

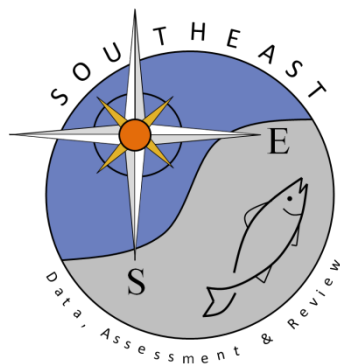
Updated landings information for the commercial fisheries in Puerto Rico with emphasis on silk and queen snapper and parrotfish fisheries

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## Abstract

### Introduction

Descriptions of the historical fisheries in Puerto Rico have been presented by a number of researchers (see Wilcox 1899, 1900; Jarvis 1932; Inigo and Juhl 1968, Anon. circa 1980 cited in Cummings and Matos-Caraballo 2009). Cummings and Matos-Caraballo (2009) provided a useful chronology to the development of Puerto Rican fisheries and a brief synopsis from that report is included here as aid into understanding the development of the island's fisheries, which are characterized by four distinct periods.

*Periods I:* The early period (late 1800's to end of WW II) consisted of mainly subsistence fishing.

Period II. The second period, from the mid 1940's through the early 1950's marks the beginning of the commercial fishing. This period was one of infrastructure development (fish processing and storage facilities, a low scale effort into high seas fishing explorations, and construction of a fishery research laboratory in Mayaguez.

*Period III:* A third period, from the 1950's - late 1970's, was characterized as one of continued infrastructure development particularly geared towards training of fishers, development of fishing centers, intense gear development and marketing research. The focus was on developing the shelf/sill and shelf edge fisheries and increasing the overall productivity of the coastal fisheries. Matos-Caraballo (2008) reported that nominal trap effort rose by over 300% between 1976 and 1981 and that reported landings increased from 4.9 million pounds to 7.4 million pounds (Figure 1, Cummings and Matos-Caraballo, 2009) Much of the development during the third period was conducted through programs implemented by the fisheries laboratories and sponsored through the government. During this period, around 1967 a statistical reporting system was also implemented with the intent of quantifying the fisheries production. Also, around this time (early 1970's), a dramatic increase in the ability of local fishermen to fish deeper and further from the coast resulted in increased landings in Puerto Rico, although not all the landings are believed to have come from Puerto Rico waters. Matos-Caraballo (2008) reported that 12-15 Puerto Rico vessels from Cabo Rojo (Puerto Real) about 40-55 feet in length fished off Bahamas, Turk and Caicos and Dominican Republic. During the late 1980's however, Puerto Rican vessels were prohibited from fishing the waters of the Bahamas, Turks and Caicos and the Dominican Republic; subsequent fisheries landings levels dropped as well, reported landings were 6.5 million pounds in 1980 declining to 2.0 million pounds in 1992.

*Period IV:* The fourth period of fisheries in Puerto Rico is from the late 1980's through the current time. From 1990, Puerto Rico's commercial fisheries have been studied by the Fisheries Research Laboratory of the Department of Natural Environment al Resources (DNER) and management is through DNER. CODREMAR was no longer in existence. All fishery management was transferred to the DNER, thru Law 61 of August 23, 1991. The mentioned law assigns the FRL to work under the DNER authority. During this current period emphasis has been on refining the statistical data collection activities enabling the mangers to evaluate the current production of the local fisheries. These activities have included expanding the port

sampling activities, conducting fisher census's to quantify the current industry, and increasing port sampling throughout the island. In addition, focus has been on development of regulations aimed at maintaining the sustainability of Puerto Rico's marine resources. Matos-Caraballo (2008) provides a comprehensive accounting of the historical and current regulations relating to Puerto Rico's marine resource.

This report provides updated information on reported landings of all species of finfish and shellfish landed commercially in Puerto Rico from 1983-2009. In addition, updated landings profiles for three species/groups of interest to the Southeast Data and Assessment Review Workshop (SEDAR) 26 Process are provided. The three focus groups of interest to SEDAR26 were: silk and queen snapper and parrotfish family. Parrotfish are not reported at the species level in the commercial landings in Puerto Rico therefore it was necessary to use the aggregate family classification of Parrotfish family for this report. In addition, recommendations are made relating to data selection (years, gears) for use in subsequent abundance index development analyses for these three SEDAR 26 focus species/groups (silk and queen snapper and parrotfish family).

### **Available Data and Methods**

Statistical data collection systems have been in place since around 1967 in Puerto Rico (Suarez-Caabro 1975). According to Suarez-Caabro the sales ticket system was implemented in July 1967 to obtain information weight and value of fish and shellfish in Puerto Rico's coastal commercial fisheries. Computerized information on Puerto Rico's commercial fisheries exists only since 1983 however some printed records were available beginning around the late 1960's (Matos-Caraballo 2000, Suarez and Caabro 1975). Data available for stock assessment evaluations however, is continuous from 1983-2007 and various summary stratifications summaries of the information are presented here in an attempt to identify the primary commercial fisheries operating in Puerto Rico and the relative productivity of each. Sales records were obtained through voluntary reports by fishers until 1998 when reporting became mandatory through Puerto Rico Law 278 of November 29<sup>th</sup>, 1998. Commercial fishers were required to submit their landings reports to the DNER. During many of these years, the reporting was carried out through efforts of port agents to pick up the sales tickets.

A summary table describing the data attributes available for the Puerto Rico commercial fisheries was prepared (Table 1).

### **Updated Landings Results**

#### *All Fisheries*

Table 2 provides updated summary of commercial landings in Puerto Rico since 1983. Table 2a provides summarized landings by gear type. Table 2b provides the percentage breakdown of all species reported landings by gear category for all years.

