SEDAR 14 DW Doc-7

Information on Commercial Removals of the Mutton snapper, *Lutjanus analis*, in Puerto Rico from 1983 through 2005 and trends in nominal catch per unit of effort

Prepared
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Report Version Dated 6/6/2007 9:50:50 AM

Sustainable Fisheries Division Contribution No. SFD-2007-016
SEDAR-14 Data Workshop Report No-04

Introduction and Fishery Background

Descriptions of the historical fisheries off Puerto Rico exist from several studies. Cummings and Matos-Caraballo (2003) provided a review of the literature describing the early fisheries off Puerto Rico. The earliest accounts of commercial fishing date back to the 1930's. Most of the early reports indicate that although fishing occurred in Puerto Rico during the late 1800's that prior to about 1900's it was mainly for subsistence purposes (see Wilcox 1899, 1900, Jarvis 1932 as cited in Cummings and Matos-Caraballo 2003a). This is further supported by Jarvis's work (1932), who 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 of Puerto Rico's fisheries.

More recent studies, since the late 1990's, of the Puerto Rico commercial fisheries have expressed concern as to the condition of several species or species groups commonly reported in these fisheries including several snappers and groupers (see Matos-Caraballo 2002). Declining landings in some fisheries off Puerto Rico (i.e. pot fisheries) and increasing landings in other gears (i.e., hand lines, gill nets, and diver operations) have been reported. Matos-Caraballo (2002) also reported declines in total landings from the west coast of Puerto Rico and for the first time since 1972 a trend of increasing landings from the south coast of Puerto Rico. Matos-Caraballo (1998, 2004) reported that several species and shellfish species, previously considered as trash fish by most commercial fishers in Puerto Rico are now being landed and sold. These included the squirrelfish species *Holocentrus ascensionis* and *H. rufus* and also *Carpilius corallinus* and *Mythrax spp.* In addition, Matos-Carabollo (2004) reported a decline in the number of active fishermen (Table 1) as well as the number of vessels participating in the deep water snapper fishery.

Historically snappers have been the most important fish family in the Puerto Rico fishery market in pounds and numbers of fish (Matos-Caraballo 2001, 2002, 2004; Suarez-Caabro, 19797. The mutton snapper, *Lutjanus analis*, has historically been an important component of the Puerto Rico commercial finfish landings, on average making up about 2% of the total combined shellfish and finfish landings by weight and about 23% of the annual fish (all species) landings (Cummings and Matos-Caraballo, 2004, Matos-Caraballo 2004, 2002, 2001, 1998).

The primary focus of this report is to present updated information on the commercial mutton snapper off Puerto Rico including updated landings statistics for 1983 through 2005 and information on catch per unit of effort. This information is needed to address the status or condition of the population. In addition, information is presented on the economic value of the mutton snapper commercial fishery in Puerto Rico and also commercial catch per unit of effort (CPUE).

Data Sources and Methods

Commercial Landings Data Source

Statistics for the commercial fisheries of Puerto Rico were collected by the Fisheries Research Laboratory (FRL) of the Puerto Rico Department of Natural and Environmental

Resources (DNER). Since 1967, the Puerto Rico Fisheries Statistics Program (FSP) has collected data on the commercial fishery through primarily cooperative agreements. The FSP was administered through the Department of Agriculture of Puerto Rico from 1966 to 1979. The Commercial Fisheries Statistics Program (CFSP) was implemented in 1967 under the Commercial Fisheries Research and Development Act of 1964 (PL 88-309) (see Matos-Caraballo 2004, Collazo and Calderon 1988). From 1979 through the late 1980's, the FSP program was administered by the Corporation for the Development and Administration of the Marine, Lacustrine and Fluvial Resources of Puerto Rico (CODREMAR) and during this period, the CFSP statistics program was supported contractually by NOAA. Since the early 1990's the CFSP, FSP has been supported through a cooperative agreement with NOAA, NMFS through the State/Federal (SF) Cooperative and Inter-jurisdictional Fisheries Program (IJ). Through the SF/CSP/IJ program, commercial fishery landings data were collected form Puerto Rico's fishers, fish buyers and fishing associations, whom voluntarily cooperate with the FSP. However, not all participants in the fisheries (i.e., fishers, dealers, cooperatives, fisher helpers) always cooperate in all years.

Methods of Collection and Information Recorded

In addition to collecting data on landings, fisheries port samplers in Puerto Rico routinely visited the coastal municipalities (n=42) including the islands of Vieques and Culebra, and the fishing centers (n=88, Figure 1). Matos-Caraballo (2002) presented details of the data collection program in Puerto Rico. Briefly, information is recorded for each fisher sale as to the date of sale, name of fish buyer, fisherman identification, information on fisher helper identification, the municipality and the fishing center of sale, the number of trips (ntrips) representing to a unique sales record, gear type used, amount of fishing effort (e.g., hours fishing, number of gear, number of traps, number of hours soaked, number of lines), weight in pounds of the species sold, taxonomic identification (species or family), and market value (dollars). Sometimes information is recorded on the minimum and maximum depth of the fishing area that resulted in this catch but not always. Not all data records contained information on gear quantity or effort and for many records the 'ntrips' data variable exceeded one, indicating that some fishers perhaps retained their catch over several trips and were later sold or these type entries could have been data recording entries or errors in completing the sales form. In Puerto Rico's commercial fisheries, the majority of the finfish are landed in the round except for the deep water snappers (e.g., queen, silk, and wenchman) which are usually gutted. Lobster, oyster and octopus were also landed in the round, and according to Matos-Carabollo (2002) conch landings include the meat only. Apparently, beginning around 2003, about 50% of the conch fishers began dressing the conch meats prior to landing and by 2004, all at-sea cleaning was done by all conch fishers, so trends in landings of that species should account for changes in fishing operations that took place (Puerto Rico DNER, unpublished). Also, for some sales in nearly all years, finfish were classified as to first, second, or third class fish, or trash fish as defined by Matos-Caraballo and Sadovy (1990). According to Matos-Caraballo and Sadovy (1990), the definitions of these four categories varied somewhat by region but in general were broadly defined as: "first class fish included large snappers, grouper, grunt, trunkfish and hogfish; second class fish included small snapper and grouper, parrotfish, goatfish, and triggerfish; third class fish included smaller individuals of second class fish and large squirrelfish. The "trash fish" category included butterfly fish, angelfish, surgeonfish, small squirrelfish and small fishes of a number of other

species". According to Matos-Caraballo (20004) mutton snapper were recorded as first class fish in the landings data until 1987.

It was not possible to identify individual fishing trips in the total commercial landings dataset with complete accuracy since unique trip identification was not maintained at the time of computer processing by the PR FRL, CFSP, FSP for the data collected through 2002. Beginning in 2003, the CFSP, FSP staff implemented the addition of a unique trip identification number on each separate fishing trip, at the time of data entry. A unique tripid variable was computer generated according to an algorithm constructed from unique combinations of date of sale (year, month, and day), fishing center, fisherman id, gear code, and the ntrips variable that occurred on each record. These unique trip records were used in subsequent calculations that required information at the trip level (e.g., catch per unit of effort by trip, total pounds sold by trip across all species, pounds sold of mutton snapper by trip and so on).

