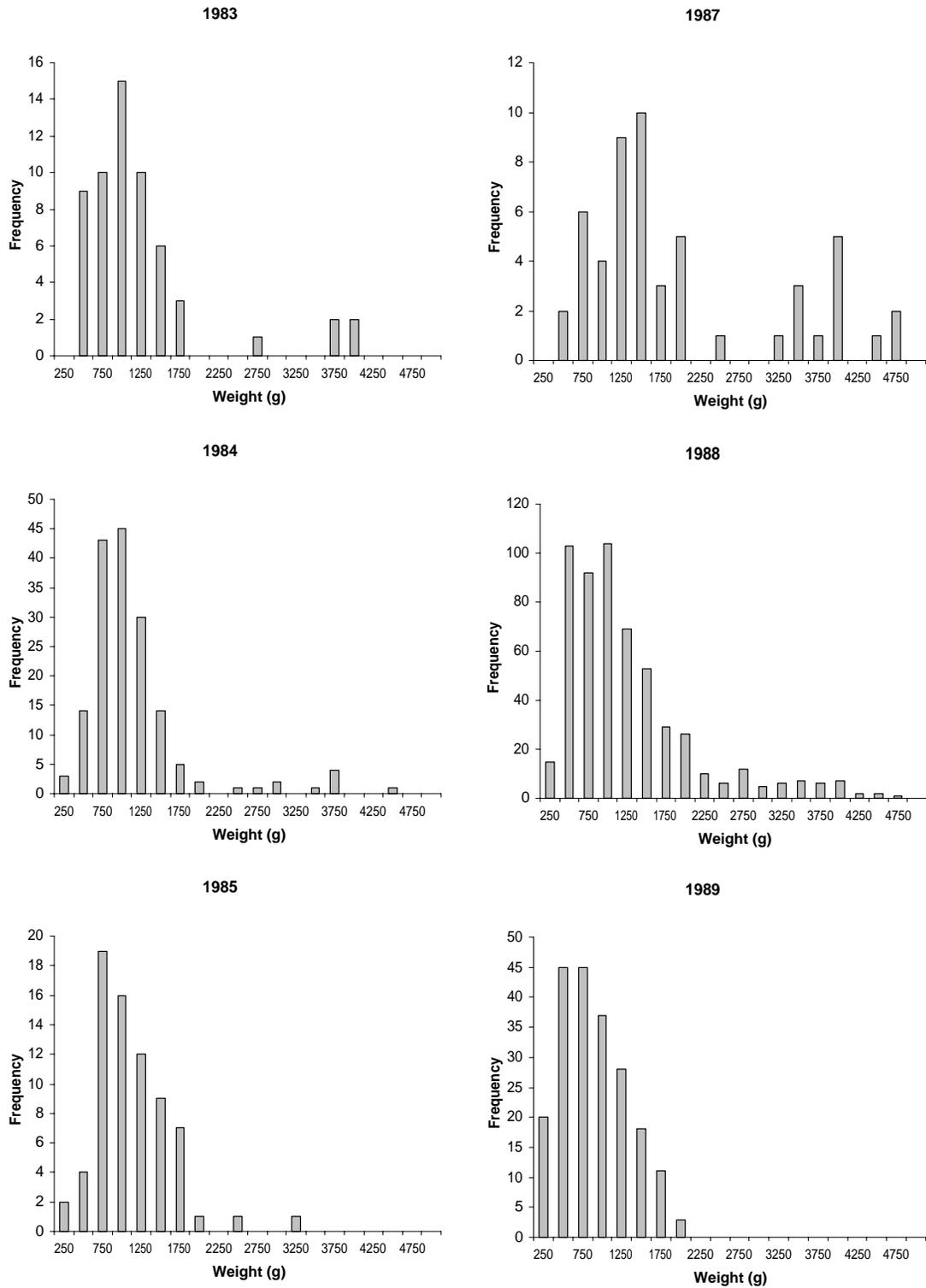
Carib- Figure 28. Percent length frequency distribution of queen snapper by gear (rod and reel) and year, 1985-2002. Only years with N>30 are shown.



Carib- Figure 29. Length frequency distribution of sampled silk snapper in the St. Croix district. Histograms from years 1986, 1992, and 1997 to 2002 are not presented due to small sample sizes. The vertical dashed lines indicate length at sexual maturity for males (M) , 380 mm, and females (F) 500 mm.

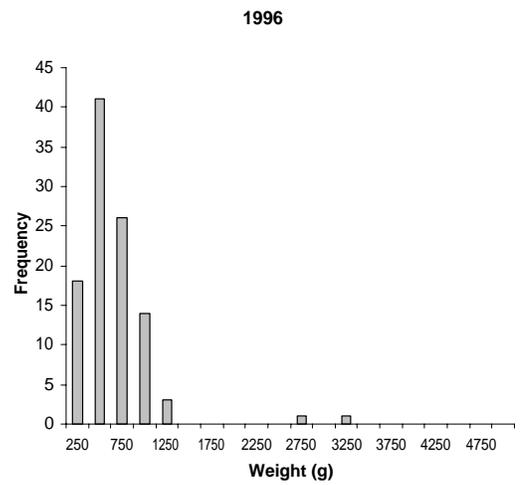
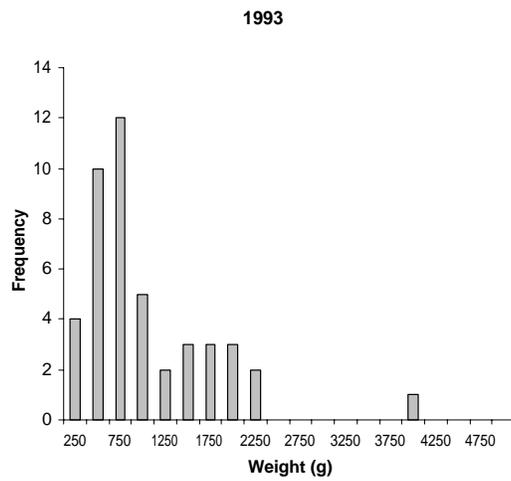
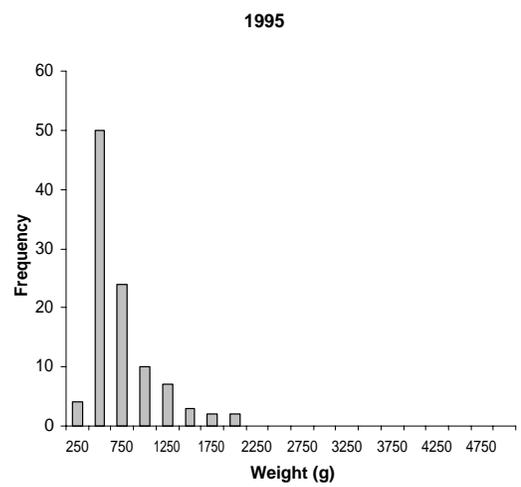
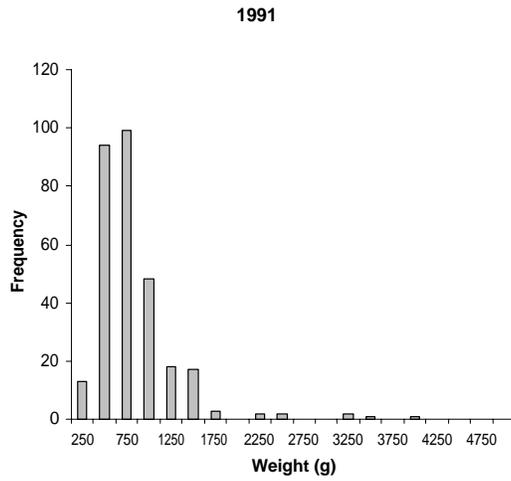
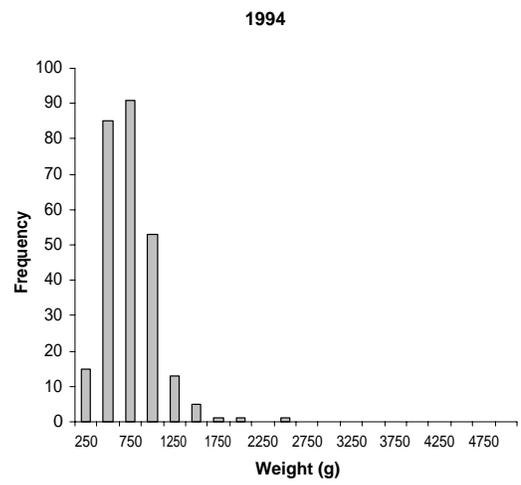
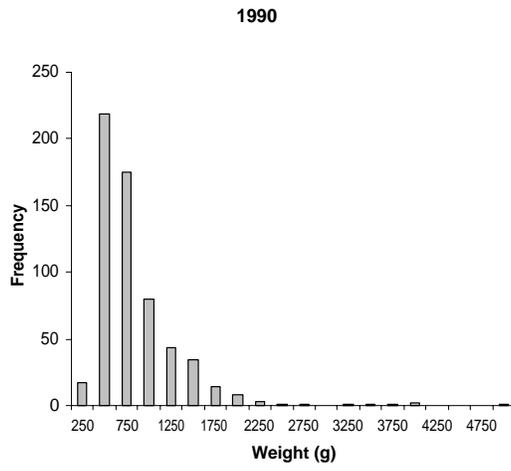
Carib- Figure 29 (continued)

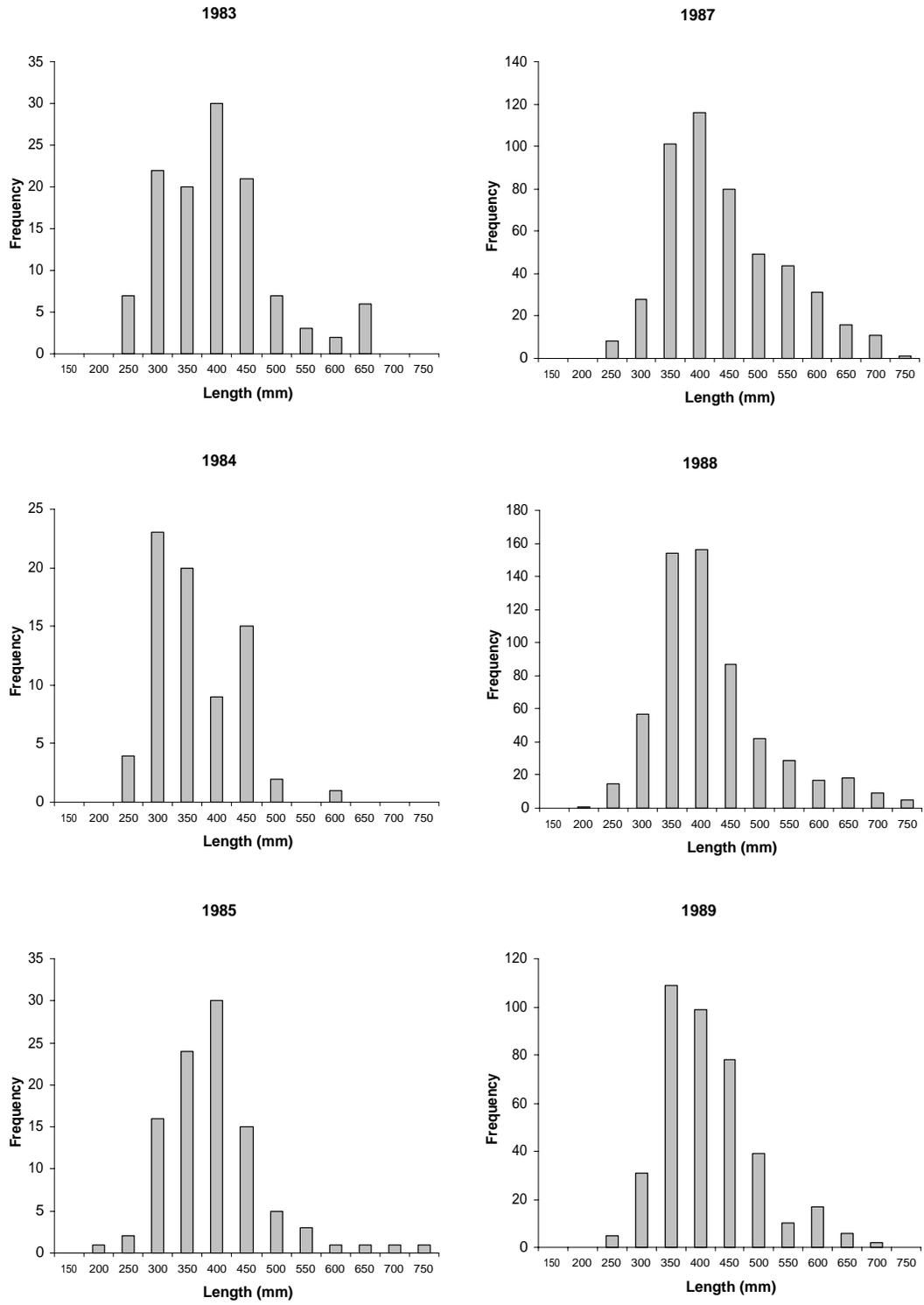




Carib- Figure 30. Weight frequency distribution of sampled silk snapper in the St. Croix district. Histograms from years 1986, 1992, and 1997 to 2002 are not presented due to small sample sizes.