## *SEDAR 26 Focus Species Landings Summary (Silk and Queen Snapper and Parrotfish family)*

*The focus species groups evaluated under the SEDAR 26 Stock assessment process were silk and queen snapper, and the parrotfish family. Tables 3 and Figure 1 provides a summary of commercial landings in Puerto Rico for the three focus study groups.*

*Tables 4a and 4b provide a summary of the parrotfish family landings by gear group and the percentage breakdown by gear group for parrotfish family landings. These data suggest that four main gears were reported landings parrotfish, gillnets, fish pots, trammel nets and dive gear. Between 1983-1991, parrotfish were mainly landed by gillnets and pots. After 1991, parrotfish were landed using gillnets, fish pots, trammel nets and gear. Dive gear were mainly important after 1997.*

*Table 5 provides the percentage composition by gear category for queen snapper landings. The reported landings data indicate that this species was landed mainly by reefish handlines, long lines and troll gear. The data indicate that the longline gear became more important in the landings of this species in the late 1990's.*

*Table 6 provides the percentage composition of landings by gear category for silk snapper landings. This species has traditionally been landed by fish pots and reefish handlines. Pots were the main gear used until around 1984, thereafter mainly reefish handlines were the predominant gear landing silk snapper.*

*Table 7 and Figure 2 provides all species commercial landings and the percentage contribution for the three SEDAR26 focus groups.*

### **Recommendations for Abundance Index Development**

#### *Parrotfish*

It is recommended to consider the following stratification in the subsequent exploration of the commercial landings data for parrotfish catch per unit of effort abundance indices. The summarized landings data indicate four primary gears of importance in the fishery (gillnets, fish pots, diver operations, and trammel nets). Separate time series should be considered for these four primary gears and then spatial (fishing center/municipality/coast) and temporal (within year-month or quarter) comprehensiveness valuated as to sufficiency for further analyses using index standardization techniques (Anova, GLM, etc.). As the relative contribution of these four gears changed over the period of years, the available time series is not expected to be equal in length, as an example dive gear are important (with annual landings by this gear category  $\geq 10\%$  by weight of the year total) 1997 and thereafter, thus inclusion of earlier years trips (mostly zero catches of parrotfish) would not be supported. There is some concern that the gear identification for some of the gill net and trammel net landings records may be confounded for years before 1988, thus if these gears are considered separately for abundance index construction, the time series should begin around 1988. Alternatively, one time series for

trammel nets and gillnets combined could be analyzed for abundance trends with the data beginning in 1983.

#### *Queen Snapper*

It is recommended to consider the following stratification in the subsequent exploration of the commercial landings data for queen snapper catch per unit of effort abundance indices. The summarized landings data indicate three primary gears of importance in the fishery (reeffish handlines, longlines, and troll gear) during the entire time series, 1983-2009. Separate time series should be considered for these three primary gears and spatial (fishing center/municipality/coast) and temporal (within year month or quarter) comprehensiveness evaluated as to sufficiency for further analyses using index standardization techniques (Anova, GLM, etc.). Previous examinations of queen snapper abundance indices (Cummings and Matos-Caraballo, 2009) presented indices for combined gears and combined spatial areas. Prior to further index development, more detailed examination of the area and gear specific observations should be done to support aggregation over these strata. The queen snapper fishery is mainly conducted off the west coast of Puerto Rico corresponding to municipalities between Cabo Rojo and Aguadilla thus the importance of more thorough examination of the spatial and temporal resolution of the index data set is warranted.

#### *Silk Snapper*

It is recommended to consider the following stratification in the subsequent exploration of the commercial landings data for silk snapper catch per unit of effort abundance indices. The summarized landings data indicate two primary gears of importance in the fishery (reeffish handlines and fish pots) over the entire time series, 1983-2009. Separate time series should be considered for each of these primary gears and spatial (fishing center/municipality/coast) and temporal (within year) comprehensiveness then evaluated as to sufficiency for further analyses using index standardization techniques (Anova, GLM, etc.). Previous examinations of silk snapper abundance indices (Cummings and Matos-Caraballo, 2009) presented indices for each of these gear groups, however observations were combined over areas of landings (e.g, fishing center). Prior to further index development, more detailed examination of the area and gear specific observations should be done to support aggregation over these strata and to aid in selection of all trips (both positive success and non-positive success) fishing the silk snapper population.

### **References**

- Cummings, Nancie J. and Daniel Matos-Caraballo. 2009. Notes Relating to the Commercial Fisheries in Puerto Rico. SEDAR SP3-09, 41pg.
- Matos-Caraballo, Daniel. 2008. Lessons learned from the Puerto Rico's Commercial fishery, 1988-2008 Proc. Gulf Caribbean Fish. Inst. 61<sup>st</sup> . Annual Session.
- Suarez-Caabro, Jose a. Pueroto Rico's fishery statistics 1968-1969. Agricultural and fisheries contributions. Vol. II (1) April 1975.



Table 1. Data attributes available for the commercial fisheries landings records in Puerto Rico.

<b>Data Attribute</b>	<b>Availability</b>	<b>How to use</b>	<b>Notes</b>
Landings	1983-2007	Quantify level of removals	Consistent through time series
Trip Effort and units of gear measures (# hours fished, # pots, etc, # lines0)	1998	1. CPUE analyses, 2. Changes in trip effort over time spatially 3. Changes in trip units of gear over time	1. Not always entered 2. further work necessary to determine quantity of effort data on the landings records (i.e., number trip records, etc..)
Depth of fishing trip	1998-	1. Investigate inshore / offshore movement of fleet 2. For 2008 and after can link to biostatistical record and examine species size distribution vs depth	Not always entered
Fisherman identification code	1983-2007	Link fisher trips	Not unique across years
Unique Trip identification	2003-2007	Link unique trips, linking began in 2003	
Computer generated trip id	1983-2002	Link unique trips	Problems in generating unique trip, dealer composite trips exist
Gear id	1983-2007	CPUE by fishery	Multiple gears occur on some trips, some result of dealer composite reports
Length samples per trip	2008 forward	Size composition of individual trips	Linking variable added to biostatistical form in 2008
Correction factors	1983-2007, some represent an interval of years, available annually, Per Daniel Matos- may be available on a region level	Expansion of reported landings to total	1. Only exist at annul level 2. Some estimates represent span of years due
Length frequency	1980-2007	1. Characterize size composition of catches 2. evaluate changes in size with depth, from 2008 on	1. Cannot link to individual landings records until 2008





Table 2. Summary of commercial landings in Puerto Rico by gear group for all species reported. Units = pounds whole weight.