The economic value, measured in U.S. dollars ($), of mutton snapper by year, month, and gear was calculated using the reported data from the commercial fishing sales records from 1983-2003. Information is presented in this report on total annual value of mutton snapper for all fisheries combined and also for the two primary gears used to catch mutton snapper, lines and pots. The average value, price per pound ($), was also calculated by year and by fishery and is presented for all mutton snapper.

Important Point Regarding these Data

It should also be noted that the Puerto Rico commercial landings sales records represent only a portion of the total commercial removals as noted by Matos-Caraballo (2002). Not all active fishermen in Puerto Rico report their sales as discussed in that report. Matos-Caraballo (2004) provided updated information on the number of active commercial fishers in Puerto Rico, the number of full time or part time fishers, and the number and size (length) of active commercial vessels. Information from Matos-Caraballo (2004) and from Cummings and Matos-Caraballo (2003) is provided here for purposes of calculating total expanded commercial landings in Puerto Rico (Table 1). In 2004, a fisherman licensing system was implemented in Puerto Rico.

Summary Results

Commercial Sales of Mutton Snapper in Puerto Rico- General Trends

Computerized data documenting levels of commercial sales of fish and shellfish in Puerto Rico were available through the PR DNER, CFSP, FSP for 1983 through 2005. Computerized data documenting species specific sales of fish and shellfish in Puerto Rico are not currently available prior to 1983 although this information was collected by the CFSP since 1966. Annual reported pounds of mutton snapper sold in Puerto Rico from 1983 through 2005 ranged from 20,059 pounds (1987) to 93,360 pounds (1999) (Table 2, Figure 2a, 2b). Although Matos-Caraballo (2004) noted that mutton were classified as 'first class' fish until 1987, reported landings between 1983 and 1986 were much larger than those between1987 and 1990. As a review, "first class" fish included large snappers, grouper, grunt, trunkfish and hogfish; second class fish included small snapper and grouper, parrotfish, goatfish, and triggerfish; third class fish included smaller individuals of second class fish and large squirrelfish. The "trash fish" category included butterfly fish, angelfish, surgeonfish, small squirrelfish and small fishes of a

number of other species". In addition, reporting rates were about 10-15 lower according to Matos-Caraballo during the years when mutton snapper were mixed in the finfish landings (Table 1). The landings information for 2005 calendar year should be considered as preliminary.

The number of individual fisher sales of mutton snapper varied over the 23 year period from 1,155 (1988) sales to 4,501 (2002) sales over the same period (Table 2). Peak years in the total reported pounds of mutton snapper sold and the number of individual fisher sales were 1999 and 2002 respectively. Prior to 1987, mutton reported landings varied between about 30,000 pounds and 65,000 pounds (Table 2, Figure 2a, b). From 1987 through 2002 reported fisher sales of mutton snapper increased steadily, after 2002, reported landings declined. The 2005 data should be considered as preliminary in all of the discussions below. In addition Matos-Caraballo (2004) noted that mutton snapper were included in the 'first class' finfish category until 1987. The reader is cautioned when examining trends in the reported landings to be cautious and to take into account annual reporting rates (Table 1) as well as changes in landings classifications during the early years of the statistical data collection, particularly in the discussions below that pertain to trends.

Trends in Sales of Mutton Snapper in Puerto Rico by Major Gear Category

The individual commercial sales records of mutton snapper were summarized by reported fishing gear, as recorded on the fisher sales ticket, and by calendar year to identify the primary gears used to catch mutton snapper off Puerto Rico over the 23 year time series and also to identify possible trends in reported fisher sales by gear over time (Tables 3a-c and Figures 2a, b). The commercial sales records indicate that mutton snapper were predominately caught mainly by fishers using some type of line (e.g., rod and reel, hand line, bottom line, silk haul) or were caught with pots (Tables 3b, Figure 2b). Annually, these two gears produced from 60 to 75% of the total reported mutton landings (Table 3b). These two categories of fishing gears are referred to in this report as the "major" gears involved in the capture of mutton snapper off Puerto Rico. 'Lines' referred to in this report, as 'rod and reel' in data categorizations, contributed consistently from about 25% to 60% by weight of the total annual pounds sold of this species between 1983-2005 (Table 3b, Figure 2b). On average, the percentage by weight that pots contributed annually to the total reported mutton snapper landings ranged from about 20 % to 58% (Table 3b, Figure 2b). The annual percentage contribution of mutton sales by pot gear declined from 58% in 1983 to 24% in 1988 and varied without trend during the subsequent years. Other gears that were reported to catch mutton snapper off Puerto Rico were: cast nets (0.5%, diving (scuba, skin diving, spear) (6.8%), nets (12%), seines (3.3%), and vertical lines (2.2%), however with the exception of nets, on average these gears contributed less than 10 percent of the annual total weight landed of mutton snapper (Figure 2b). Nets followed by diving operations were the main gears in the "minor" gears involved in capture of this species (Figure 2b).

The reported commercial statistics can be used to evaluate general patterns regarding changes in the mutton snapper fishery across the 23 year period, 1983-2005, within these gear categories. Sales of mutton snapper from rod and reel gear show an increase from about 1989 through 1999 (Table 3c, Figure 2a, b). Although the percentage of mutton taken by rod and reel, remains about the same overall since 2000, at around 48% % (Table 3b), total annual landings from this gear, declined each year since 2000 (Table 3a). Prior to 1988 the percentage of mutton caught with

rod and reel gear was about 30 %. Before 1988 pots were reported catching more mutton snapper than since 1988 at about 44 % annually by weight (Table 3b). Sales from fishers reportedly using cast nets seines, and vertical lines remained stable over the entire 21 year time series at less than 5% annually. The percentage of total landings from dive operations and nets showed occasional increases, particularly between 1988 and 1990 and again in 1993 for dive gears and between 1994 and 2002 for net gear (Table 3b). Similar increases in the percentage of annual landings were not reported during these years for pot gear landings. Table 3b indicates small increases in the percentage of total mutton landings from hook and line gear occurred during the late 1990's similar to those observed for net landings. The percentage increase was not large for any gear, on average about 5-10% per annum (Table 3 b and Figure 2b) and a trend is very difficult to identify when considering that reporting rates by fishers varied from 51% to 86% over the 23 year period. Table 3c provides the number and the percentage of individual fisher sales by year and gear category and this also shows changes in reporting between gears and across years, which also may be reflective of the changes in fisher reporting rates in these strata.