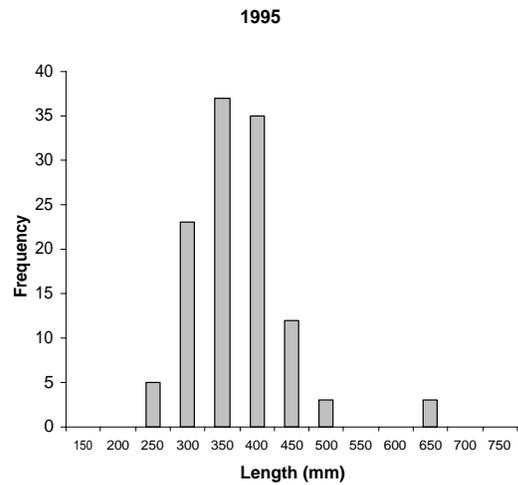
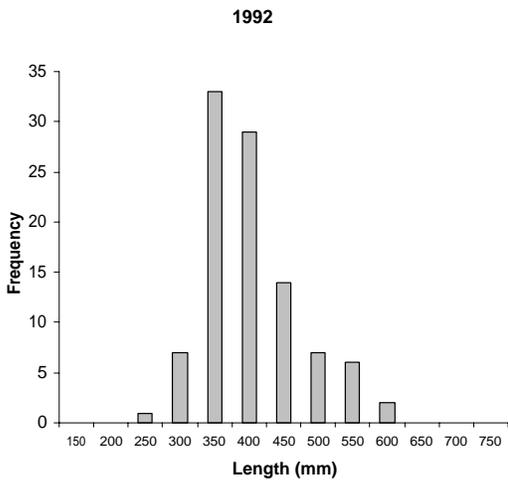
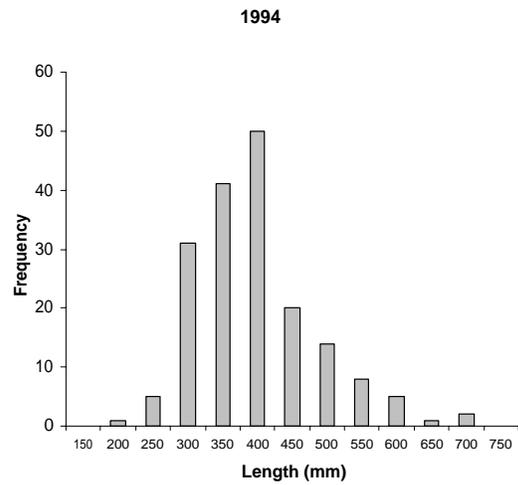
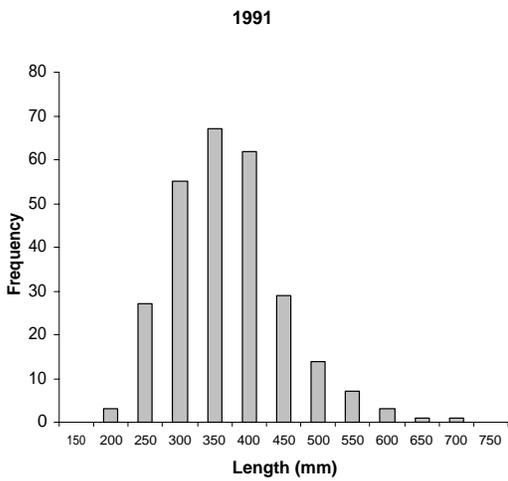
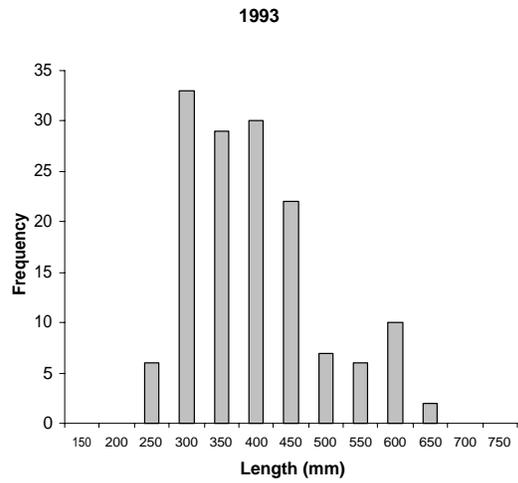
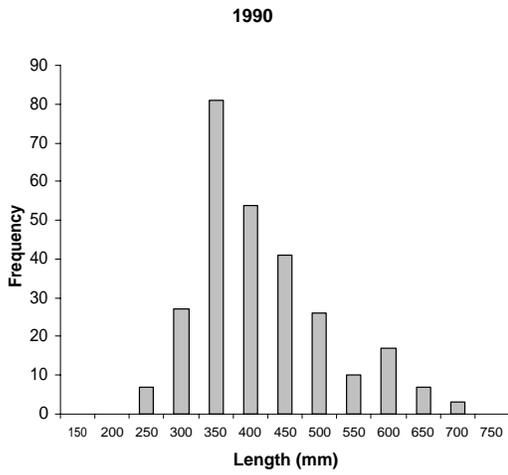
Carib- Figure 30 (continued)



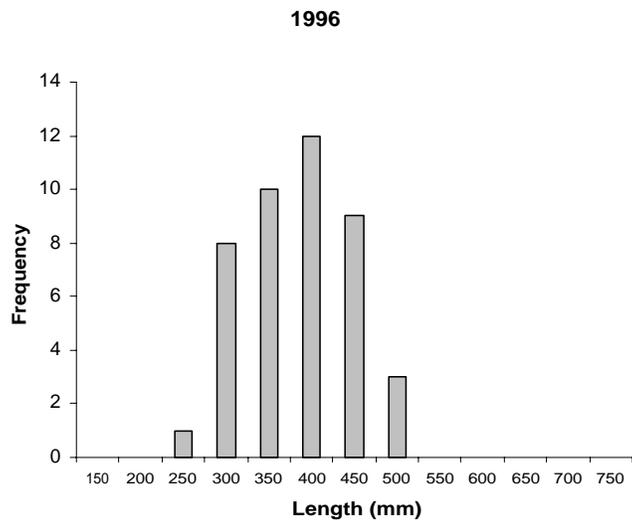


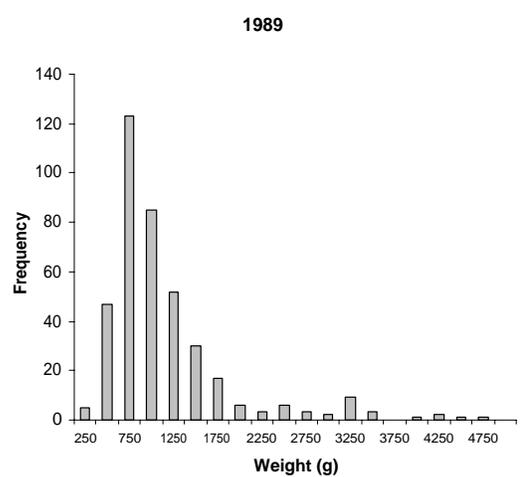
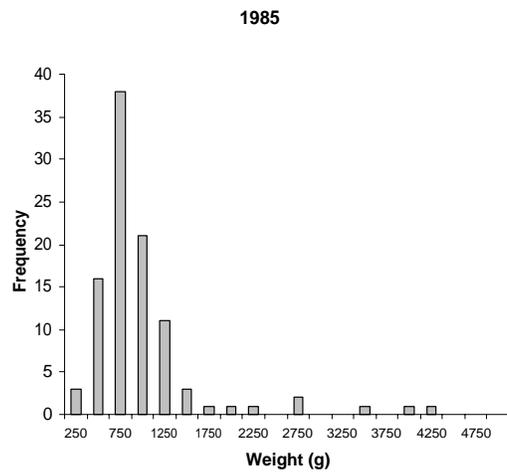
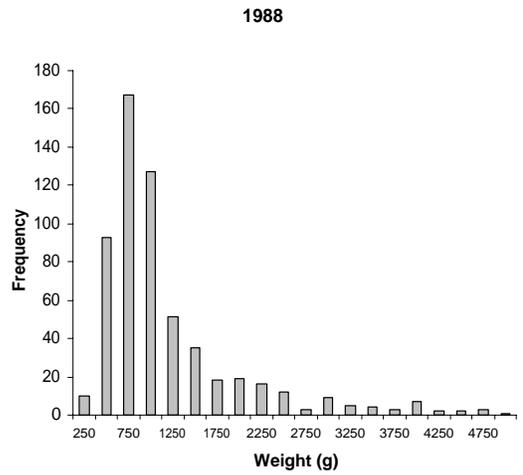
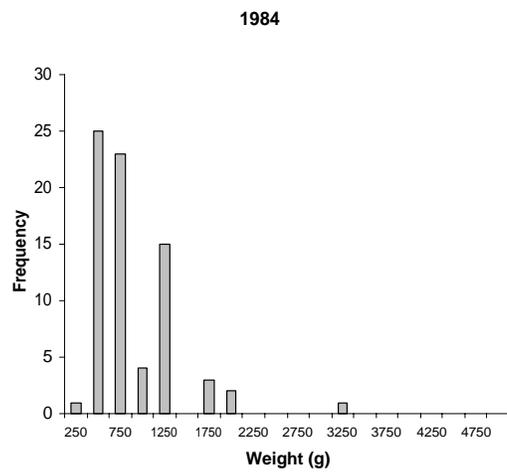
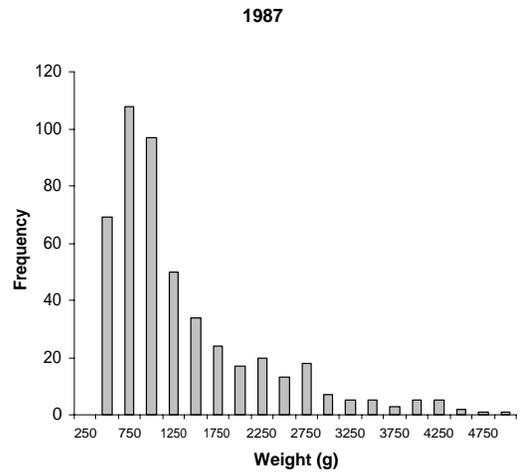
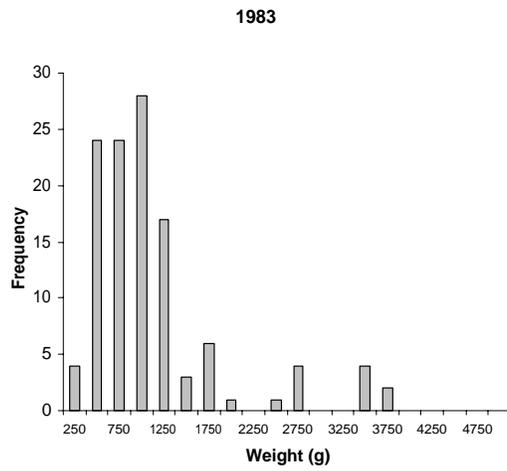
Carib Figure 31. Length frequency distribution of sampled queen snapper in the St. Croix district. Histograms from years 1986 and 1997 to 2002 are not presented due to small sample sizes

Carib- Figure 31 (continued)



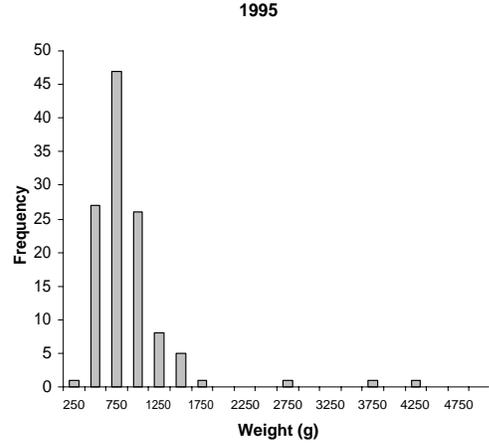
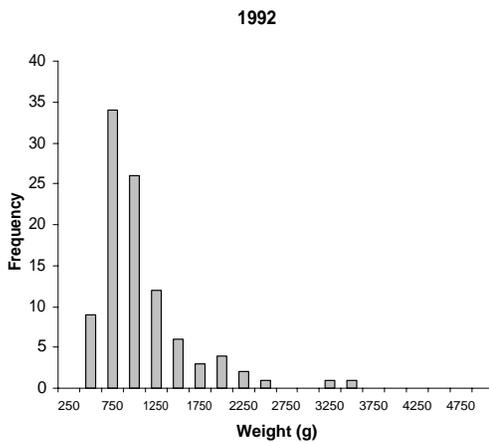
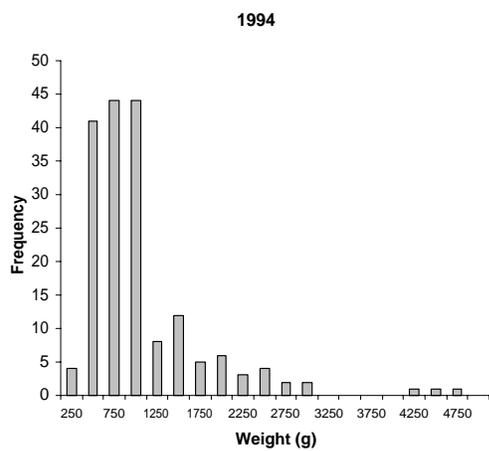
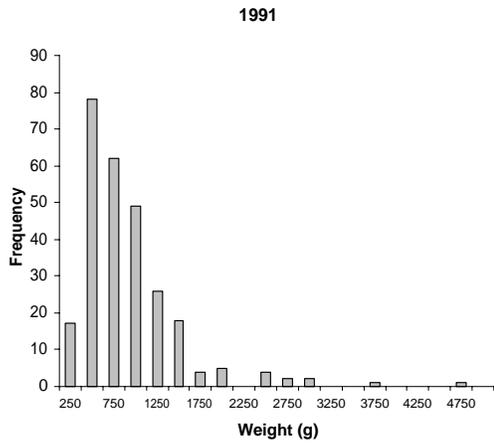
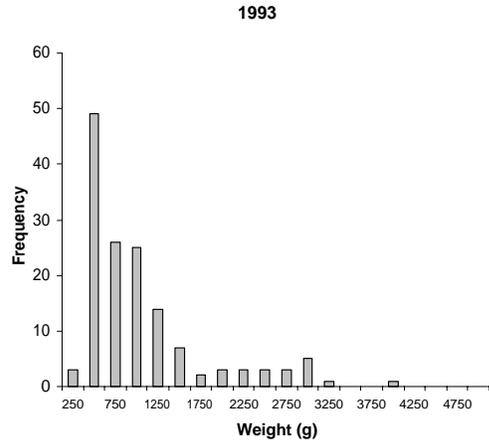
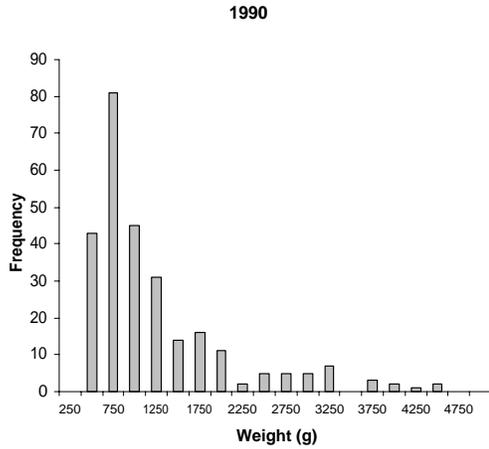
Carib- Figure 31 (continued)