YEAR	GEAR								
	<i>By Hand, Other</i>	<i>Cast Nets</i>	<i>Combined Gears</i>	<i>Diving Outfits, Other</i>	<i>Gill Nets, Other</i>	<i>Haul Seines, Beach</i>	<i>Haul Seines, Long</i>	<i>Lines Hand, Other</i>	<i>Lines Long, Reef Fish</i>
1983		16197.0	198.0	832195.0	412383.0	1095.0	212275.0	415299.0	29528.0
1984		19199.0	12.0	670741.0	338442.0	785.0	145825.0	361896.0	26416.0
1985		19012.0	2126.0	450913.0	369858.0	1280.0	103810.0	568045.0	22059.0
1986		13389.0	219.0	338266.0	364493.0	532.0	89315.0	603559.0	9844.0
1987		18401.0		261646.0	304107.0	138.0	115248.0	412079.0	12047.0
1988	5963.0	6053.0	21760.0	44120.0	266909.0	143.0	91601.0	399986.0	23410.0
1989	1888.0	8945.0	10530.0	151869.0	228807.0	474.0	125145.0	503758.0	26154.0
1990	1041.0	5751.0	1141.0	265730.0	270360.0		85416.0	463012.0	27935.0
1991	1826.0	17829.0		298190.0	326101.0	472.0	121774.0	579710.0	19830.0
1992	283.0	14996.0	26.0	228466.0	151465.0	409.0	82480.0	588828.0	18224.0
1993	191.0	13799.0	209.0	343777.0	242709.0	405.0	101854.0	768890.0	28055.0
1994	2937.0	28992.0		361170.0	311775.0	301.0	87664.0	813518.0	20124.0
1995	7396.0	30170.0	233.0	491230.0	307967.0	446.0	138941.0	1244469	40311.0
1996	11999.0	25837.0	20.0	514286.0	361889.0	534.0	119831.0	1121424	49415.0
1997	1674.0	31966.0		508470.0	453324.0	292.0	124057.0	1119129	57500.0
1998	859.0	24697.0	157.0	616394.0	401215.0	496.0	70366.0	946263.0	73949.0
1999	547.0	33219.0	16.0	555196.0	452615.0	326.0	63063.0	962795.0	66308.0
2000	228.0	32721.0	530.0	656384.0	433000.0	585.0	59834.0	947818.0	117859.0
2001	2569.0	27274.0	1140.0	625426.0	448334.0	410.0	77222.0	1040927	51736.0
2002	638.0	28055.0	1942.0	650082.0	448157.0	1159.0	84351.0	964579.0	53319.0
2003	616.0	15812.0	207.0	413594.0	260193.0	183.0	73408.0	768626.0	31725.0
2004	275.0	15862.0	758.0	457286.0	162694.0	239.0	65863.0	537641.0	24551.0
2005	1189.0	15271.0	2031.0	384806.0	88492.0		19473.0	564294.0	20942.0
2006	565.0	5728.0	2418.0	345479.0	62331.0	3.0	26822.0	468551.0	20631.0
2007	682.0	6750.0	720.0	364941.0	68074.0	407.0	8432.0	457492.0	17339.0
2008	272.0	10252.0	118.0	363514.0	79737.0		5047.0	524916.0	7278.0
2009	2951.0	6194.0	4995.0	311421.0	83299.0		20259.0	395257.0	5958.0
All	46589.0	492371.0	51506.0	11505592	7698730	11114.0	2319376	18542761	902447.0

Table 2. Continued.

YEAR	GEAR							All
	Lines Troll, Other	Pots And Traps, Crab, Other	Pots And Traps, Fish	Pots And Traps, Spiny Lobster	Rod and Reel	Spears	Trammel Nets	
1983	418256.0	2077.0	1558255	18343.0		587.0		3916688
1984	208769.0	1454.0	1354670	25400.0		689.0		3154298
1985	176500.0	1222.0	1121541	14644.0		4024.0	51.0	2855085
1986	188195.0	1190.0	905865.0	19449.0	3.0	1098.0		2535417
1987	177133.0	1616.0	764694.0	15741.0			83.0	2082933
1988	238505.0	640.0	587371.0	11327.0	2334.0	314087.0	488.0	2014697
1989	235493.0	815.0	803456.0	20178.0	298.0	160442.0	12969.0	2291221
1990	265377.0	2906.0	702237.0	15901.0	236.0	237.0	73561.0	2180841
1991	199589.0	3086.0	731537.0	15810.0	27.0	10.0	144113.0	2459904
1992	138782.0	2050.0	561205.0	8732.0	1281.0	70.0	247997.0	2045294
1993	118647.0	1219.0	607020.0	5406.0	119.0	215.0	264006.0	2496521
1994	208872.0	1068.0	698741.0	12311.0	876.0	499.0	162099.0	2710947
1995	344039.0	3439.0	824437.0	26526.0	308.0	265.0	229708.0	3689885
1996	259619.0	4515.0	785889.0	31823.0	213.0	128.0	295706.0	3583128
1997	366272.0	6019.0	831774.0	46650.0	8952.0	2197.0	247615.0	3805891
1998	332180.0	2930.0	715965.0	42096.0	3332.0	244.0	223939.0	3455082
1999	310885.0	666.0	681145.0	31920.0	3628.0	31.0	167088.0	3329448
2000	305331.0	916.0	604566.0	20027.0	4092.0	134.0	91058.0	3275083
2001	266390.0	1714.0	749059.0	35503.0	4466.0	127.0	58944.0	3391241
2002	233153.0	3053.0	689984.0	35118.0	1733.0	47.0	79208.0	3274578
2003	193169.0	1009.0	514095.0	31979.0	2238.0		84144.0	2390998
2004	153425.0	637.0	353212.0	30993.0	1206.0		62869.0	1867511
2005	165839.0	3238.0	235201.0	33607.0	954.0		33852.0	1569189
2006	121860.0	4332.0	208401.0	26414.0	22.0		47863.0	1341420
2007	126882.0	3818.0	155959.0	18307.0	15.0	17.0	26829.0	1256664
2008	88415.0	2521.0	137527.0	20564.0	4090.0		21981.0	1266232
2009	96973.0	2117.0	158458.0	29843.0	9637.0		28052.0	1155414
All	5938550	60267.0	18042264	644612.0	50060.0	485148.0	2604223	69395610

Table 2b. Commercial landings summary for all species reported. Units are percentage of pounds by year and gear category.