The complete data series suggest that over this period, 1983-2005, in Puerto Rico line gear has remained the most important gear for mutton snapper, contributing currently about 50% of the total removals (Table 3a). Pot gear, however has remained a consistent producer of about 25% of the reported landings of the mutton snapper. As noted by Cummings and Matos-Caraballo (2004) for yellowtail snapper, landings by hook and line gear increased during the middle 1990's while pot landings declined, however the percentage of pot landing of the total remained stable. As Tables 3a-c shows here, mutton snapper landings showed occasional increases in overall annual landings and in these years, percentage contribution of landings from the minor gears, in particular dive operations and nets were important in the gear composition. These changes could also be indicative of a change in availability of this species to the 'minor' gears such as nets and seines often used in shallower habitat.

Temporal Trends in Mutton Snapper Sold in Puerto Rico

The reported commercial sales from Puerto Rico were examined to identify temporal trends in the landings of mutton snapper (Table 4 and Figures 3a, b). Sales of mutton snapper in Puerto Rico by month ranged from a low of 5 % (December) to 14% (April) across all of the years combined. These data show a tendency for landings to increase from low levels in November and December through April and thereafter to remain fair stable during the remaining months (Table 4 and Figure 3a). Peaks were observed in landings in most years between March and May, possibly coinciding with the presumed peaks in spawning for the mutton snapper off Puerto Rico (Figuerola and Torres-Ruiz, 2001).

During a few years, particularly between 1989 and the mid 1990's, another increase in monthly landings was observed during late summer months of August-October, followed by a decline (Table 4 and Figure 3a, b). This second increase is similar to that observed also for the yellowtail snapper commercial landings from this region and as with yellowtail snapper, was not always consistent in every year (see Cummings and Matos-Caraballo, 2004). No information exists in the literature to indicate a second major period of spawning for mutton snapper off Puerto Rico, during the fall months that, could explain the observed increase in landings. The literature indicates spawning occurs predominately between late spring (March) and early

summer (June) for most geographical areas this species inhabits (see Cummings, 2007). An interesting exception was the report by Wantanabe (2001) who reported movement of juvenile mutton snappers, < 7 cm, into seagrass beds in Florida and Cuba peaked in August and September, suggesting some spawning may occur during late summer and early fall in these regions. Laboratory experiments suggest that mutton snapper are planktonic at less than 10 mm TL and the pelagic larval duration lasts only about 27 to 37 days (Cummings, 2007; Lindeman, 1997). The observed increase in the Puerto Rico commercial landings in late summer and early fall could be due to an increase in reporting during these months in some years or possibly suggests uncertainty in the classification of mutton snapper during the early years of the statistical collection system. However, between 2001 and 2005, reported landings showed an increase during August as in the early years, 1989-mid 1990's, again introducing uncertainty into any temporal trend in the data. This would suggest a need to further examine intra annual fisher reporting rates at the fishing center and fishery (gear) level.

Spatial Trends in Mutton Snapper Sold in Puerto Rico

The commercial sales of mutton snapper were summarized by major fishing reporting center and calendar year to identify the primary municipalities of sale for mutton snapper in Puerto Rico. The tabled summary data were organized and depicted in a tabular form, beginning from the most northeast located municipality (Isabela) moving eastward along the north coast to the municipality of Ceiba, then along the east coast of Puerto Rico to Humaco off the southeast coast, then southwest to Cabo Rojo and finally to the last municipality at the northwest coast of Aquadilla (Figure 1). Unfortunately, the PR, DNER, CFSP, FRL does not request exact information on the capture location on the sales ticket (e.g., latitude/longitude of fishing location). In this study, municipality (and fishing center) was considered only as a very general proxy for approximate fishing location.

The 23 year time series of fisher sales statistics from 1983-2005, indicates that mutton snapper have been landed in nearly all of the major island municipalities in Puerto Rico in nearly all years (Tables 5a, 5b). However, historically, not all of the municipalities have been major landing sites for mutton snapper, landing on average at least 1% of the total annual landings. The highlighted rows of Table 5b identify municipalities in which the landings of mutton snapper were 1% or more across all years. The landing sites at which the largest amounts of the mutton snapper in Puerto Rico are landed are along the southwest coast and included Lajas (11.6 %), Cabo Rojo (12.6%), and Mayaguez (14.6%). Of the remaining landing centers which contributed more than 1% annually, the area off the southeast coast from Fajardo through Santa Isabel dominated. Typically, these municipalities contributed from 1 to 5 % annually but not usually more, with the exception of Salinas that had an average landings percentage of 7.8&% across all years. Table 5b illustrates that this species is reportedly landed at many fishing centers throughout Puerto Rico but predominately from the southeast and southeast. Table 5b also illustrates the large amount of intra annual variability in the landings across municipality and across years. Again, the reader is cautioned to carefully consider trends in these data in particular without consideration of the variability in reporting rates (Table 1). In addition, prior to 1987 much uncertainty exists as to the true level of mutton snapper identified to species thus the spatial distribution of landings no doubt contains uncertainty as well.

The individual records of trips that landed and sold mutton snapper landings (i.e., successful mutton trips) were stratified by major gear type (pots, lines, nets, seines, etc.) and the contribution by landing site identified for graphical review.

Reported Value ($) of Mutton Snapper sold in Puerto Rico

Description information pertaining to the value of the commercial fishery in Puerto Rico for mutton snapper is provided in Tables 6 through 10. Extreme caution is urged when evaluating the total economic value of this species to the overall commercial fish and shellfish fishery for several reasons. First, there is known uncertainty in the level of reporting rates by the fishers in Puerto Rico; since 1969 the estimated reporting rates have varied from about 50% to 86 % annually (Table 1), thus both reported landings and estimated value are no doubt severely under reported. Matos-Caraballo (2004) presented some information regarding the variability in reporting rates between regions for 2002 however, the lack of year specific regional and fishery specific (gear) estimates of reporting prevents, corrections being made to the basic reported sales records. In addition, prior to 1987 mutton snapper was reported as "first class" fish by fishers when selling the catch, thus the accuracy of landings levels before 1987 is unknown.

The estimated value (U.S. $) of the Puerto Rico commercial fishery for mutton snapper, *Lutjanus analis*, ranged from around 230,000 $ in 1987 to 189,000 $ in 2002 (Table 6). Monthly percentage value estimates for the fishery, combined across region and gears, suggested that maximum value was received usually during March (Table 7). As would be expected line gear and pots produced the largest economic components to the value of the mutton snapper fishery in Puerto Rico (Tables 8a, b). Similarly, the southeast and southwest coastal fishing centers dominated spatially as would be expected since these centers annually reported the maximum landings levels (Tables 9a, b). More interesting perhaps is the gradual increase in the average price per pound of the mutton snapper in Puerto Rico (Table 10 and Figure 4). These estimates indicate that in each fishery landing this species, that average price per pound has increased. On average, across all fisheries, the price per pound of a mutton snapper has increased for about 1.11$ (1983) to about 2.30$ (2005). Although, mutton snapper may have been reported as "first class" fish prior to 1987, the value received for the portion of landings, which was identified to species level as mutton snapper, should not be affected. The variability between fisheries of the value of mutton snapper was about 20 cents per pound, with on average fish from diving operations and vertical lines receiving upwards to 2.10 $ to 2.18 $ per pound, while nets, pot, and line caught fish received about 1.80 $ to 2.0 $ per pound. Seine caught mutton snapper received on average the lowest value per pound at 1.62 $ average across all years. It appears, from these data, that the price per pound of the mutton snapper in Puerto Rico continues to increase, as in 2005 values from 2.37$ to 2.6$ per pound were received by fishers, again supporting previous studies reports of the importance of the mutton snapper to the overall fin fish fisheries in Puerto Rico.