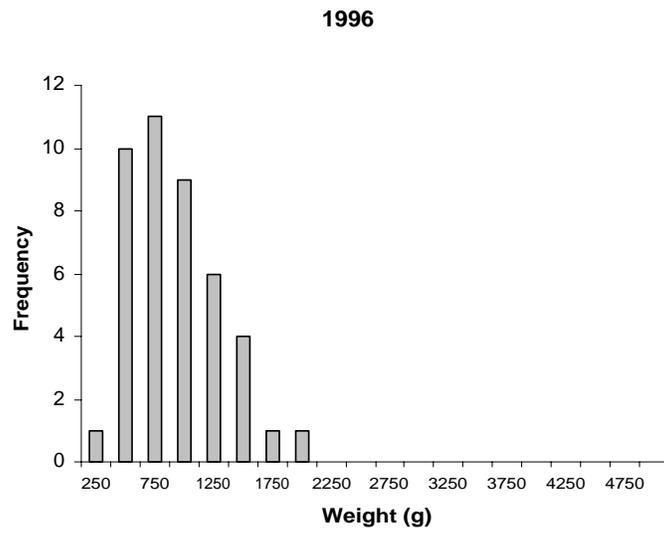


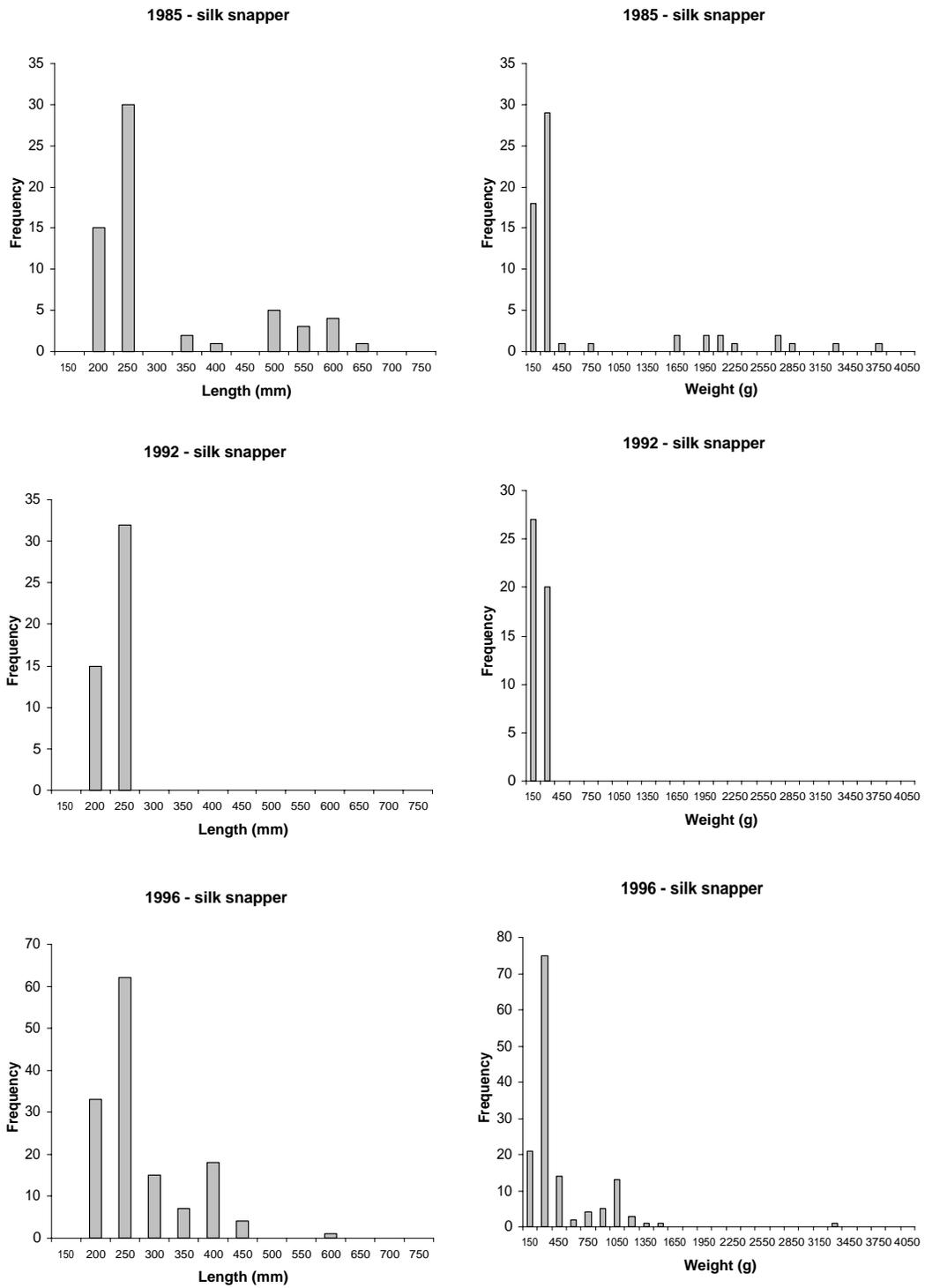
Carib- Figure 32. Weight frequency distribution of sampled queen snapper in the St. Croix district. Histograms from years 1986 and 1997 to 2002 are not presented due to small sample sizes.

Carib- Figure 32 (continued)



Carib- Figure 32 (continued)

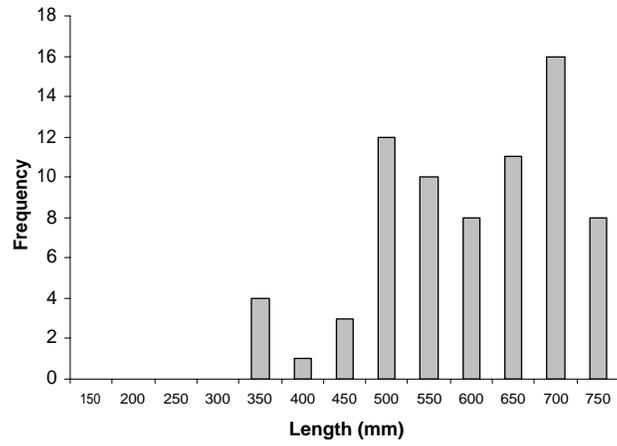




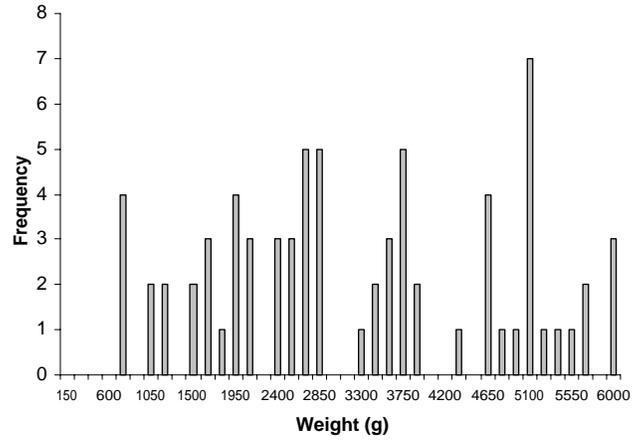
Carib- Figure 33. Size frequencies distributions of sampled silk and queen snapper in the St. Thomas / St. John district. Only those years with sample sizes > 47 individuals are presented.

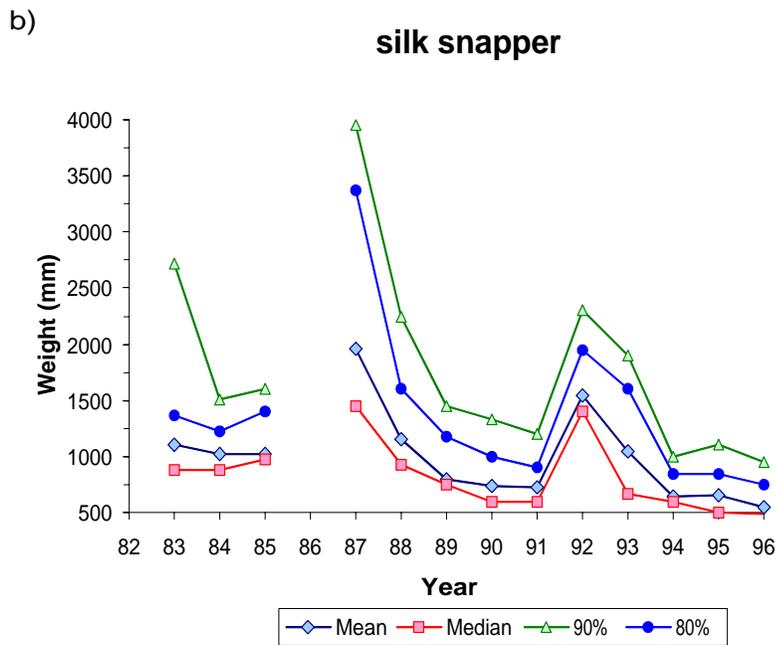
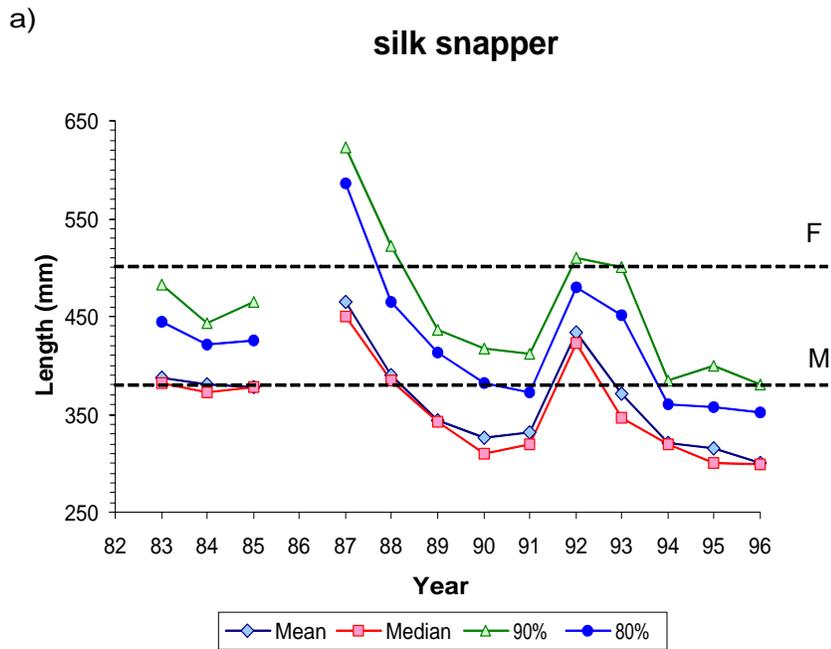
Carib- Figure 33 (continued)