YEAR	<i>FISHERY</i>						
	<i>By Hand, Other</i>	<i>Cast Nets</i>	<i>Combined Gears</i>	<i>Diving Outfits, Other</i>	<i>Gill Nets, Other</i>	<i>Haul Seines, Beach</i>	<i>Haul Seines, Long</i>
1983		0.4	0.0	21.2	10.5	0.0	5.4
1984		0.6	0.0	21.3	10.7	0.0	4.6
1985		0.7	0.1	15.8	13.0	0.0	3.6
1986		0.5	0.0	13.3	14.4	0.0	3.5
1987		0.9		12.6	14.6	0.0	5.5
1988	0.3	0.3	1.1	2.2	13.2	0.0	4.5
1989	0.1	0.4	0.5	6.6	10.0	0.0	5.5
1990	0.0	0.3	0.1	12.2	12.4		3.9
1991	0.1	0.7		12.1	13.3	0.0	5.0
1992	0.0	0.7	0.0	11.2	7.4	0.0	4.0
1993	0.0	0.6	0.0	13.8	9.7	0.0	4.1
1994	0.1	1.1		13.3	11.5	0.0	3.2
1995	0.2	0.8	0.0	13.3	8.3	0.0	3.8
1996	0.3	0.7	0.0	14.4	10.1	0.0	3.3
1997	0.0	0.8		13.4	11.9	0.0	3.3
1998	0.0	0.7	0.0	17.8	11.6	0.0	2.0
1999	0.0	1.0	0.0	16.7	13.6	0.0	1.9
2000	0.0	1.0	0.0	20.0	13.2	0.0	1.8
2001	0.1	0.8	0.0	18.4	13.2	0.0	2.3
2002	0.0	0.9	0.1	19.9	13.7	0.0	2.6
2003	0.0	0.7	0.0	17.3	10.9	0.0	3.1
2004	0.0	0.8	0.0	24.5	8.7	0.0	3.5
2005	0.1	1.0	0.1	24.5	5.6		1.2
2006	0.0	0.4	0.2	25.8	4.6	0.0	2.0
2007	0.1	0.5	0.1	29.0	5.4	0.0	0.7
2008	0.0	0.8	0.0	28.7	6.3		0.4
2009	0.3	0.5	0.4	27.0	7.2		1.8
All	0.1	0.7	0.1	16.6	11.1	0.0	3.3

Table 2b. Continued (Percentage breakdown of all species commercial landings by gear category).

YEAR	GEAR						
	<i>Lines Hand, Other</i>	<i>Lines Long, Reef Fish</i>	<i>Lines Troll, Other</i>	<i>Pots And Traps, Crab, Other</i>	<i>Pots And Traps, Fish</i>	<i>Pots And Traps, Spiny Lobster</i>	<i>Rod and Reel</i>
1983	10.6	0.8	10.7	0.1	39.8	0.5	
1984	11.5	0.8	6.6	0.0	42.9	0.8	
1985	19.9	0.8	6.2	0.0	39.3	0.5	
1986	23.8	0.4	7.4	0.0	35.7	0.8	0.0
1987	19.8	0.6	8.5	0.1	36.7	0.8	
1988	19.9	1.2	11.8	0.0	29.2	0.6	0.1
1989	22.0	1.1	10.3	0.0	35.1	0.9	0.0
1990	21.2	1.3	12.2	0.1	32.2	0.7	0.0
1991	23.6	0.8	8.1	0.1	29.7	0.6	0.0
1992	28.8	0.9	6.8	0.1	27.4	0.4	0.1
1993	30.8	1.1	4.8	0.0	24.3	0.2	0.0
1994	30.0	0.7	7.7	0.0	25.8	0.5	0.0
1995	33.7	1.1	9.3	0.1	22.3	0.7	0.0
1996	31.3	1.4	7.2	0.1	21.9	0.9	0.0
1997	29.4	1.5	9.6	0.2	21.9	1.2	0.2
1998	27.4	2.1	9.6	0.1	20.7	1.2	0.1
1999	28.9	2.0	9.3	0.0	20.5	1.0	0.1
2000	28.9	3.6	9.3	0.0	18.5	0.6	0.1
2001	30.7	1.5	7.9	0.1	22.1	1.0	0.1
2002	29.5	1.6	7.1	0.1	21.1	1.1	0.1
2003	32.1	1.3	8.1	0.0	21.5	1.3	0.1
2004	28.8	1.3	8.2	0.0	18.9	1.7	0.1
2005	36.0	1.3	10.6	0.2	15.0	2.1	0.1
2006	34.9	1.5	9.1	0.3	15.5	2.0	0.0
2007	36.4	1.4	10.1	0.3	12.4	1.5	0.0
2008	41.5	0.6	7.0	0.2	10.9	1.6	0.3
2009	34.2	0.5	8.4	0.2	13.7	2.6	0.8
All	26.7	1.3	8.6	0.1	26.0	0.9	0.1

Table 2b. Continued.

<i>YEAR</i>	<i>GEAR</i>		
	<i>Spears</i>	<i>Trammel Nets</i>	<i>All</i>
1983	0.0		100.0
1984	0.0		100.0
1985	0.1	0.0	100.0
1986	0.0		100.0
1987		0.0	100.0
1988	15.6	0.0	100.0
1989	7.0	0.6	100.0
1990	0.0	3.4	100.0
1991	0.0	5.9	100.0
1992	0.0	12.1	100.0
1993	0.0	10.6	100.0
1994	0.0	6.0	100.0
1995	0.0	6.2	100.0
1996	0.0	8.3	100.0
1997	0.1	6.5	100.0
1998	0.0	6.5	100.0
1999	0.0	5.0	100.0
2000	0.0	2.8	100.0
2001	0.0	1.7	100.0
2002	0.0	2.4	100.0
2003		3.5	100.0
2004		3.4	100.0
2005		2.2	100.0
2006		3.6	100.0
2007	0.0	2.1	100.0
2008		1.7	100.0
2009		2.4	100.0
<i>All</i>	0.7	3.8	100.0

Table 3. Reported commercial landings of silk and queen snapper and parrotfish group in Puerto Rico 1983-2009, SEDAR26 focus species. Preliminary information. Data presented = number reported landings observations (N) and reported pounds (whole weight). Landings are reported (not expanded).

Year	Parrotfishes		Queen snapper		Silk snapper		All three species groups	
	#Reports	Pounds	#Reports	Pounds	# Reports	Pounds	#Reports	Pounds
1983	2,677	233,579	.	.	3,860	396,343	6,537	629,922
1984	1,698	231,387	.	.	2,713	357,156	4,411	588,543
1985	2,105	221,378	.	.	2,403	371,827	4,508	593,205
1986	1,763	105,546	.	.	2,664	356,899	4,427	462,445
1987	1,370	76,854	38	4,379	2,659	207,063	4,067	288,296
1988	265	12,208	209	14,763	2,232	170,034	2,706	197,005
1989	71	4,279	214	15,405	2,988	245,961	3,273	265,645
1990	470	36,849	220	11,390	2,303	176,884	2,993	225,123
1991	914	68,059	451	17,780	3,242	167,230	4,607	253,069
1992	1,134	91,932	492	25,285	3,004	207,966	4,630	325,183
1993	1,171	160,187	555	32,346	3,075	244,065	4,801	436,598
1994	1,549	115,750	496	27,765	3,826	338,852	5,871	482,367
1995	2,017	79,881	581	34,138	4,595	363,300	7,193	477,319
1996	2,547	102,799	575	36,685	4,340	311,324	7,462	450,808
1997	2,713	110,944	560	38,778	4,051	285,787	7,324	435,509
1998	2,433	97,503	567	46,073	3,779	209,384	6,779	352,960
1999	2,403	80,547	699	66,695	3,601	224,818	6,703	372,060
2000	3,054	74,041	761	82,869	3,493	188,270	7,308	345,180
2001	3,665	96,762	906	102,138	5,029	266,851	9,600	465,751
2002	3,172	107,485	838	110,061	4,637	198,148	8,647	415,694
2003	3,277	69,229	1,584	127,015	4,921	170,012	9,782	366,256
2004	2,488	51,152	1,068	79,553	3,634	118,997	7,190	249,702
2005	1,644	31,157	1,376	156,755	2,883	110,525	5,903	298,437
2006	1,792	31,922	1,032	102,889	2,291	83,399	5,115	218,210
2007	1,858	33,742	1,125	111,130	1,709	68,364	4,692	213,236
2008	1,740	28,134	1,290	137,292	2,185	108,634	5,215	274,060
2009	1,969	28,353	1,088	110,275	1,852	83,360	4,909	221,988
All Years	51,959	2,381,659	16,725	1,491,459	87,969	6,031,453	156,653	9,904,571