Nominal Catch per Unit of Effort (CPUE)

The 23 year time series of mutton snapper landings records were also examined for calculating CPUE of mutton snapper in the Puerto Rico commercial fishery. CPUE was calculated for each sales (landing) record as the pounds landed divided by the number of trips as indicated by the 'ntrips' data variable which was recorded on each recorded. As described in the materials and data section above, other attributes recorded for each sales record included: date of

sale (year, month, and day), fishing center and major municipality of sale, gear used in the capture, total weight sold, fisherman identification, and the 'ntrips' variable. The number of fishing trips variable, 'ntrips', was further evaluated to aid in the selection of trips or sales records to be used to calculate CPUE. Although the Puerto Rico, CFSP, FSP landings data collection system was intended to collect information from commercial fishers at the trip level, often fishers recorded values greater than 1. Summary attributes of the calculated catch per tri p and the ntrips variable are presented, in Table 11 and Figure 5.

In total, there were 51,345 positive sales records for mutton snapper in the total combined all fish and shellfish data set which contained some 1,811, 170 individual records of species specific landings. These include data observations from all year, 1983-2005, all fishing centers and all gear categories. After excluding records for which the ntrips variable was codes as 'zero' or was missing or for which non-numeric values occurred some 50,078 records remained. Table 11 indicates that about 67 % of the records landing mutton snapper, indicated a landing representing a single fishing trip (i.e., ntrips=1). Casual inspection of the information in Table 11 and Figure 5 indicates that as 'ntrips' increased, the standard deviation of the mean also increased, somewhat counter intuitive to what might be expected as number of observations increases. This was a similar observation in reviewing the individual sales records of yellowtail snapper (see Cummings and Matos-Caraballo, 2004, Table 12 and Figure 14). In addition the basic pattern of the StdDev (of CPUE) variable is not consistent in the data but rather shows both increasing and decreasing trends. In the categories where the StdDev variable increases, very large increases are observed in these simple data attributes, often many fold larger than the mean was the standard deviation of the mean.

It is very difficult to decipher the true meaning of how the 'ntrips' variable was recorded by the fisher and/or fish house completing the form in these data. There is no objective basis for determining a convenient or logical cutoff criterion for data selection from the ntrips variable information alone. In addition there is no sound operational reason to expect that the mutton snapper fishery is a multi-day fishery, based on the pattern in catch per trip (i.e., CPUE) from what is considered in this dataset as single day trips (ntrips =1). Table 11 indicates that across the individual categories of the ntrips variable (i.e., from ntrips = 1 to ntrips = 99) nominal CPUE varied from about 0.1 lbs to 17.3 lbs with an un-weighted mean of 2.33 lbs per trip. Similarly, for 'ntrips' LE 7 trips (similar to the cutoff criterion of 7 trips, explored for yellowtail snapper CPUE analyses in SEDAR8) the un-weighted mean CPUE of mutton snapper across all 7 categories was 7.9 lbs per trip and the minimum and maximum CPUE was 4.6 and 17.3 lbs per trip. These reported levels of landings per trip do not suggest in general large catches, and further examination of the total landed trip weights although not presented in tabular or graphical form here, generally support this idea; the latter all trips data are available from the authors for review. The general tendency from the mutton snapper landings data indicates that most fishers indicated landing catches representing a single trip; these records alone represented some 68% of all positive trips of mutton snapper. Based on the patterns depicted in the 'ntrips' variable and the overall nature of the shallow water snapper fisheries in the US Caribbean to be relatively short in duration, all subsequent analyses excluded observations where the "ntrips" variable was codes as greater than 1.

Calculations of nominal CPUE for mutton snapper for the ntrips = 1 observations and for each major and minor gear category (rod and reel, pot, net, seines, dive, cast net, vertical line) used to capture this species over the 23 year period are presented in Table 12 and Figure 6. CPUE calculations were made and presented for all the gears capturing this species however the reader is reminded that the major gears responsible for the majority of yellowtail snapper landings in Puerto Rico are lines (coded as rod and reel here) and pots, followed by diving operations, nets and seines. The major gears represented some 40 % and 30 % on average annually of the total sales observations (i.e., sample size) in the two data sets respectively (Tables 12b). Table 12a and b represent the positive or successful trips landing mutton snapper which were coded for the ntrips variable as '1', thus the percentage contribution across categories differs slightly from the un-filtered data and percentages from Table 3c. However, the dominant gears remained to be lines followed by pots and then diving operations (Table 12). Caution should be exercised when evaluating trends from prior to about 1997 or so, as these were the early formative years of the data collection system in Puerto Rico.

The summarized CPUE calculations from the 'ntrips' = 1 data set indicated that in general mutton snapper commercial CPUE from lines (rod and reel) varied without trend from 1985-2005 from about 15 pounds to 30 pounds per trip and was 18 pounds per trip in 2005 (Table 12a, Figures 6a, b). The very high nominal CPUE calculation in 1984 observed in the rod and reel nominal CPUE was evident in all gear categories except for dive operations. Interestingly, the aberrant large CPUE in 1984 was also present in the yellowtail snapper trend presented in SEDAR8 analyses (Cummings and Matos-Caraballo, 2004). Nominal pot CPUE of mutton snapper varied from about 11 pounds per trip to 20 pounds per trip over the 23 year period and was 13 pounds per trip in 2003 (Table 12a, Figures 6a, b). CPUE observations from pots and line gear contributed 78 % to the total all gear CPUE data set (Table 12b). CPUE from all gears combined varied from 13 pounds per trip to 25 pounds per trip over the 23 year period and was 18 pounds per trip in 2005 (Table 12a). The 1984 data points were excluded from this discussion as it appears to be aberrant in all gear and closer inspection of all the data for 1984 is recommended for future analyses. It is also important to consider the number of positive (successful) landings records for the mutton snapper. Table 12a shows that report of positive landings nearly tripled between the mid to late 1980's and mid 1990's, possibly from increasing in reporting rates or other unknown reasons. During 1986 and 1987 the level of successful landings reports declined dramatically from 1985 level (Table 12a, b). These were the early years of the development of the formal data collection system by Puerto Rico DNER, CFSP, FSP.