1985 - queen snapper

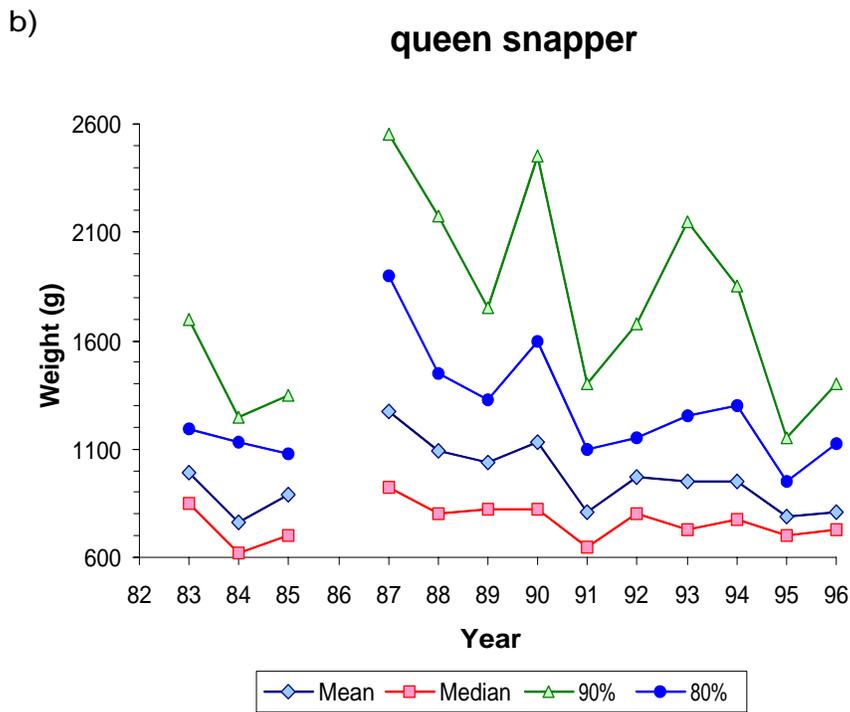
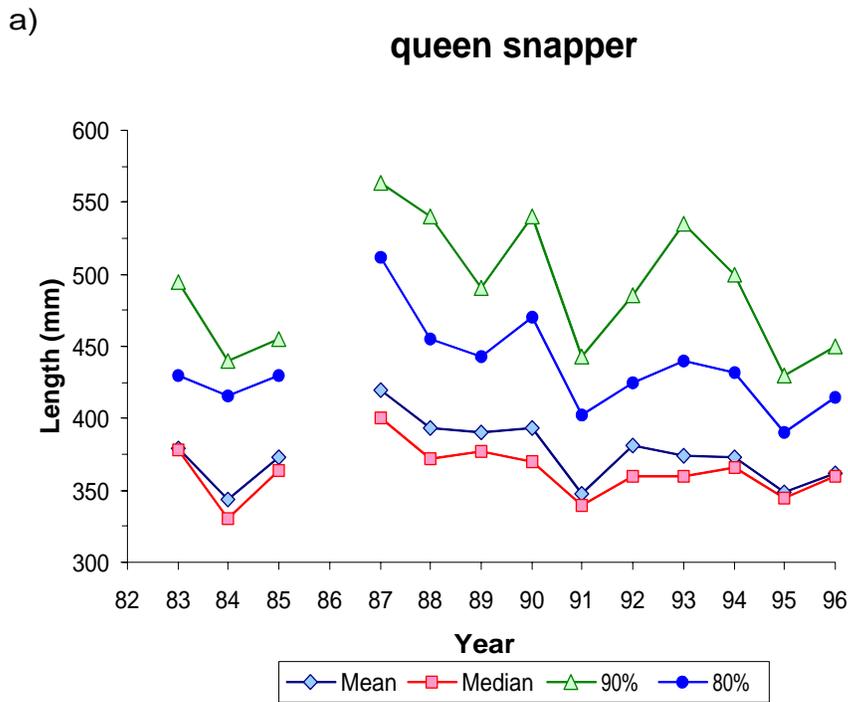


1985 - queen snapper

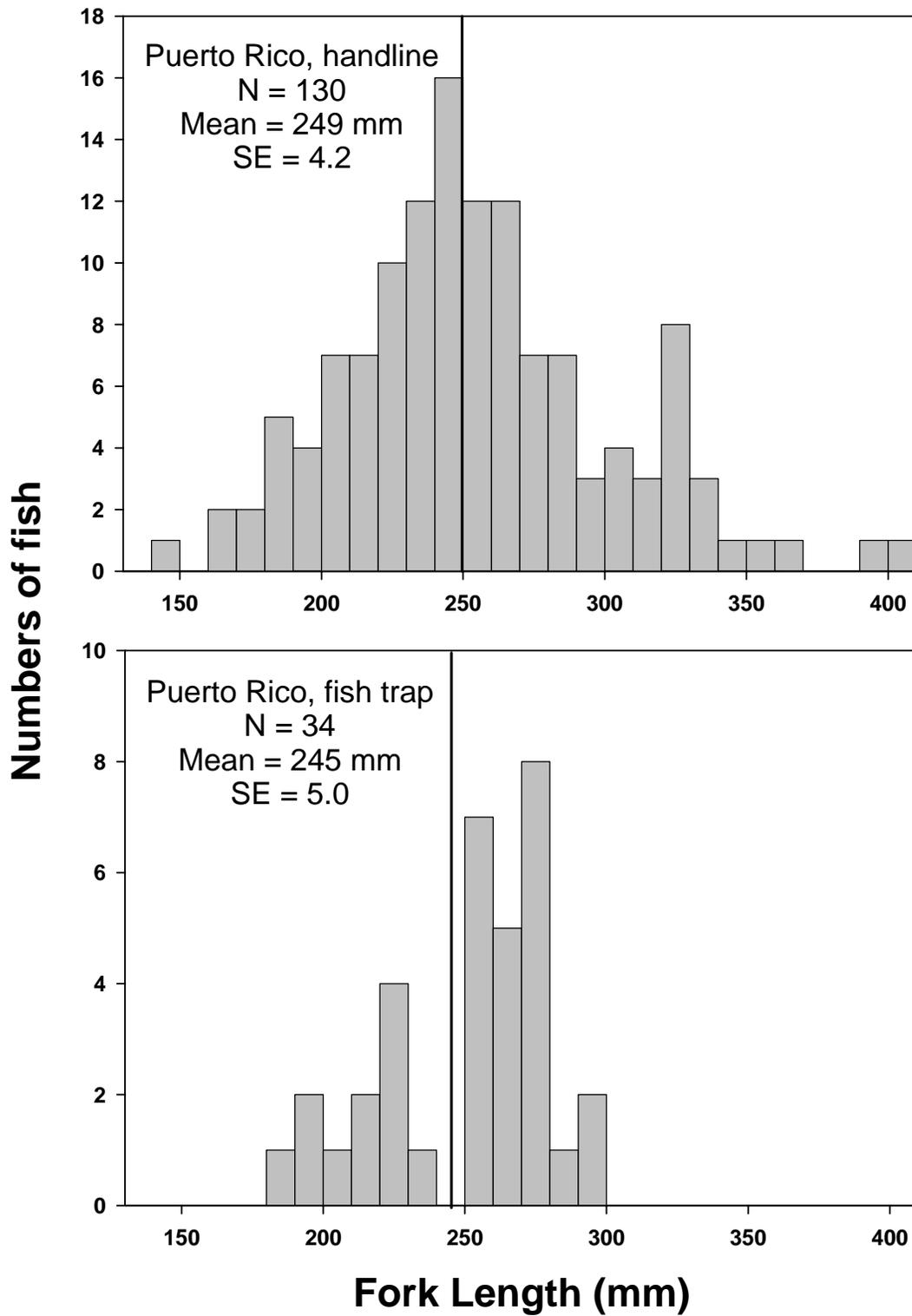




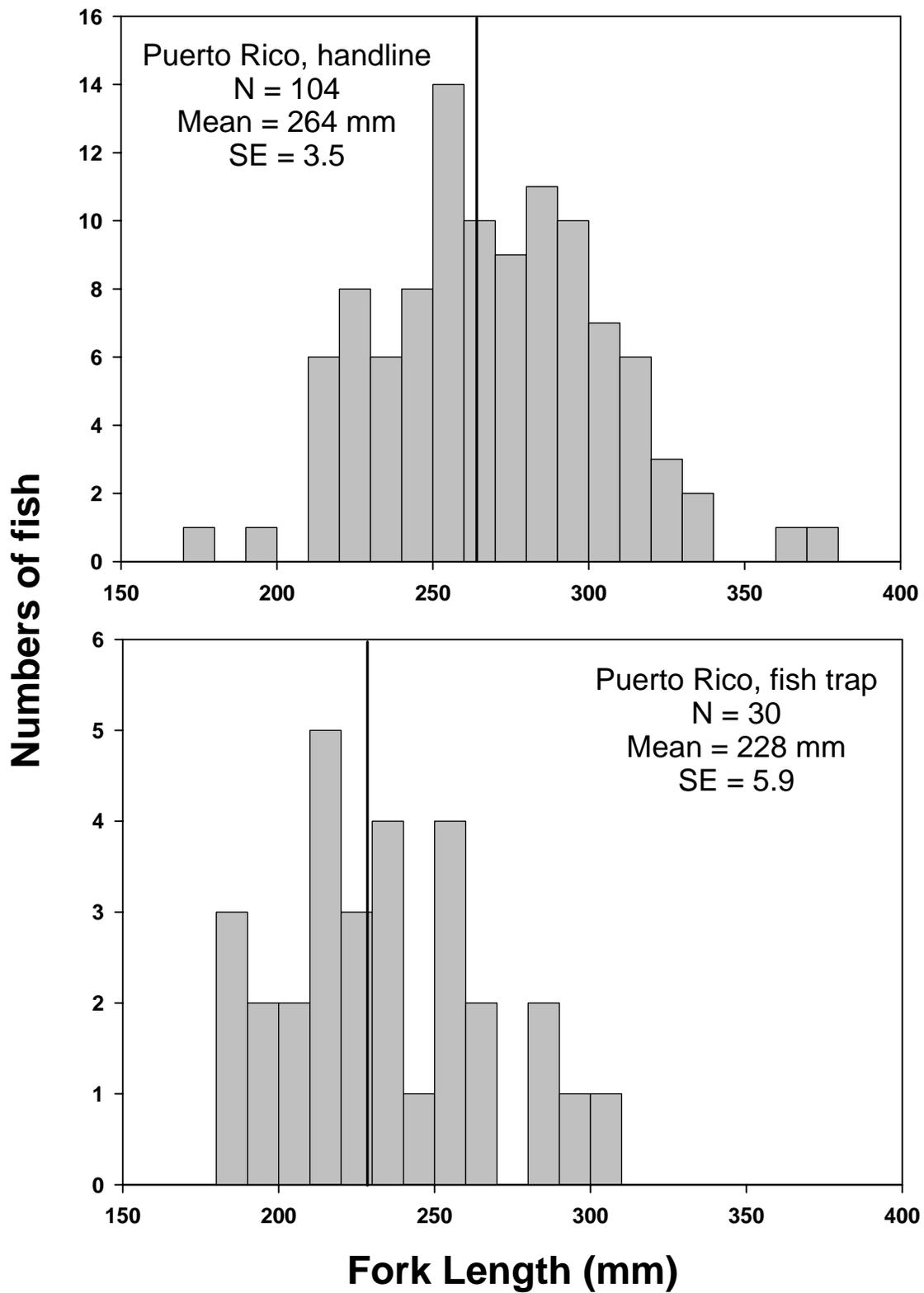
Carib- Figure 34. a) length and b) weight means, median, 90 percentile, and 80 percentile of sampled silk snapper in the St. Croix district. Dashed lines indicate length at sexual maturity for males (M) , 380 mm, and females (F) 500 mm.



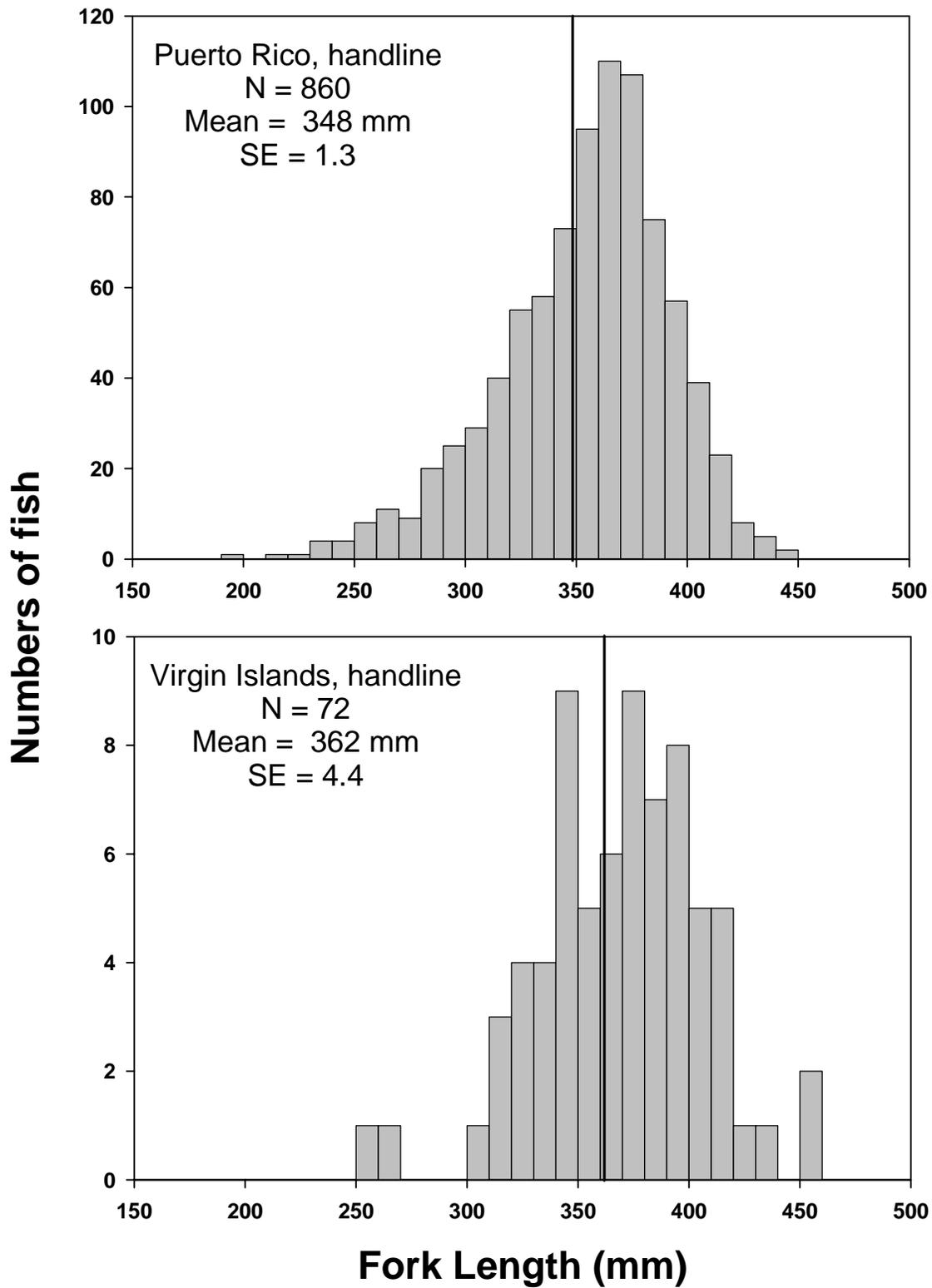
Carib- Figure 35. a) length and b) weight means, median, 90 percentile, and 80 percentile of sampled queen snapper in the St. Croix district.