Table 4a. Reported landings of parrotfish family by gear category, 1983-2009.

YEAR	GEAR								
	Cast Nets	Combined Gears	Diving Outfits, Other	Gill Nets, Other	Haul Seines, Beach	Haul Seines, Long	Lines Hand, Other	Lines Long, Reef Fish	Lines Troll, Other
1983			2457.00	93833.00		3128.00	938.00		24.00
1984	7.00		1359.00	95378.00		1038.00	1370.00	36.00	7.00
1985	4.00		1478.00	76458.00		3612.00	3577.00	82.00	410.00
1986			1706.00	42901.00		547.00	2517.00		55.00
1987	345.00		2162.00	35462.00		2253.00	1448.00		35.00
1988		176.00	223.00	7271.00		92.00	1234.00		7.00
1989			81.00	2668.00		315.00	39.00		
1990			2410.00	19071.00		573.00	122.00	5.00	
1991			2705.00	27143.00		621.00	1552.00	4.00	3.00
1992			8660.00	1827.00		1599.00	331.00	28.00	9.00
1993	5.00		4930.00	46284.00		653.00	2094.00	34.00	182.00
1994			10453.00	57973.00	36.00	349.00	6177.00	26.00	104.00
1995	8.00		7677.00	14633.00		1852.00	5709.00	47.00	45.00
1996	62.00		8349.00	22369.00		1751.00	4525.00	52.00	275.00
1997	135.00		17114.00	25912.00		1489.00	3492.00	47.00	15.00
1998	95.00		15268.00	15726.00		253.00	4599.00	35.00	50.00
1999	318.00		17617.00	18869.00	71.00	110.00	3831.00	6.00	230.00
2000	12.00		21201.00	20974.00		185.00	4546.00		7.00
2001	344.00		24289.00	21047.00		814.00	8772.00	31.00	558.00
2002	90.00		21695.00	19321.00	164.00	1314.00	5117.00		32.00
2003	30.00		8133.00	9745.00	27.00	10754.00	1636.00	4.00	
2004			5309.00	9978.00		4331.00	1154.00	35.00	
2005			2205.00	5099.00		1083.00	1439.00	9.00	15.00
2006			3538.00	7296.00		604.00	1191.00	2.00	1352.00
2007			10507.00	3195.00		232.00	2430.00	12.00	1266.00
2008			7882.00	3373.00		1118.00	4747.00	6.00	440.00
2009			8266.00	1973.00		551.00	6990.00		1040.00
All	1455.00	176.00	217674.0	705779.0	298.00	41221.00	81577.00	501.00	6161.00



Table 4a. Continued (parrotfish landings summary by gear).

YEAR	GEAR						All
	Pots And Traps, Crab, Other	Pots And Traps, Fish	Pots And Traps, Spiny Lobster	Rod and Reel	Spears	Trammel Nets	
1983		133191.0	8.00				233579.0
1984		132136.0	51.00		5.00		231387.0
1985		135687.0	28.00		42.00		221378.0
1986		57416.00			404.00		105546.0
1987		35149.00					76854.00
1988		2702.00	17.00		375.00	111.00	12208.00
1989		999.00			144.00	33.00	4279.00
1990		8923.00				5745.00	36849.00
1991	360.00	9470.00				26201.00	68059.00
1992		8489.00	50.00			70939.00	91932.00
1993		9443.00	7.00			96555.00	160187.0
1994		10729.00				29903.00	115750.0
1995		16440.00	20.00			33450.00	79881.00
1996		20381.00	30.00			45005.00	102799.0
1997	90.00	21784.00	24.00			40842.00	110944.0
1998		24643.00				36834.00	97503.00
1999		20218.00	45.00			19232.00	80547.00
2000		19296.00		12.00		7808.00	74041.00
2001		22780.00	17.00			18110.00	96762.00
2002		27554.00				32198.00	107485.0
2003		18901.00				19999.00	69229.00
2004		14908.00				15437.00	51152.00
2005		12544.00	141.00			8622.00	31157.00
2006		9788.00	2.00			8149.00	31922.00
2007		9409.00	20.00		4.00	6667.00	33742.00
2008		6227.00		15.00		4326.00	28134.00
2009		6581.00	430.00	15.00		2507.00	28353.00
All	450.00	795788.0	890.00	42.00	974.00	528673.0	2381659

Table 4b. Percentage composition of parrotfish family landings by gear group.

YEAR	Gear							
	Cast Nets	Combined Gears	Diving Outfits, Other	Gill Nets, Other	Haul Seines, Beach	Haul Seines, Long	Lines Hand, Other	Lines Long, Reef Fish
1983			1.1	40.2		1.3	0.4	
1984	0.0		0.6	41.2		0.4	0.6	0.0
1985	0.0		0.7	34.5		1.6	1.6	0.0
1986			1.6	40.6		0.5	2.4	
1987	0.4		2.8	46.1		2.9	1.9	
1988		1.4	1.8	59.6		0.8	10.1	
1989			1.9	62.4		7.4	0.9	
1990			6.5	51.8		1.6	0.3	0.0
1991			4.0	39.9		0.9	2.3	0.0
1992			9.4	2.0		1.7	0.4	0.0
1993	0.0		3.1	28.9		0.4	1.3	0.0
1994			9.0	50.1	0.0	0.3	5.3	0.0
1995	0.0		9.6	18.3		2.3	7.1	0.1
1996	0.1		8.1	21.8		1.7	4.4	0.1
1997	0.1		15.4	23.4		1.3	3.1	0.0
1998	0.1		15.7	16.1		0.3	4.7	0.0
1999	0.4		21.9	23.4	0.1	0.1	4.8	0.0
2000	0.0		28.6	28.3		0.2	6.1	
2001	0.4		25.1	21.8		0.8	9.1	0.0
2002	0.1		20.2	18.0	0.2	1.2	4.8	
2003	0.0		11.7	14.1	0.0	15.5	2.4	0.0
2004			10.4	19.5		8.5	2.3	0.1
2005			7.1	16.4		3.5	4.6	0.0
2006			11.1	22.9		1.9	3.7	0.0
2007			31.1	9.5		0.7	7.2	0.0
2008			28.0	12.0		4.0	16.9	0.0
2009			29.2	7.0		1.9	24.7	
All	0.1	0.0	9.1	29.6	0.0	1.7	3.4	0.0