Over the 23 year time series from 1983-2005, mutton snapper nominal CPUE varied without major trend in nearly all fisheries. The calculated mean CPUE value for 1984 appears to be an outlier and given that a similar extremely high CPUE was observed from the yellowtail snapper fishery for this year, caution should be used when using data for 1984 in any analyses related to CPUE or abundance calculations from such data. Graphical comparisons of line, pot and dive operation CPUE for mutton snapper are also shown in Figure 6b. These gears are the primary harvesting gears for mutton snapper and should be considered for use in further examinations of abundance trends for the mutton snapper. Again, the reader is cautioned to view the 1984 data points as questionable as CPUE in this year was nearly four fold that of adjoining years for all gear categories except dive operations. It is recommended that until the 1984 raw landings data can be fully verified as to accuracy, that they be excluded from analyses relating to

CPUE and also caution be exercised when discussing trends in total landings for this year. In addition, it is recommended that subsequent analyses of CPUE for deriving standardized abundance indices exclude data records in which the ntrips variable is coded greater than "1". Finally, it is recommended that subsequent CPUE analyses and, those analyses which require total catch or total landings as input carefully consider limiting such analyses to 1987 and thereafter as prior to 1987, mutton snapper were classified as 'first class' fish thus removals are underestimated for years before 1987 and trends in CPUE could be biased, and these were the early years of data collection in this region and procedures and protocols were being continually evaluated and improved during those early years.

Additional Points Worthy of Mention

The following section identifies some of the specific points regarding the Puerto Rico commercial landing data for further consideration when using these data for deriving abundance trends and/or examining trends in resource condition in this region.

1. Finfish Class or Category of reporting-

a. It is particularly difficult to discuss trends for mutton prior to 1987 as mutton was recorded as snapper category before 1987- recorded as 'snapper' or 'first class' fish (Matos-Caraballo, 2004).

b.. Often in Puerto Rico mutton snapper are also sold as silk snapper so landings could be underreported; mutton are a nice red color and often confused with silk. Matos-Caraballo (2004) indicated that during the late 1980's, sampling personnel in DNER, CFSP, FSP made efforts to indicate the importance of fishers regarding accurate reporting of this species. – reported and sold as 'silk'

2. Non-reporting by fishers (Table 1)-

This has varied throughout the history of the data collection process, both up and down. In addition, some information exists that indicates regional variability in reporting rates (Matos-Caraballo, 2004, Job 3). It is highly recommended that the Puerto Rico DNER, FSP program attempt to maintain annual profiles of fisher identification for use in following individual fisher catch rates and also to facilitate estimates of non-reporting.

3. General observation of increasing landings-

There have been observed increases in the recorded landings of some species. Matos- Caraballo 2004 (Job 1) noted also that there had been an increase in the reporting rates both overall and as well that groupers were being 'more' broken out. Apparently early on many species were lumped – e.g., some groupers, e.g., red hind were included as 'first class' fish. Matos reports that by late 1980's much of the red hind were not lumped.. Matos further noted that in light of some gear reductions (traps) that landings continued to increase and felt this was at least partially due to reporting and to breaking out the species in the data. It is difficult to decipher these changes as possibly some are from changes in gear usage and also some from reporting rate variability.

4. Fishing Operational Changes-
Also, there has been a large reduction in the number of boats >40 ft (now there are some 15-20 – what was the number way back-that could impact trends in landings as well as species compositional changes, depending on areas fished. It is highly recommended that the Puerto Rico DNER FSP continue to conduct the annual census surveys of fishers in order to quantify operational changes in the fishery and to better characterize fishing gears employed in these fisheries.

5. Exploitation from other sources-
Recreational catch levels are basically unknown as there are little data. However, it is thought by many that mutton snapper is not a priority amongst recreational anglers. This needs to be evaluated more carefully.

6. Comment from aquaculture group (Alston, et. al. 2005) citing Matos-Caraballo, 1998) that Puerto Rico now produces only about 5% of the seafood and fish it consumes. Further, Alston et al. (2005) reported that the local fishery in Puerto Rico has not supplied more than 5% of its demand for seafood during the last 30 years.

7. Matos-Caraballo 2004 wrote that fishers reported that the muttons aggregated around April-June, the data show March-April in general but also some peaks occur in the landing in August and September for some years; this could be due to reporting.

Important Literature

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Table 1. Number of fishers and estimated reporting rate for Puerto Rico commercial fish and shellfish fisheries from 1969 to 2005.

Number Fishermen	Calendar Year1	Reporting Rate	Range	Standard Deviation	Cummings Value	Cummings Rationale	Source of Information
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	Calderon 1983 (Coop. SF Rpt) and Collazo and Calderon 1988
1447	1980	0.75			0.75	Not Changed	same as above
NK	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	0.56 - 0.61		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	Matos-Caraballo and Rivera-Alvarez, 1994.
1731	1987	0.75			0.75	Not Changed	Matos-Caraballo and Rivera-Alvarez, 1994.
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 1990
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
NK	1997	0.78			0.78	Not Changed	Matos-Caraballo, 1998
NK	1998	0.78			0.78	Not Changed	Matos 2000 Coop. SF Rpt.
NK	1999	0.78			**0.78**	**1997 value**	PR DNR Annual Report
NK	2000	0.57			0.57	Not Changed	Matos 2003, personal communication to J. Bennet and N. Cummings
NK	2001	0.68			0.68	Not Changed	same as above
1163	2002	0.86			0.86	Not Changed	same as above
NK	2003	0.56			0.56	Not Changed	Matos 2004
NK	2004	0.61			-	-	Matos 2007, email to J. Bennett
NK	2005	0.5			-	-	Matos 2007, email to J. Bennett

NK= Not Known

Table 2. Summary of commercial sales (pounds) of mutton snapper**,** *Lutjanus analis*, in Puerto Rico, 1987-2005 by calendar year. 2005 Preliminary data. Data available beginning in 1983.

	pounds	
	#sales	*Sum*
Calendar Year		
1983	1952	65141
1984	1398	53086
1985	1354	45633
1986	1276	30338
1987[1]	1167	20059
1988	1155	21554
1989	1438	31756
1990	1332	25192
1991	2139	42139
1992	1495	32516
1993	1634	29359
1994	1652	39729
1995	2932	70935
1996	3694	76462
1997	3841	76602
1998	3577	77437
1999	3943	93360
2000	4101	84271
2001	4261	88621
2002	4501	91907
2003	4422	80072
2004	3431	47143
2005	2562	33561
All	59257	1256873

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

Shading depicts maximum and minimum values in a year for number of sales or landings.