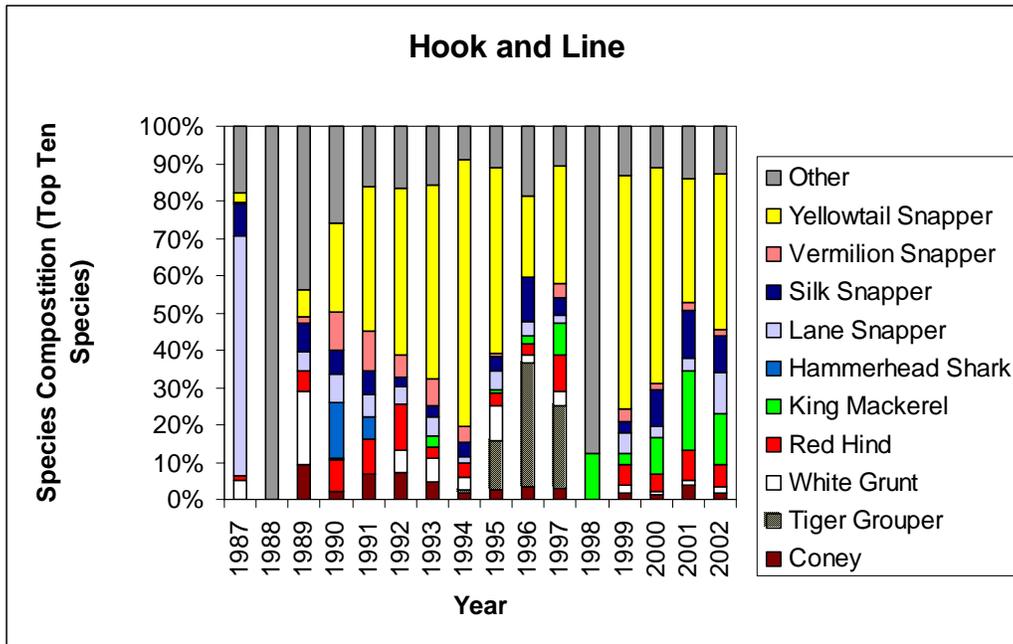
Carib- Figure 36. Length frequency distributions of silk snapper collected by (A) handlines and (B) fish traps around Puerto Rico. Vertical lines indicate means.



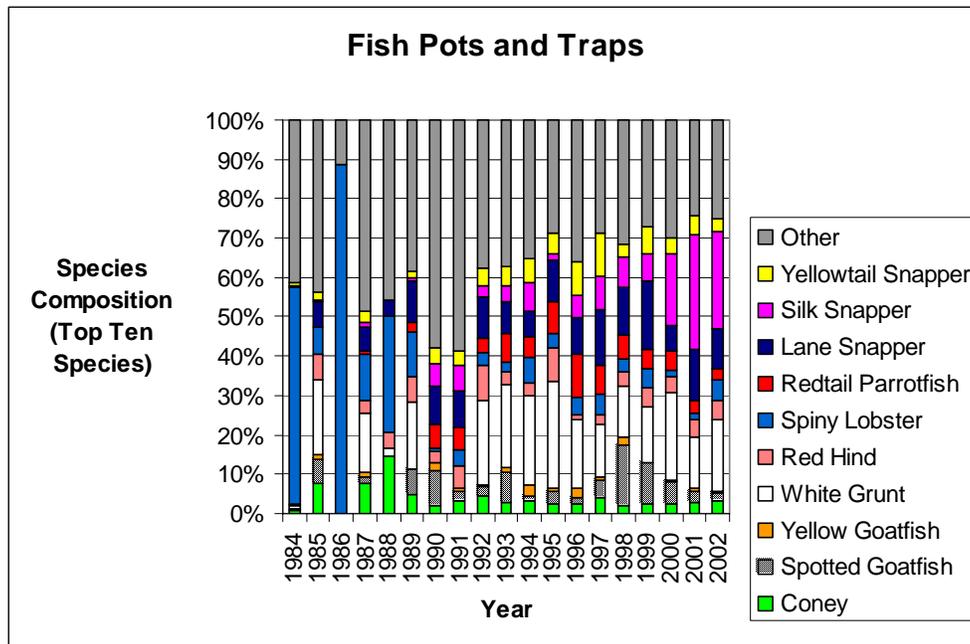
Carib- Figure 37. Length frequency distributions of blackfin snapper collected by (A) handlines and (B) fish traps around Puerto Rico. Vertical lines indicate means.



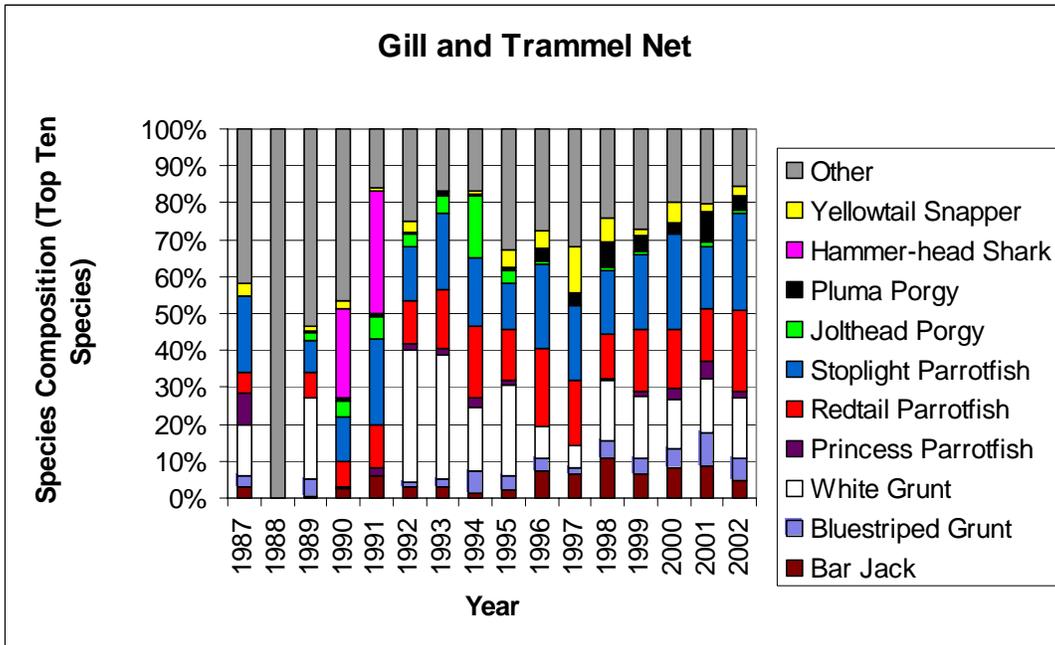
Carib- Figure 38. Length frequency distributions of sand tilefish collected by handlines around (A) Puerto Rico and (B) the U.S. Virgin Islands. Vertical lines indicate means.



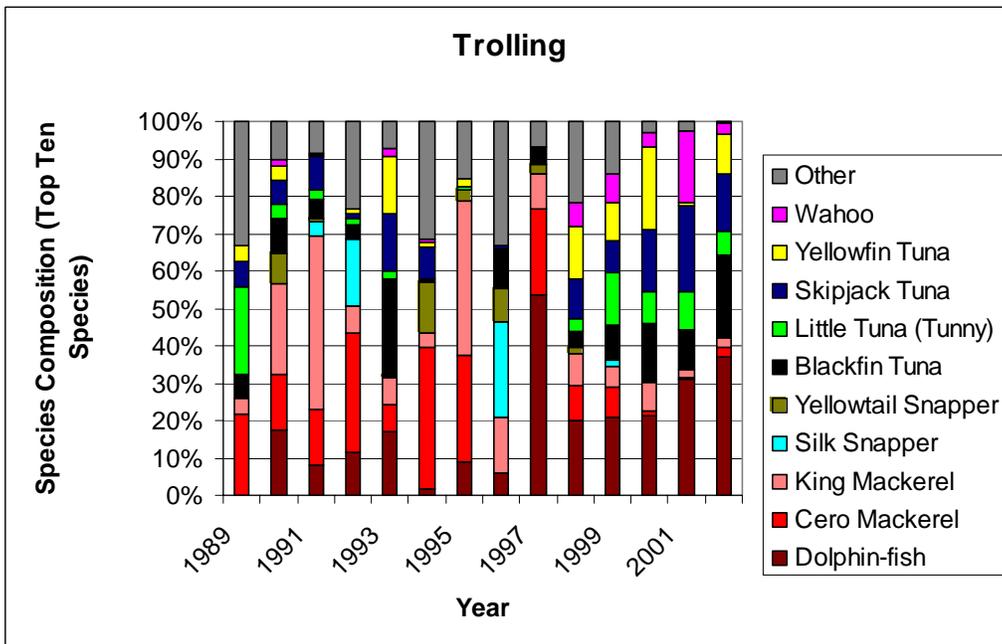
Carib- Figure 39. Annual species composition of the top ten species sampled by the Puerto Rico trip interview program (TIP) for trips that used hook and line.



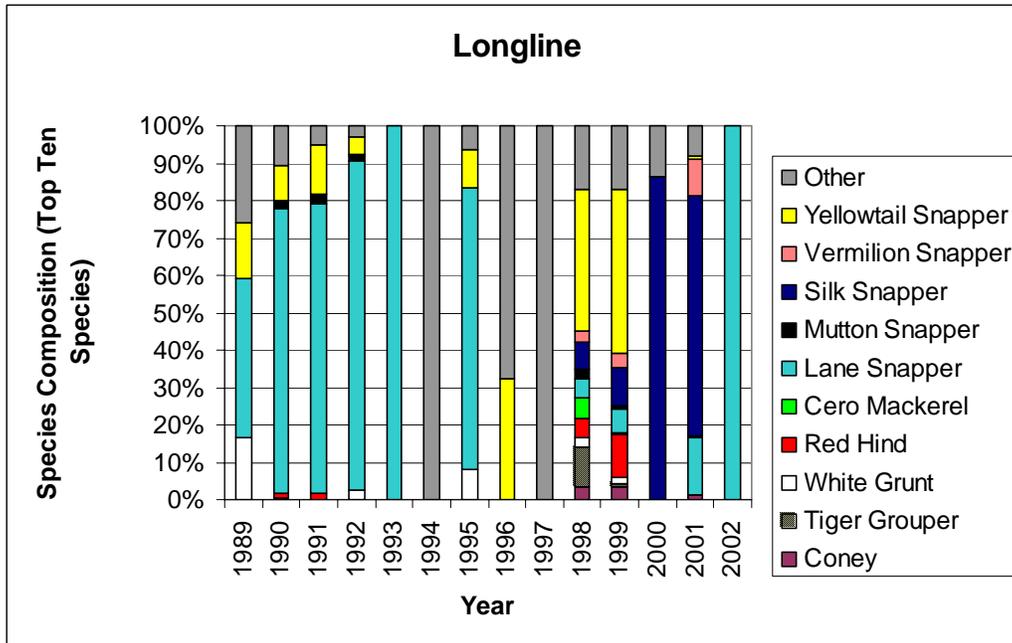
Carib- Figure 40. Annual species composition of the top ten species sampled by the Puerto Rico trip interview program (TIP) for trips that used fish pots and traps.



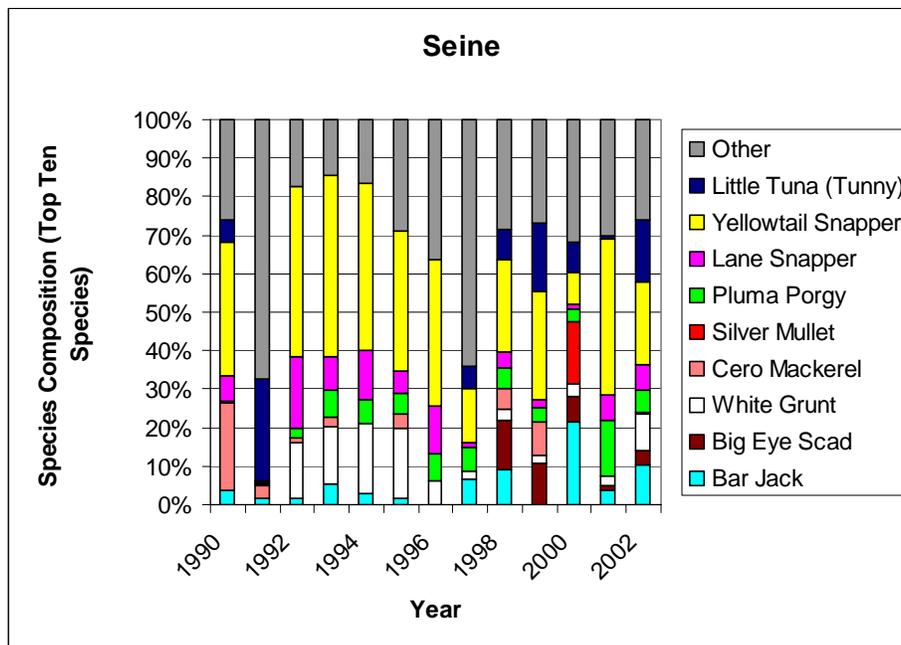
Carib- Figure 41. . Annual species composition of the top ten species sampled by the Puerto Rico trip interview program (TIP) for trips that used gill and trammel nets.