Table 4b. Continued. Percentage composition of parrotfish family landings by gear group.

YEAR	GEAR							All
	Lines Troll, Other	Pots And Traps, Crab, Other	Pots And Traps, Fish	Pots And Traps, Spiny Lobster	Rod and Reel	Spears	Trammel Nets	
1983	0.0		57.0	0.0				100.0
1984	0.0		57.1	0.0		0.0		100.0
1985	0.2		61.3	0.0		0.0		100.0
1986	0.1		54.4			0.4		100.0
1987	0.0		45.7					100.0
1988	0.1		22.1	0.1		3.1	0.9	100.0
1989			23.3			3.4	0.8	100.0
1990			24.2				15.6	100.0
1991	0.0	0.5	13.9				38.5	100.0
1992	0.0		9.2	0.1			77.2	100.0
1993	0.1		5.9	0.0			60.3	100.0
1994	0.1		9.3				25.8	100.0
1995	0.1		20.6	0.0			41.9	100.0
1996	0.3		19.8	0.0			43.8	100.0
1997	0.0	0.1	19.6	0.0			36.8	100.0
1998	0.1		25.3				37.8	100.0
1999	0.3		25.1	0.1			23.9	100.0
2000	0.0		26.1		0.0		10.5	100.0
2001	0.6		23.5	0.0			18.7	100.0
2002	0.0		25.6				30.0	100.0
2003			27.3				28.9	100.0
2004			29.1				30.2	100.0
2005	0.0		40.3	0.5			27.7	100.0
2006	4.2		30.7	0.0			25.5	100.0
2007	3.8		27.9	0.1		0.0	19.8	100.0
2008	1.6		22.1		0.1		15.4	100.0
2009	3.7		23.2	1.5	0.1		8.8	100.0
All	0.3	0.0	33.4	0.0	0.0	0.0	22.2	100.0

Table 5. Reported percentage composition of queen snapper commercial landings by gear category, 1983-2009.

YEAR	GEAR						
	Cast Nets	Diving Outfits, Other	Gill Nets, Other	Haul Seines, Long	Lines Hand, Other	Lines Long, Reef Fish	Lines Troll, Other
1987	0.5				76.6		
1988		1.5	0.8		88.2		9.0
1989		0.2	0.4		82.2	11.6	4.5
1990		3.5			90.7	1.6	0.4
1991		1.2	0.3		96.3	0.7	0.3
1992	0.0	0.2	0.0		88.2		
1993	0.0		0.2	1.3	86.3		0.6
1994	0.1	0.5	0.1	0.2	88.7	0.9	2.1
1995	0.2	0.1			92.2	0.3	1.1
1996		1.2	1.6		83.9		1.1
1997	0.1	0.7	1.3	0.3	89.4	5.0	0.7
1998		1.2	0.3	2.0	68.5	24.4	1.9
1999	0.1	0.7			80.7	15.6	0.9
2000	0.1	0.4	0.1		36.1	60.0	2.8
2001	0.5	0.2	3.2	0.1	77.4	10.1	5.8
2002		5.9	0.3		88.2	0.6	2.4
2003			0.2	0.1	96.8	0.5	1.6
2004			0.1		97.4	0.3	1.8
2005			0.0	0.0	79.7	0.0	20.1
2006			0.0		82.6		16.9
2007	0.0		0.3		96.4	0.2	2.6
2008		2.0	0.5	0.1	95.7	0.0	1.7
2009		0.6	0.1		94.7	0.0	4.4
All	0.1	0.9	0.5	0.1	85.3	5.9	5.3

Table 5. Continued (Queen snapper percentage composition landings by gear).

YEAR	GEAR					All
	Pots And Traps, Fish	Pots And Traps, Spiny Lobster	Rod and Reel	Spears	Trammel Nets	
1987	22.9					100.0
1988	0.5			0.0		100.0
1989	1.1					100.0
1990	3.8					100.0
1991	1.3					100.0
1992	11.4				0.2	100.0
1993	10.0				1.6	100.0
1994	7.4					100.0
1995	6.0					100.0
1996	12.1				0.1	100.0
1997	2.5	0.1			0.1	100.0
1998	1.6		0.0			100.0
1999	2.1					100.0
2000	0.5		0.0			100.0
2001	2.7					100.0
2002	2.6				0.0	100.0
2003	0.8					100.0
2004	0.4					100.0
2005	0.1					100.0
2006	0.5					100.0
2007	0.4					100.0
2008	0.1					100.0
2009	0.0		0.1			100.0
All	1.9	0.0	0.0	0.0	0.0	100.0

Table 6. Percentage composition of commercial silk snapper landings by gear.