Table 3a. Annual commercial landings (pounds) of mutton snapper**,** *Lutjanus analis*, in Puerto Rico by major gear category from 1983-2005. 2005 Preliminary data. Data available beginning in 1983.

	agear								
	Cast Net	Dive, Spear, Scuba	Net	Other	Pot	Rod and Reel	Seine	Verticcal Line	All
	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds
cyear	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
1983	83	3013	3368	.	37564	16221	3955	937	65141
1984	72	570	3322	.	26793	15966	5107	1256	53086
1985	.	1141	6260	.	19956	15247	1222	1807	45633
1986	84	2868	6434	.	11162	8098	1082	610	30338
1987	197	1151	3334	.	6221	6990	1478	688	20059
1988	15	2251	3158	16	5227	9195	775	917	21554
1989	314	4189	2718	4	9065	13179	1753	534	31756
1990	15	3502	2659	.	7005	10906	808	297	25192
1991	416	3689	5113	.	11861	19269	1312	479	42139
1992	9	2029	2318	.	9160	16655	1564	781	32516
1993	127	3209	2578	.	8720	12615	1971	139	29359
1994	1116	2205	4812	.	9432	18527	2351	1286	39729
1995	716	3140	7574	.	14183	42308	1537	1477	70935
1996	317	3489	12338	.	15809	40698	1480	2331	76462
1997	1003	3433	12395	.	18087	38448	1707	1529	76602
1998	187	5086	10145	.	18817	40341	1310	1551	77437
1999	106	5146	11936	.	22671	50260	1212	2029	93360
2000	174	6224	15035	.	21004	39700	380	1754	84271
2001	216	5990	13496	.	20299	44669	2710	1241	88621
2002	72	8234	12600	.	22139	43830	3164	1868	91907
2003	.	4159	7817	.	19693	44317	2457	1629	80072
2004	.	6109	5237	.	13928	19165	1321	1383	47143
2005	.	5097	2428	.	8790	16057	231	958	33561
All	5239	85924	157075	20	357586	582661	40887	27481	1256873

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as "first class fish" (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 3b. Annual percentage of commercial sales of mutton snapper**,** *Lutjanus analis*, by gear category in Puerto from 1983 through 2003. 2005 Preliminary data. Data available beginning in 1983.

	agear								
	Cast Net	Dive, Spear, Scuba	Net	Other	Pot	Rod and Reel	Seine	Vertical Line	All
	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds
	RowPctSum	RowPctSum	RowPctSum	RowPctSum	RowPctSum	RowPctSum	RowPctSum	RowPctSum	RowPctSum
cyear									
1983	0.1	4.6	5.2	.	57.7	24.9	6.1	1.4	100.0
1984	0.1	1.1	6.3	.	50.5	30.1	9.6	2.4	100.0
1985	.	2.5	13.7	.	43.7	33.4	2.7	4.0	100.0
1986	0.3	9.5	21.2	.	36.8	26.7	3.6	2.0	100.0
1987	1.0	5.7	16.6	.	31.0	34.8	7.4	3.4	100.0
1988	0.1	10.4	14.7	0.1	24.3	42.7	3.6	4.3	100.0
1989	1.0	13.2	8.6	0.0	28.5	41.5	5.5	1.7	100.0
1990	0.1	13.9	10.6	.	27.8	43.3	3.2	1.2	100.0
1991	1.0	8.8	12.1	.	28.1	45.7	3.1	1.1	100.0
1992	0.0	6.2	7.1	.	28.2	51.2	4.8	2.4	100.0
1993	0.4	10.9	8.8	.	29.7	43.0	6.7	0.5	100.0
1994	2.8	5.6	12.1	.	23.7	46.6	5.9	3.2	100.0
1995	1.0	4.4	10.7	.	20.0	59.6	2.2	2.1	100.0
1996	0.4	4.6	16.1	.	20.7	53.2	1.9	3.0	100.0
1997	1.3	4.5	16.2	.	23.6	50.2	2.2	2.0	100.0
1998	0.2	6.6	13.1	.	24.3	52.1	1.7	2.0	100.0
1999	0.1	5.5	12.8	.	24.3	53.8	1.3	2.2	100.0
2000	0.2	7.4	17.8	.	24.9	47.1	0.5	2.1	100.0
2001	0.2	6.8	15.2	.	22.9	50.4	3.1	1.4	100.0
2002	0.1	9.0	13.7	.	24.1	47.7	3.4	2.0	100.0
2003	.	5.2	9.8	.	24.6	55.3	3.1	2.0	100.0
2004	.	13.0	11.1	.	29.5	40.7	2.8	2.9	100.0
2005	.	15.2	7.2	.	26.2	47.8	0.7	2.9	100.0
All	0.4	6.8	12.5	0.0	28.5	46.4	3.3	2.2	100.0

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 3c. Annual distribution of commercial landings (n=number of sales tickets) of mutton snapper**,** *Lutjanus analis*, in Puerto Rico by major gear category from 1983-2005. 2005 Preliminary data. Data available beginning in 1983.

	Gear Category																			
	Cast Net pounds		Dive, Spear, Scuba pounds		Net pounds		Other pounds		Pot pounds		Rod and Reel pounds		Seine pounds		Verticcal Line pounds		All Gears pounds	
	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN	N	RowPc-tN
cyear																		
1983	3	0	84	4	109	6	.	.	1086	56	534	27	108	6	28	1	1952	100
1984	2	0	29	2	92	7	.	.	760	54	395	28	106	8	14	1	1398	100
1985	.	.	42	3	197	15	.	.	606	45	446	33	44	3	19	1	1354	100
1986	4	0	124	10	268	21	.	.	449	35	359	28	61	5	11	1	1276	100
1987	9	1	72	6	186	16	.	.	374	32	402	34	98	8	26	2	1167	100
1988	2	0	118	10	163	14	2	0	333	29	466	40	30	3	41	4	1155	100
1989	6	0	166	12	183	13	2	0	425	30	587	41	42	3	27	2	1438	100
1990	1	0	202	15	145	11	.	.	418	31	535	40	13	1	18	1	1332	100
1991	9	0	233	11	280	13	.	.	641	30	907	42	33	2	36	2	2139	100
1992	1	0	120	8	163	11	.	.	480	32	643	43	50	3	38	3	1495	100
1993	10	1	201	12	152	9	.	.	466	29	732	45	54	3	19	1	1634	100
1994	21	1	130	8	200	12	.	.	502	30	699	42	34	2	66	4	1652	100
1995	32	1	176	6	285	10	.	.	879	30	1379	47	89	3	92	3	2932	100
1996	14	0	235	6	631	17	.	.	1119	30	1438	39	84	2	173	5	3694	100
1997	44	1	251	7	710	18	.	.	1270	33	1366	36	66	2	134	3	3841	100
1998	12	0	310	9	509	14	.	.	1121	31	1453	41	28	1	144	4	3577	100
1999	6	0	301	8	631	16	.	.	1278	32	1567	40	22	1	138	3	3943	100
2000	9	0	327	8	683	17	.	.	1320	32	1609	39	18	0	135	3	4101	100
2001	10	0	343	8	711	17	.	.	1294	30	1739	41	44	1	120	3	4261	100
2002	4	0	397	9	753	17	.	.	1376	31	1757	39	60	1	154	3	4501	100
2003	.	.	386	9	673	15	.	.	1657	37	1516	34	61	1	129	3	4422	100
2004	.	.	689	20	410	12	.	.	1217	35	991	29	40	1	84	2	3431	100
2005	.	.	536	21	234	9	.	.	801	31	906	35	12	0	73	3	2562	100
All	199	0	5472	9	8368	14	4	0	19872	34	22426	38	1197	2	1719	3	59257	100

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell

.