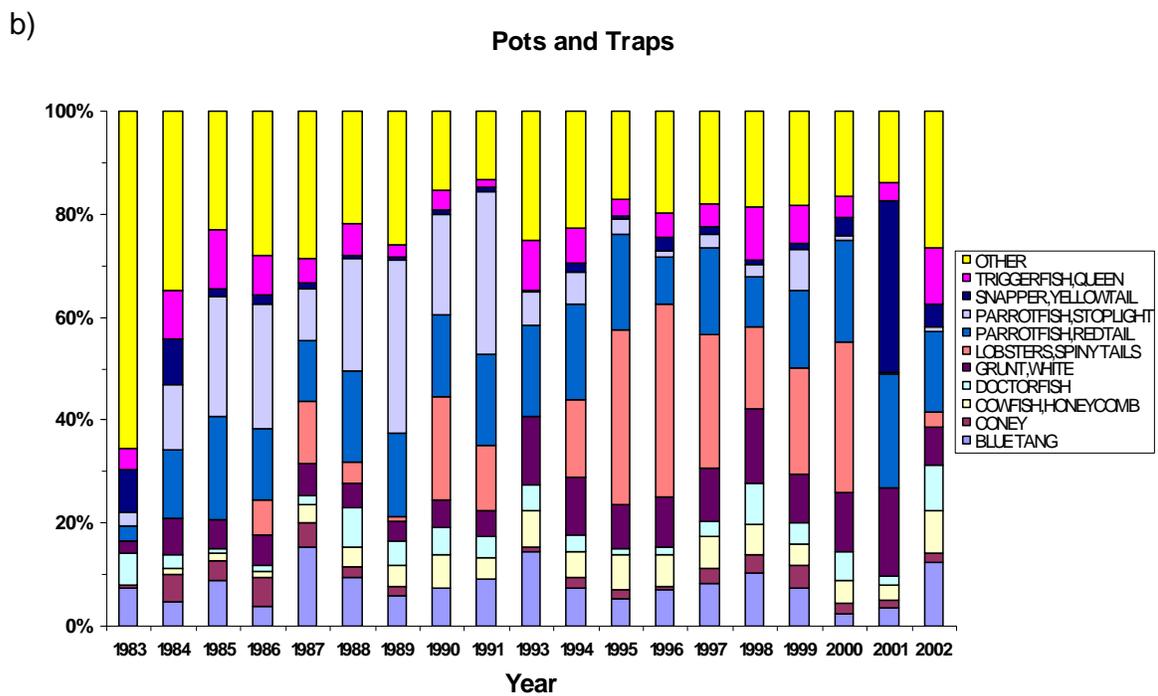
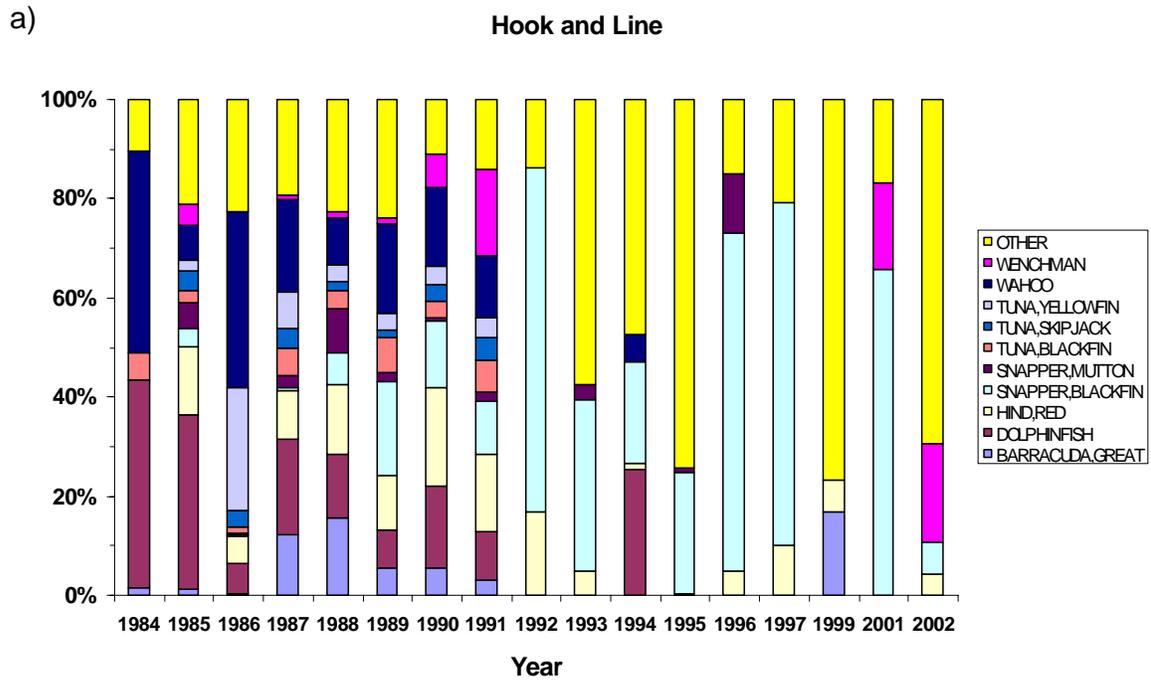
Carib- Figure 42. . Annual species composition of the top ten species sampled by the Puerto Rico trip interview program (TIP) for trips that used trolling gears.



Carib- Figure 43. Annual species composition of the top ten species sampled by the Puerto Rico trip interview program (TIP) for trips that used longlines.

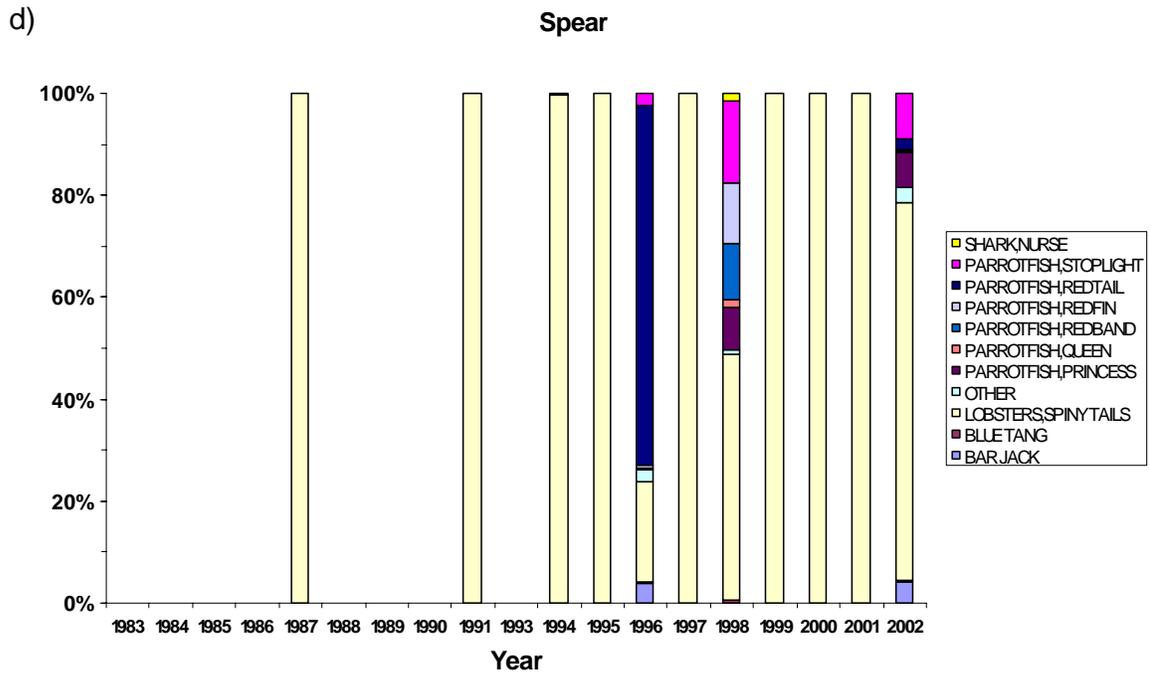
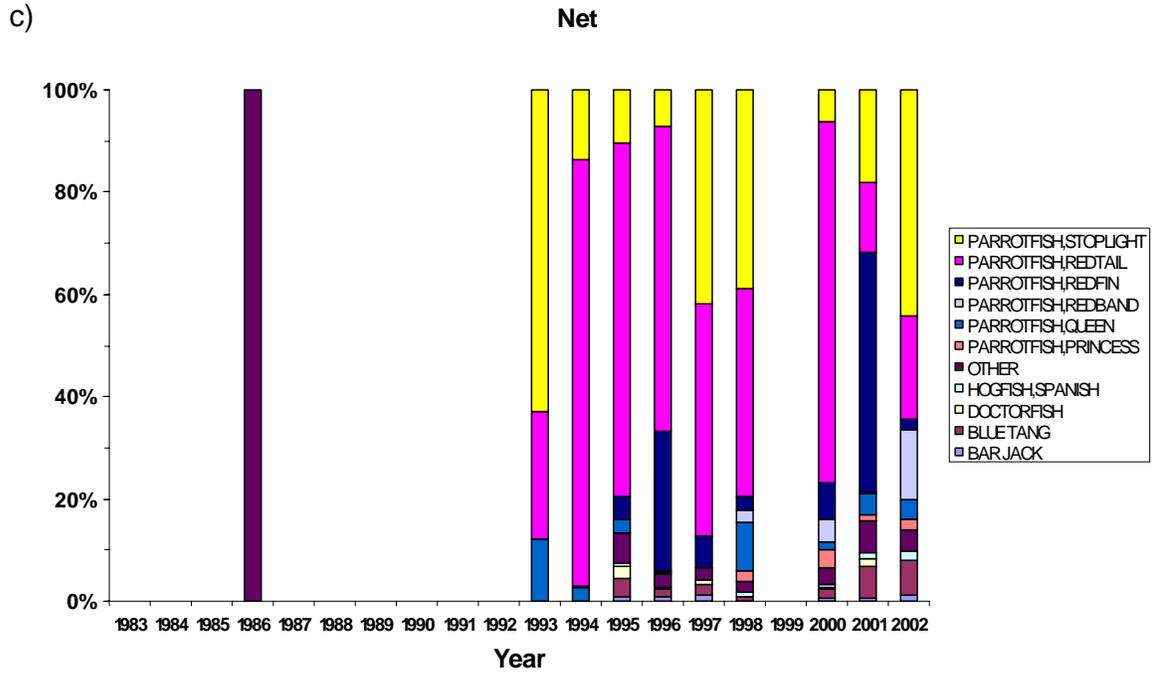


Carib- Figure 44. Annual species composition of the top ten species sampled by the Puerto Rico trip interview program (TIP) for trips that used seines.

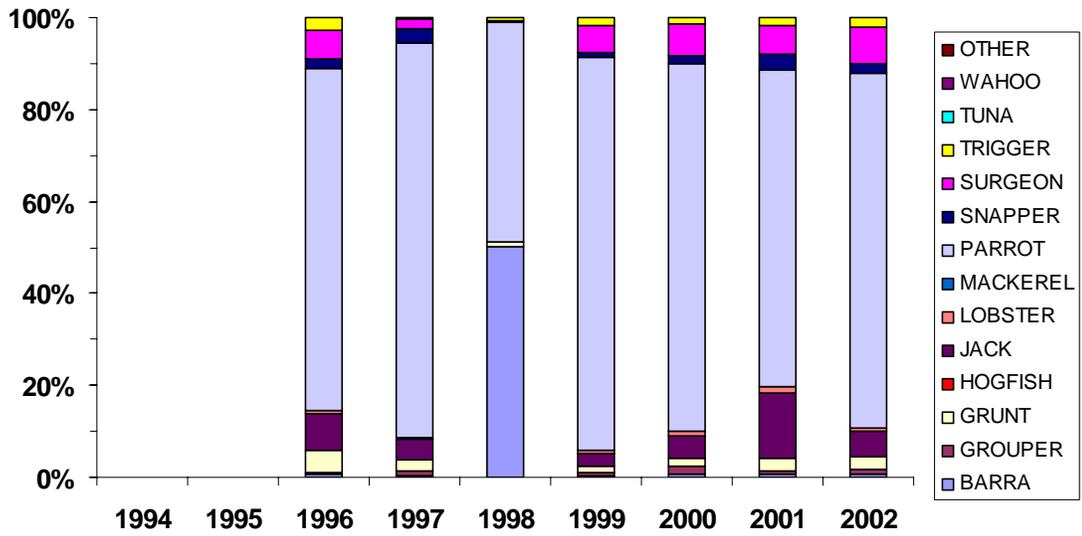


Carib- Figure 45. Percentages of the ten species with the highest percentages by year and gear. Refer to text for an explanation of estimation procedures

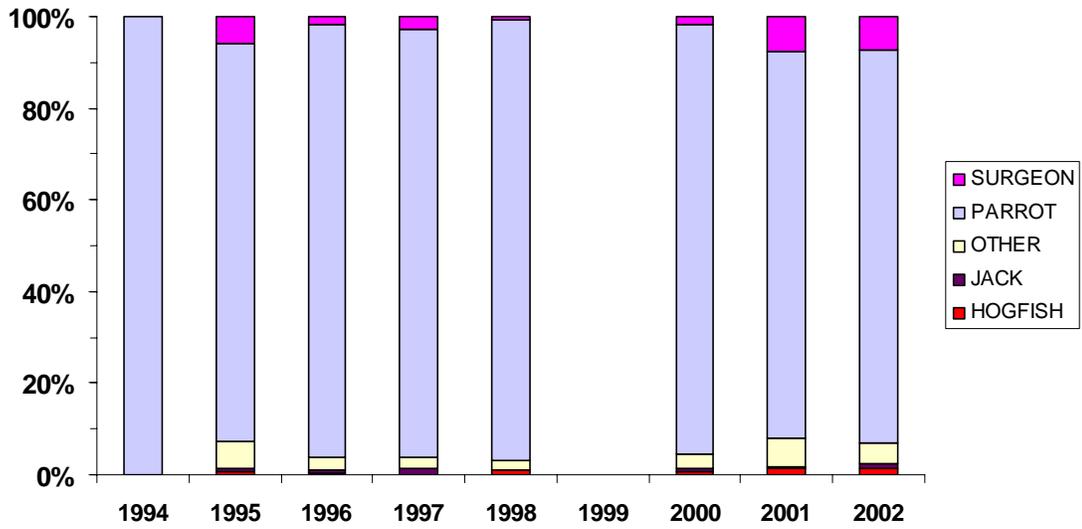
Carib- Figure 45 (continued)



GILL - reported land.