YEAR	GEAR							
	Cast Nets	Combined Gears	Diving Outfits, Other	Gill Nets, Other	Haul Seines, Beach	Haul Seines, Long	Lines Hand, Other	Lines Long, Reef Fish
1983	0.0		0.1	0.6	0.2	0.3	<b>25.0</b>	0.1
1984			0.2	0.6	0.2	0.2	<b>22.4</b>	
1985	0.0		0.5	0.8	0.1	0.3	<b>61.5</b>	0.1
1986	0.0		0.2	0.5	0.0	0.1	<b>88.0</b>	0.2
1987	0.1		0.3	0.5	0.0		<b>78.4</b>	1.3
1988	0.1		0.1	0.4		0.1	<b>83.1</b>	0.1
1989	0.0		0.0	0.6		0.0	<b>80.6</b>	0.6
1990			0.5	0.1		0.1	<b>80.3</b>	0.7
1991	0.1		0.4	0.2	0.0	0.0	<b>74.5</b>	0.4
1992	0.1		0.4	0.4		0.2	<b>73.2</b>	0.1
1993	0.2		0.3	0.1	0.0	0.0	<b>77.0</b>	0.2
1994	0.0		0.3	0.2		0.5	<b>77.6</b>	0.1
1995	0.2		0.3	0.4	0.0	0.1	<b>83.8</b>	0.1
1996	0.0		0.4	0.1	0.0	0.0	<b>83.9</b>	0.2
1997	0.0		0.4	0.2	0.0	0.1	<b>83.3</b>	0.6
1998	0.0		1.5	0.5		0.2	<b>69.0</b>	3.9
1999	0.0		0.3	0.5		0.0	<b>74.0</b>	1.3
2000			0.7	0.2			<b>58.7</b>	10.7
2001	0.2		0.5	0.5		0.1	<b>58.0</b>	1.5
2002	0.1		2.1	0.5		0.2	<b>70.5</b>	1.7
2003			0.5	0.2		0.1	<b>67.8</b>	0.5
2004			1.4	0.1		0.9	<b>79.5</b>	0.2
2005			4.0	0.1		0.3	<b>80.4</b>	0.2
2006			1.9	0.0		0.7	<b>83.2</b>	0.0
2007			1.6				<b>89.6</b>	0.1
2008	0.0		5.6	2.2			<b>83.9</b>	0.4
2009		0.1	6.2	1.5			<b>59.6</b>	0.1
All	0.1	0.0	0.7	0.4	0.0	0.2	<b>69.4</b>	0.9

Table 6. Continued. Percentage silk snapper commercial landings by gear category.

YEAR	GEAR							All
	Lines Troll, Other	Pots And Traps, Crab, Other	Pots And Traps, Fish	Pots And Traps, Spiny Lobster	Rod and Reel	Spears	Trammel Nets	
1983	0.2		<b>73.4</b>					100.0
1984	0.1		<b>76.3</b>			0.0		100.0
1985	0.2		<b>36.5</b>	0.0				100.0
1986	0.3		<b>10.8</b>					100.0
1987	0.5	0.0	<b>18.8</b>					100.0
1988	0.8		<b>15.0</b>			0.3		100.0
1989	0.9		<b>15.8</b>			0.4	0.9	100.0
1990	1.4		<b>16.9</b>			0.0		100.0
1991	0.8		<b>23.5</b>				0.0	100.0
1992	0.1		<b>25.5</b>					100.0
1993	0.1		<b>22.1</b>					100.0
1994	1.1	0.0	<b>20.2</b>	0.1			0.0	100.0
1995	0.9		<b>14.1</b>	0.0	0.0	0.0	0.0	100.0
1996	0.7	0.0	<b>14.6</b>				0.0	100.0
1997	1.7		<b>13.6</b>	0.0	0.0		0.0	100.0
1998	2.4	0.0	<b>22.6</b>	0.0				100.0
1999	0.6		<b>23.1</b>				0.2	100.0
2000	0.6		<b>29.1</b>	0.0				100.0
2001	1.9		<b>37.2</b>		0.0		0.0	100.0
2002	1.7		<b>23.3</b>					100.0
2003	0.4		<b>30.4</b>	0.0			0.0	100.0
2004	1.1		<b>16.8</b>					100.0
2005	5.5		<b>9.4</b>				0.1	100.0
2006	3.9		<b>9.6</b>				0.6	100.0
2007	2.5		<b>6.1</b>	0.0			0.1	100.0
2008	2.3	0.0	<b>5.4</b>		0.1		0.0	100.0
2009	8.8		<b>7.2</b>				16.4	100.0
All	1.1	0.0	<b>27.0</b>	0.0	0.0	0.0	0.3	100.0

Table 7. Total all species commercial landings in Puerto Rico, 1983-2009, and percentage contribution by SEDAR26 focus group.

Year	All Species	Percentage Contributon by Species			
		Parrotfish	Queen Snapper	Silk Snapper	Silk+Queen+ Parrotfish_family
1983	3,916,688	5.96		10.12	16.08
1984	3,154,298	7.34		11.32	18.66
1985	2,855,085	7.75		13.02	20.78
1986	2,535,417	4.16		14.08	18.24
1987	2,082,933	3.69	0.21	9.94	13.84
1988	2,014,697	0.61	0.73	8.44	9.78
1989	2,291,221	0.19	0.67	10.73	11.59
1990	2,180,841	1.69	0.52	8.11	10.32
1991	2,459,904	2.77	0.72	6.80	10.29
1992	2,045,294	4.49	1.24	10.17	15.90
1993	2,496,521	6.42	1.30	9.78	17.49
1994	2,710,947	4.27	1.02	12.50	17.79
1995	3,689,885	2.16	0.93	9.85	12.94
1996	3,583,128	2.87	1.02	8.69	12.58
1997	3,805,891	2.92	1.02	7.51	11.44
1998	3,455,082	2.82	1.33	6.06	10.22
1999	3,329,448	2.42	2.00	6.75	11.17
2000	3,275,083	2.26	2.53	5.75	10.54
2001	3,391,241	2.85	3.01	7.87	13.73
2002	3,274,578	3.28	3.36	6.05	12.69
2003	2,390,998	2.90	5.31	7.11	15.32
2004	1,867,511	2.74	4.26	6.37	13.37
2005	1,569,189	1.99	9.99	7.04	19.02
2006	1,341,420	2.38	7.67	6.22	16.27
2007	1,256,664	2.69	8.84	5.44	16.97
2008	1,266,232	2.22	10.84	8.58	21.64
2009	1,155,414	2.45	9.54	7.21	19.21
	69,395,610	3.43	2.15	8.69	14.27