Table 4. Monthly distribution of commercial landings (percentage of pounds sold) of mutton snapper **,** *Lutjanus analis,* sold in Puerto Rico from 1983 through 2003. 2005 Preliminary data. Data available beginning in 1983.

	Month											
CYear	1	2	3	4	5	6	7	8	9	10	11	12	All
1983	8.7	8.0	10.8	9.4	9.3	9.0	6.4	8.4	8.6	8.8	7.1	5.5	100.0
1984	9.9	10.2	8.5	10.1	6.0	6.9	11.3	8.7	8.0	7.3	8.3	4.8	100.0
1985	6.0	6.7	10.0	4.9	10.7	11.3	7.5	10.5	12.4	6.8	4.8	8.4	100.0
1986	10.2	11.5	14.1	9.8	8.1	7.4	7.0	6.1	6.7	10.3	4.6	4.1	100.0
1987	9.2	7.5	11.5	10.2	9.6	8.2	7.9	8.1	8.8	7.1	5.6	6.3	100.0
1988	4.8	8.2	11.6	9.8	14.7	9.1	7.1	8.4	11.0	7.4	5.2	2.7	100.0
1989	6.3	6.3	8.8	11.6	13.6	9.5	9.7	10.1	6.1	7.8	6.6	3.6	100.0
1990	7.7	7.8	5.9	9.1	8.5	6.6	8.0	10.3	11.5	10.0	7.7	6.9	100.0
1991	8.8	10.1	9.0	8.0	10.9	9.0	7.1	8.8	8.1	7.3	7.4	5.5	100.0
1992	9.2	8.4	10.3	17.7	10.7	3.7	5.2	5.1	10.3	9.6	4.5	5.4	100.0
1993	8.3	7.8	7.2	13.7	7.4	8.0	8.8	8.7	10.8	9.2	4.4	5.6	100.0
1994	4.4	7.5	9.7	13.2	9.7	10.7	10.8	7.2	6.4	8.8	6.9	4.6	100.0
1995	5.9	7.9	13.5	18.2	10.0	9.0	7.0	6.6	5.4	6.9	5.5	4.2	100.0
1996	7.1	7.6	12.1	12.5	9.2	6.9	8.7	9.1	6.9	7.1	6.7	6.0	100.0
1997	7.0	7.1	14.7	12.7	11.5	6.4	7.0	7.2	7.0	6.9	6.4	6.0	100.0
1998	8.8	8.1	14.0	15.2	10.7	9.0	8.7	7.3	4.8	3.9	5.0	4.5	100.0
1999	7.2	7.6	15.6	15.6	12.5	9.6	6.2	6.2	5.5	4.4	5.1	4.4	100.0
2000	9.2	9.7	10.3	9.9	15.1	7.9	7.7	7.0	7.3	6.1	5.5	4.1	100.0
2001	9.1	6.6	9.5	12.9	13.7	6.6	5.4	10.1	8.1	7.6	6.2	4.3	100.0
2002	7.6	7.5	9.4	17.4	12.4	7.6	9.2	8.1	6.1	6.0	4.9	3.9	100.0
2003	6.4	5.7	14.9	23.0	14.1	5.5	4.9	5.9	6.1	5.0	5.0	3.7	100.0
2004	10.3	12.9	8.6	11.1	8.8	8.3	5.6	7.8	8.4	6.1	5.5	6.5	100.0
2005	5.3	4.8	11.8	19.2	8.4	9.6	9.6	10.5	8.2	6.7	4.1	1.8	100.0
All	7.8	8.0	11.4	13.5	11.1	8.0	7.5	7.9	7.4	6.8	5.8	4.8	100.0

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

Table 5a. Commercial landings (pounds) of mutton snapper**,** *Lutjanus analis*, sold in Puerto Rico by area (fishing center) of sale from 1983 through 2005 preiminary data. Data available beginning in 1983.