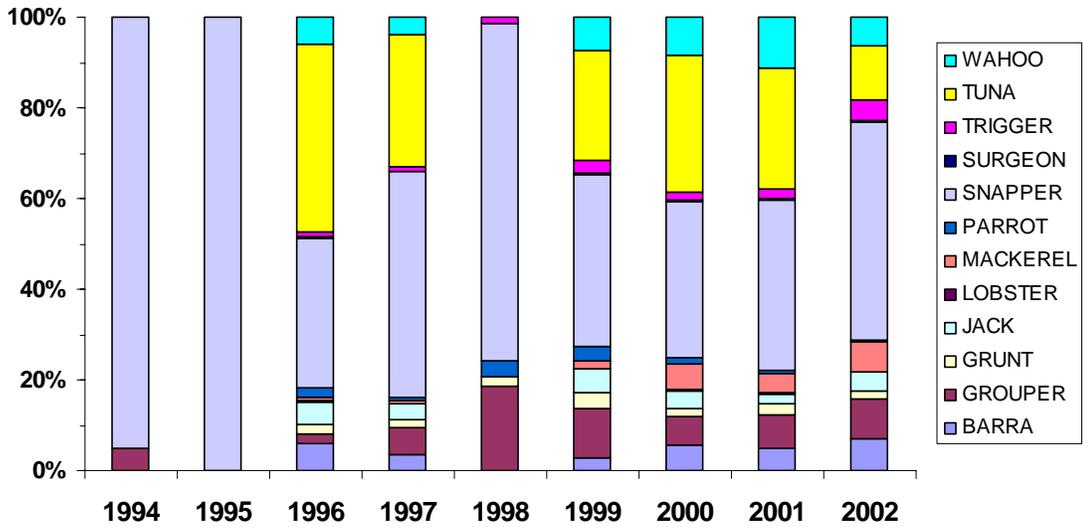
Gill - TIP



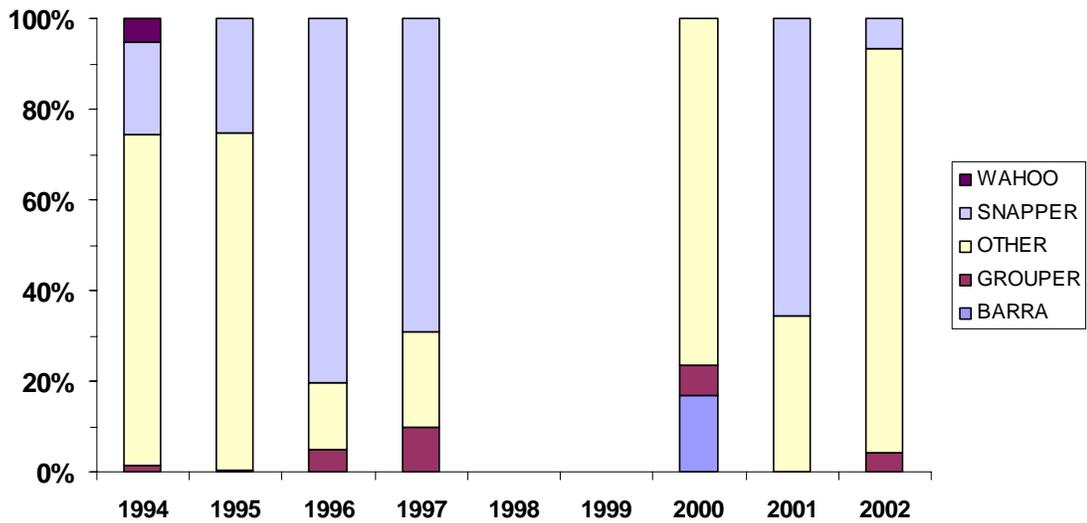
Carib- Figure 46. Species composition by gear and species complex of TIP samples and reported landings.

Carib- Figure 46 (continued)

Hook and Line - reported land.

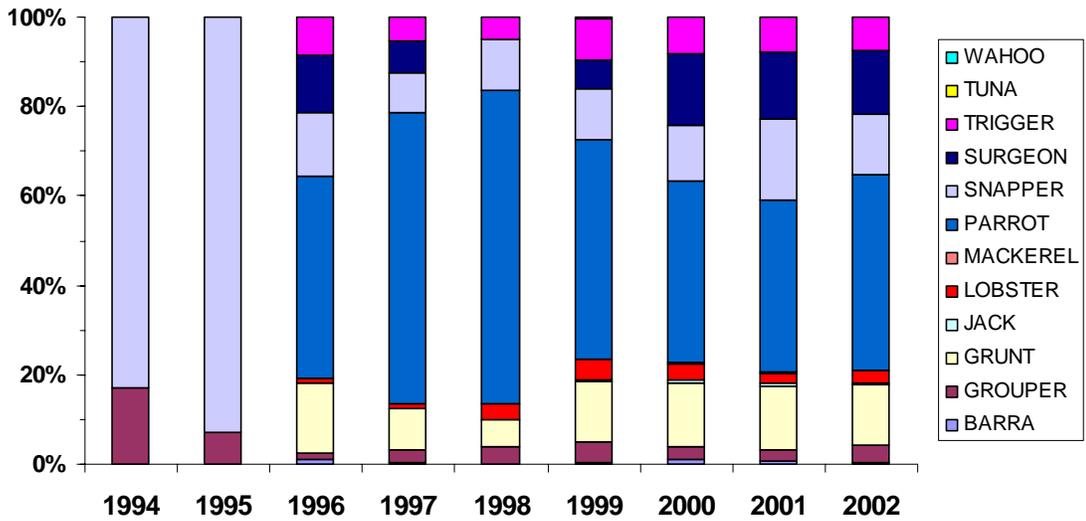


Hook and Line - TIP

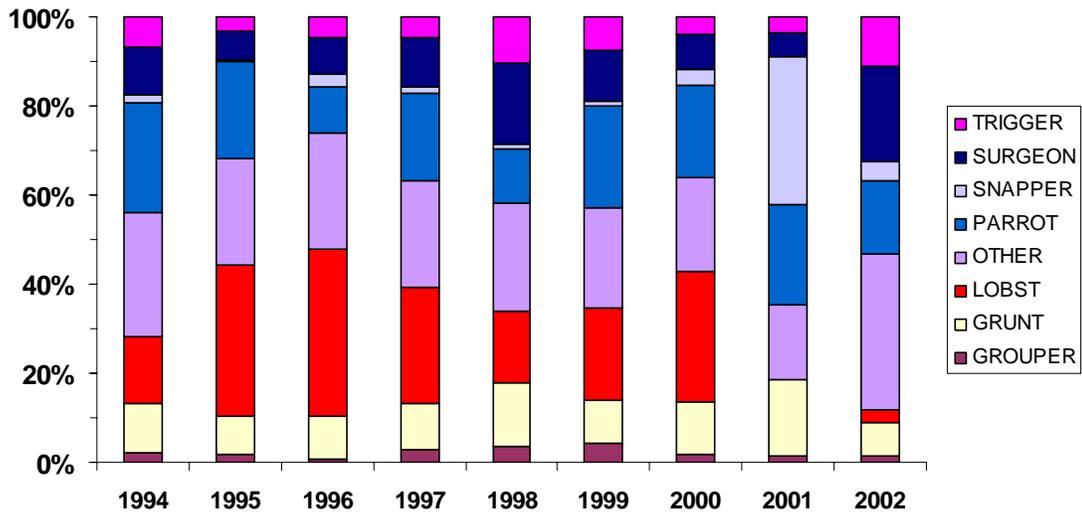


Carib- Figure 46 (continued)

Pots and Traps - reported landings

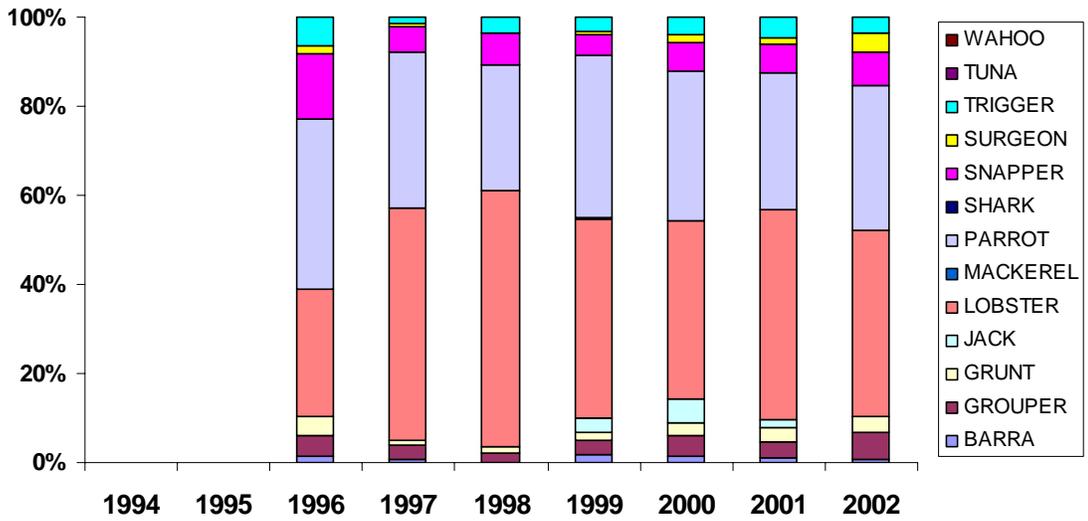


Pots and Traps - TIP

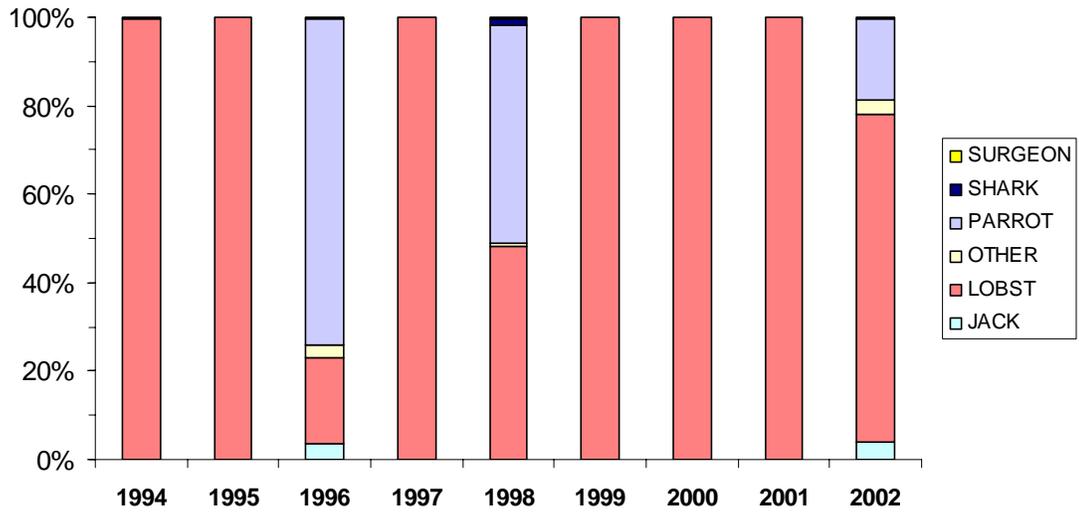


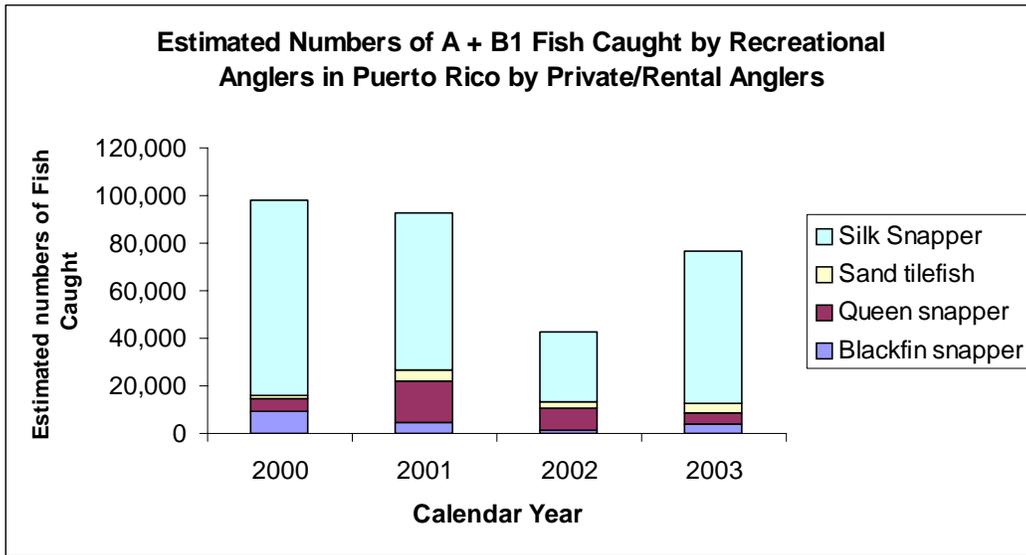
Carib- Figure 46 (continued)