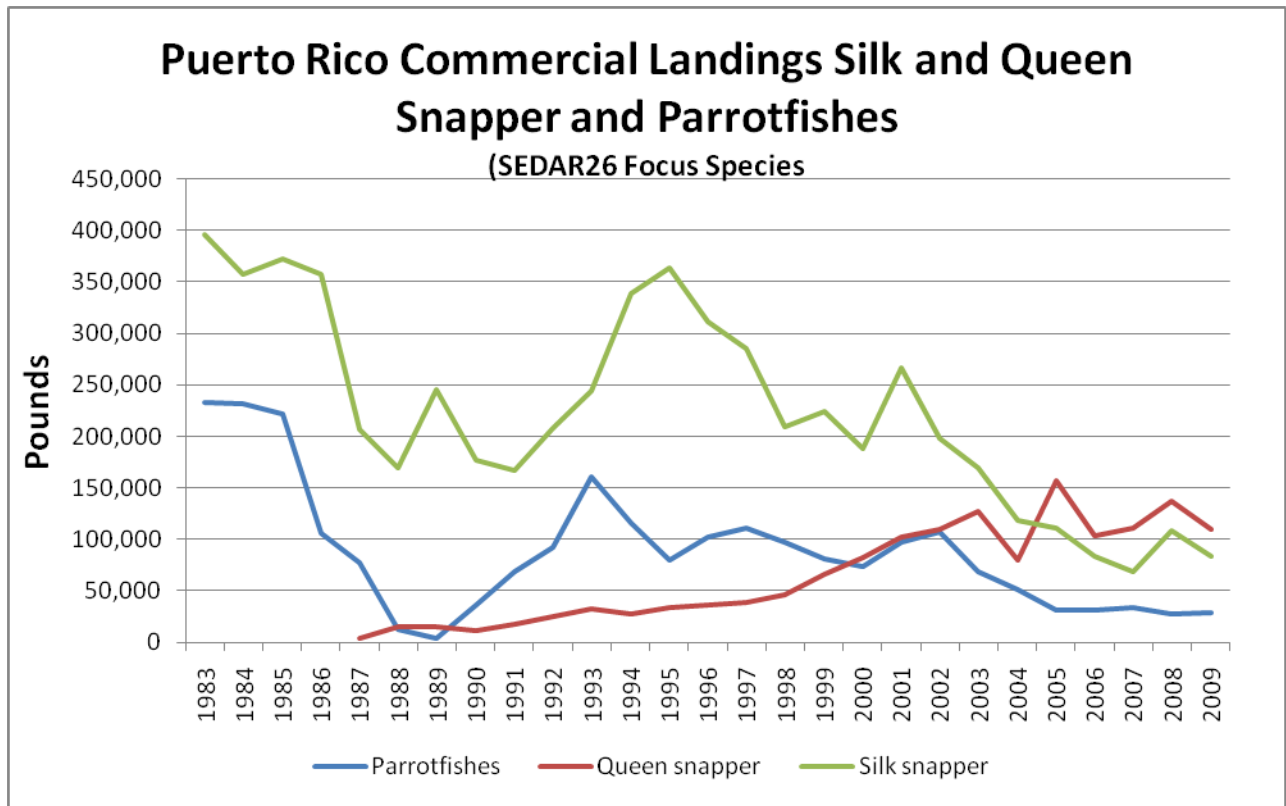


Figure 1. Reported commercial landings of silk and queen snapper and parrotfish group in Puerto Rico 1983-2009. Preliminary information.

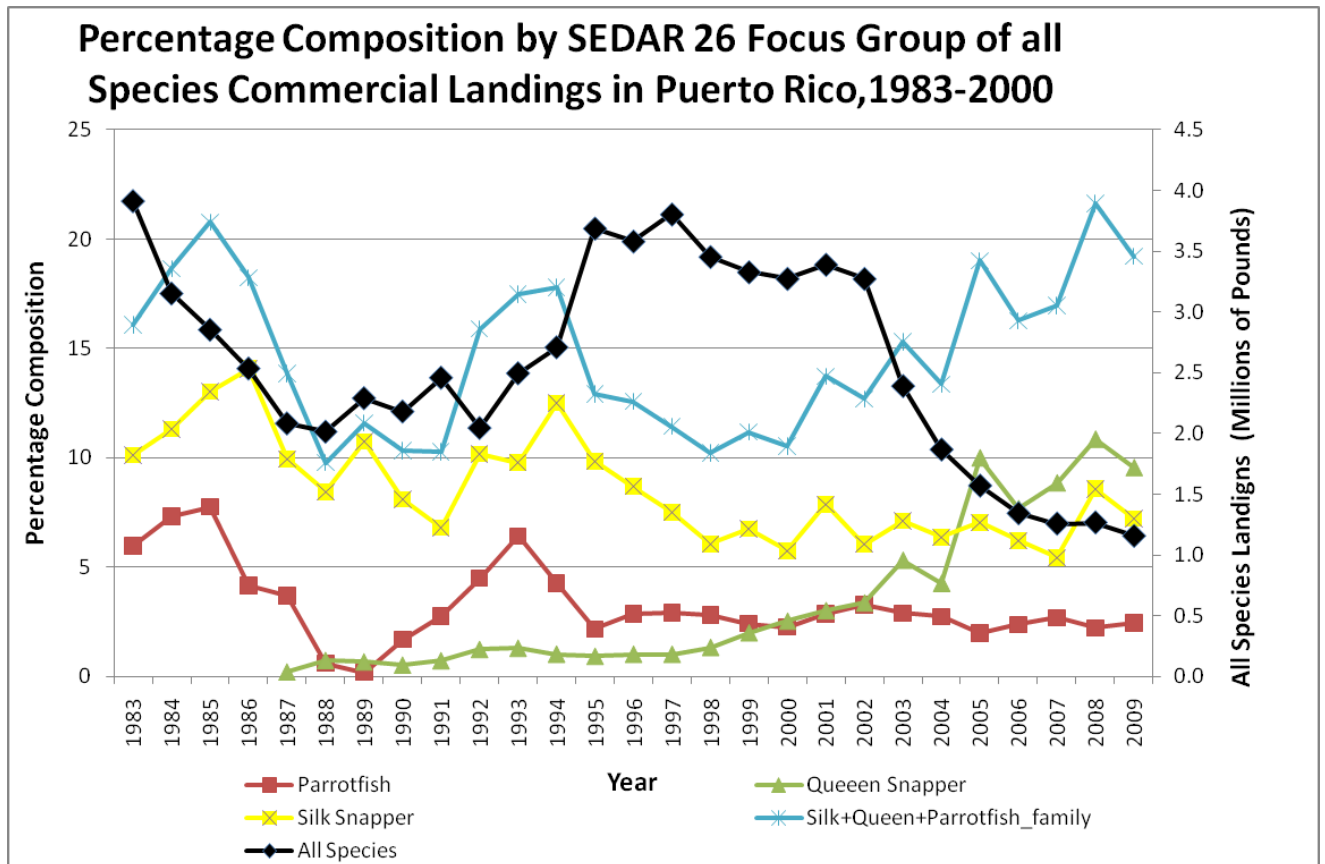


Figure 2. Reported commercial landings of all species landed in Puerto Rico, 1983 – 2009 and percentage contribution to total landings for the SEDAR26 focus groups: silk and queen snapper and parrotfish family, and all three focus groups combined (silk, queen, parrotfish family). Preliminary information. Units are pounds whole weight and percentage of pounds by gear and year stratum.