Spear - reported landings

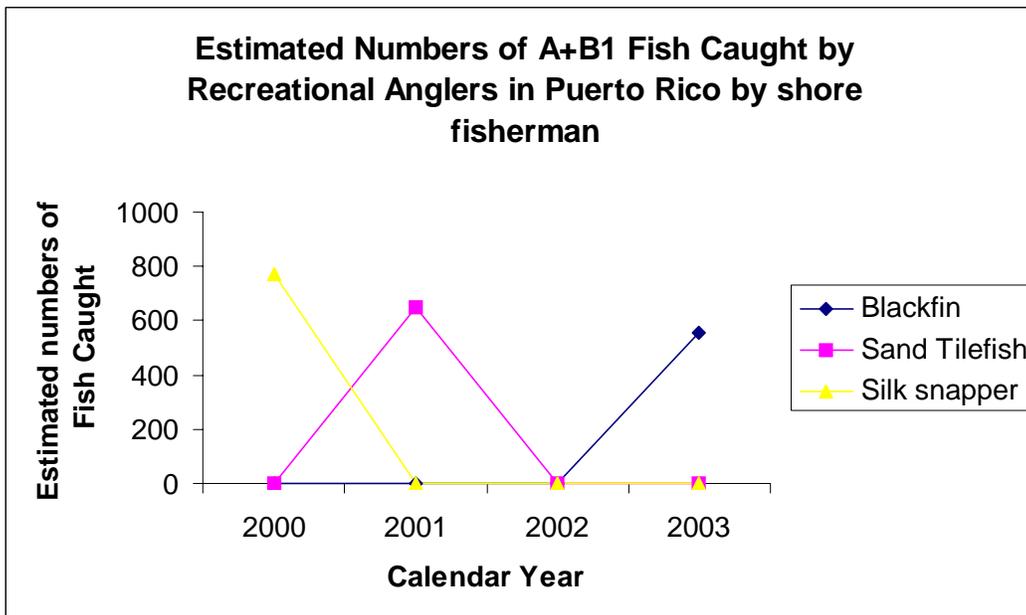


Spear - TIP

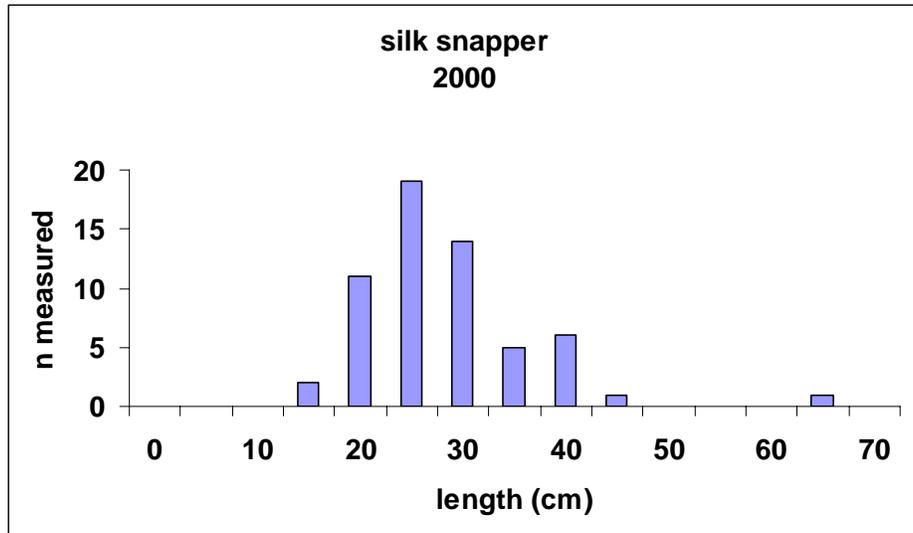




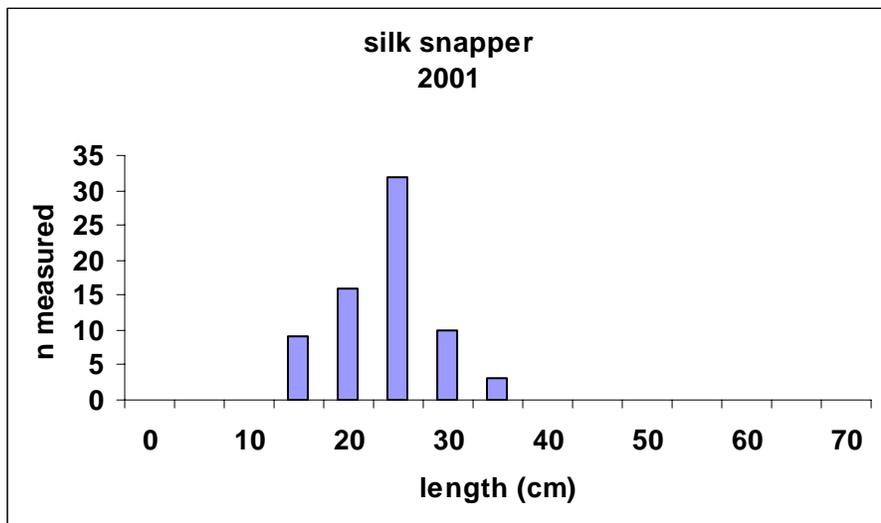
Carib- Figure 47. Estimated numbers of A+B1 fish caught by boat-based anglers (private and rental boats, there were no records for charter boats) for silk, queen, and blackfin snapper, and sand tilefish in Puerto Rico, 2000-2003.



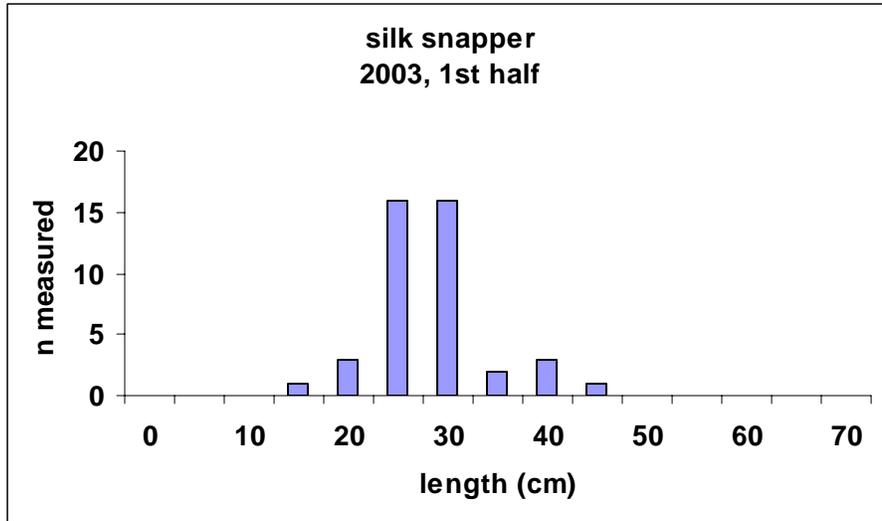
Carib- Figure 48. Estimated numbers of A+B1 fish caught by shore based anglers for silk, queen, and blackfin snapper, and sand tilefish in Puerto Rico, 2000-2003.



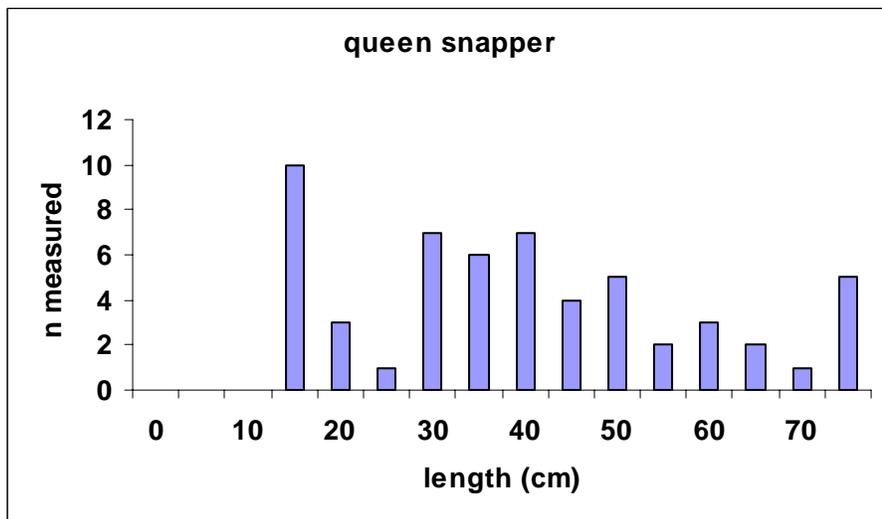
Carib- Figure 49. Size composition of silk snapper sampled during 2000 in the recreational boat-based fisheries.



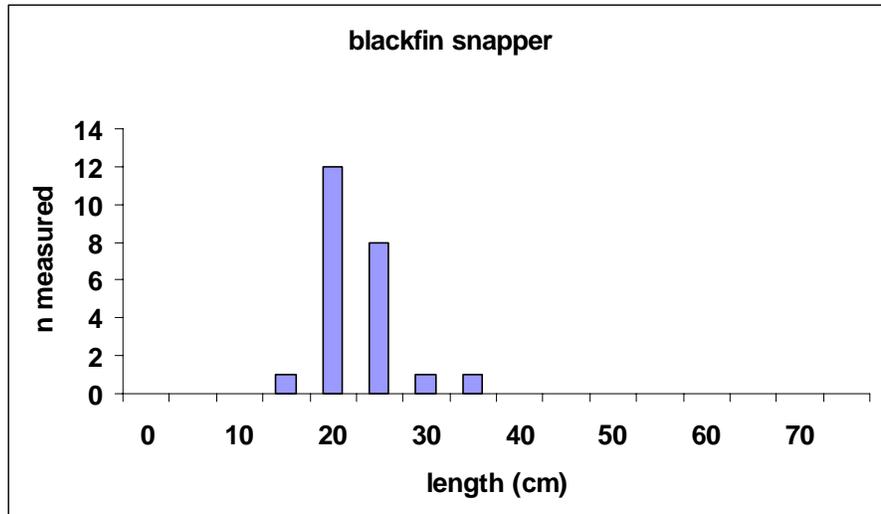
Carib- Figure 50. Size composition of silk snapper sampled during 2001 in the recreational boat-based fisheries.



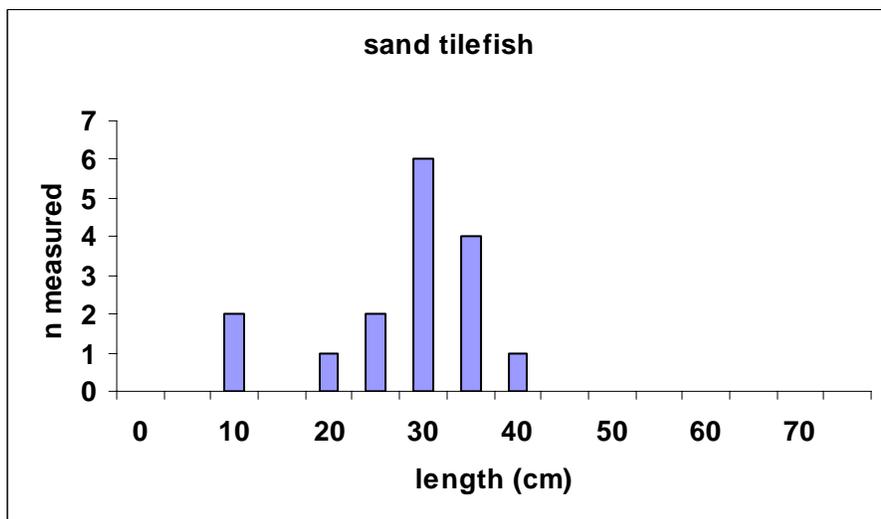
Carib- Figure 51. Size composition of silk snapper sampled during 2003 (January-June) in the recreational boat-based fisheries.



Carib- Figure 52. Size composition of queen snapper sampled between 2000 and 2003 in the recreational boat-based fisheries.



Carib- Figure 53. Size composition of blackfin snapper sampled between 2000 and 2003 in the recreational boat-based fisheries.



Carib- Figure 54. Size composition of sand tilefish sampled between 2000 and 2003 in the recreational boat-based fisheries.