	cyear																							
fishcent	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	All
Isabela	244	385	2548	313	.	.	85	250	572	577	337	97	681	745	645	162	70	88	226	523	67	.	.	8615
Camuy	256	127	397	15	131	214	48	48	44	162	28	.	118	80	223	640	344	539	114	186	615	75	157	4561
Hatillo	440	333	763	167	462	279	455	192	.	334	12	46	321	393	463	32	410	.	84	101	50	37	.	5374
Arecibo	.	.	.	.	4	.	30	.	130	.	10	162	42	267	144	278	183	237	1264	168	990	815	920	5644
Barcelo-neta	187	24	31	3	75	46	24	7	12	.	10	212	144	320	329	427	199	147	2715	171	99	60	24	5266
Manati	.	.	.	9	.	.	13	27	9	62	98	90	319	199	305	240	108	42	333	110	13	.	220	2197
Vega Baja	47	8	37	115	31	.	5	.	80	130	.	44	136	105	223	907	431	819	1031	587	308	.	.	5044
Vega Alta	118	38	153	95	13	48	26	282	77	40	93	89	211	152	48	79	62	34	317	227	240	179	40	2661
Dorado	89	.	8	167	.	8	32	12	217	9	.	106	78	510	265	51	106	20	1435	212	113	26	49	3513
Toa Baja	65	.	.	.	20	.	.	.	26	.	.	.	.	.	.	.	6	30	350	.	.	.	.	497
Catano	221	67	32	220	126	75	139	510	1605	1134	1293	1625	2501	902	1101	915	689	447	405	651	377	170	182	15387
San Juan	1366	1718	1772	1070	867	634	1550	1367	2368	1494	2130	2905	2880	1952	3040	3627	3973	4419	4396	2396	1154	596	1226	48900
Carolina	8	64	56	15	49	303	378	67	204	275	116	428	320	337	132	391	539	398	1405	355	.	.	.	5840
Loiza	583	31	18	334	175	118	5	125	1082	799	402	1305	1211	329	715	692	320	98	649	738	1062	443	131	11365
Rio Grande	547	567	177	270	113	42	110	62	23	182	165	9	310	611	897	570	739	571	702	898	489	269	260	8583
Luquillo	786	584	669	1210	809	175	95	.	1965	1167	334	176	650	447	610	424	618	244	142	407	49	96	8	11665
Fajardo	2752	1723	2145	2173	2131	714	1436	53	112	239	271	530	1927	3785	2932	2282	2654	1967	3936	2911	2480	2071	683	41907
Ceiba	731	514	438	108	1149	489	724	508	1147	694	1196	586	1129	1340	1310	2137	1562	2228	2847	2982	1743	2065	465	28092
Naguabo	1261	956	879	1127	847	75	825	373	200	246	198	1137	1037	673	1215	2098	1480	3140	2826	1897	3171	1410	888	27959
Humacao	820	500	479	547	341	301	310	102	187	418	1067	1001	1157	909	1037	1095	2546	1903	1724	952	3585	1608	541	23130
Yabucoa	25	253	145	284	49	277	287	104	1668	972	1493	573	1314	767	412	334	772	1554	1578	887	1742	276	418	16184
Maunabo	190	320	181	235	42	163	67	2	8	36	38	135	173	551	1160	1051	1752	1857	161	143	169	127	63	8624
Culebra	453	480	368	171	83	135	12	107	205	362	335	200	226	45	249	.	386	261	217	260	133	226	24	4938
Vieques	1669	418	973	2112	881	678	1589	773	297	693	964	179	663	2618	1955	3175	1680	832	4264	6581	5286	3912	405	42597
Patillas	1309	1634	482	88	191	126	102	263	324	311	442	169	1211	712	1163	929	1167	916	1013	443	667	690	505	14857
Arroyo	1662	1879	846	14	182	83	110	230	526	46	133	62	91	182	591	351	396	456	347	338	1272	339	288	10424
Guayama	4705	2037	1200	1463	545	204	323	552	1593	1495	1420	2150	3052	4260	4551	4303	4463	2673	3032	3069	3007	2906	1880	54883
Salinas	3310	3736	1973	2294	1094	1514	630	1350	1904	2165	2959	4840	10392	9004	8547	6521	6750	5403	5989	5386	5926	3392	2758	97837
Santa Isabel	261	140	.	.	.	63	2374	204	298	.	.	174	1023	2016	1376	1473	1907	2434	1905	1760	1109	742	678	19937
Juana Diaz	5368	4511	979	827	662	578	593	454	1401	938	461	484	794	1160	1987	846	3079	4967	2392	2388	1807	2100	2094	40870
Ponce	890	800	265	.	.	.	.	.	.	.	134	830	1030	1665	616	1247	1383	3501	1370	1509	1816	925	840	18821
Penuelas	157	20	89	47	66	18	74	68	126	85	218	78	315	280	220	456	180	562	377	287	903	678	607	5911
Guayami-lla	5234	3806	1672	1709	1429	1326	1121	509	1277	743	60	25	1679	2497	2282	2436	5597	7307	6439	5586	3619	1578	855	58786
Guanica	1914	1808	1472	796	950	1188	633	570	1334	3282	1303	2678	6327	3449	1808	5049	6976	4079	2449	6926	2837	598	220	58646
Lajas	3866	.	1202	1399	1096	1589	1679	3558	5234	3497	2369	1626	6544	8423	13598	13105	14580	13700	12073	20156	12503	2556	1334	145687
Cabo Rojo	17447	18130	18777	7043	2238	4740	8818	7206	8624	4097	2991	6187	4910	9728	8192	7235	7236	6924	6679	5949	5558	8166	6147	183022
Mayaguez	5069	4931	3216	2534	1760	2597	3256	3073	3885	3996	3163	5978	12219	10501	6831	7006	11778	7299	8442	9072	10416	3337	5177	135536
Anasco	15	.	78	10	42	132	49	30	260	134	29	139	739	555	225	104	924	229	288	368	64	57	50	4521
Rincon	243	43	235	452	187	437	140	142	360	62	196	160	983	499	572	359	380	234	150	1531	1768	208	23	9364
Aguada	166	36	45	227	238	265	326	663	342	299	1709	1783	237	1337	1621	1259	1304	850	983	1161	1068	1076	637	17632
Aguadil-la	667	465	833	675	981	1920	3283	1349	2413	1341	1182	731	1841	2157	3012	3151	3631	862	1572	1635	1797	3334	2764	41596
All	65141	53086	45633	30338	20059	21554	31756	25192	42139	32516	29359	39729	70935	76462	76602	77437	93360	84271	88621	91907	80072	47143	33561	1256873

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 5b. Percentage annual Puerto Rico commercial landings Summary by fishing center for mutton snapper, *Lutjanus analis*, proportion,all years, 2005 preliminary. Values represent cell percentages of pounds.

	cyear																							
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	All
fishcent																								
Isabela	0.4	0.7	5.6	1.0	.	.	0.3	1.0	1.4	1.8	1.1	0.2	1.0	1.0	0.8	0.2	0.1	0.1	0.3	0.6	0.1	.	.	0.7
Camuy	0.4	0.2	0.9	0.0	0.7	1.0	0.2	0.2	0.1	0.5	0.1	.	0.2	0.1	0.3	0.8	0.4	0.6	0.1	0.2	0.8	0.2	0.5	0.4
Hatillo	0.7	0.6	1.7	0.6	2.3	1.3	1.4	0.8	.	1.0	0.0	0.1	0.5	0.5	0.6	0.0	0.4	.	0.1	0.1	0.1	0.1	.	0.4
Arecibo	.	.	.	.	0.0	.	0.1	.	0.3	.	0.0	0.4	0.1	0.3	0.2	0.4	0.2	0.3	1.4	0.2	1.2	1.7	2.7	0.4
Barcelo-																								
neta	0.3	0.0	0.1	0.0	0.4	0.2	0.1	0.0	0.0	.	0.0	0.5	0.2	0.4	0.4	0.6	0.2	0.2	3.1	0.2	0.1	0.1	0.1	0.4
Manati	.	.	.	0.0	.	.	0.0	0.1	0.0	0.2	0.3	0.2	0.4	0.3	0.4	0.3	0.1	0.0	0.4	0.1	0.0	.	0.7	0.2
Vega																								
Baja	0.1	0.0	0.1	0.4	0.2	.	0.0	.	0.2	0.4	.	0.1	0.2	0.1	0.3	1.2	0.5	1.0	1.2	0.6	0.4	.	.	0.4
Vega																								
Alta	0.2	0.1	0.3	0.3	0.1	0.2	0.1	1.1	0.2	0.1	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.0	0.4	0.2	0.3	0.4	0.1	0.2
Dorado	0.1	.	0.0	0.6	.	0.0	0.1	0.0	0.5	0.0	.	0.3	0.1	0.7	0.3	0.1	0.1	0.0	1.6	0.2	0.1	0.1	0.1	0.3
Toa Baja	0.1	.	.	.	0.1	.	.	.	0.1	.	.	.	.	.	.	.	0.0	0.0	0.4	.	.	.	.	0.0
Catano	0.3	0.1	0.1	0.7	0.6	0.3	0.4	2.0	3.8	3.5	4.4	4.1	3.5	1.2	1.4	1.2	0.7	0.5	0.5	0.7	0.5	0.4	0.5	1.2
San Juan	2.1	3.2	3.9	3.5	4.3	2.9	4.9	5.4	5.6	4.6	7.3	7.3	4.1	2.6	4.0	4.7	4.3	5.2	5.0	2.6	1.4	1.3	3.7	3.9
Carolina	0.0	0.1	0.1	0.0	0.2	1.4	1.2	0.3	0.5	0.8	0.4	1.1	0.5	0.4	0.2	0.5	0.6	0.5	1.6	0.4	.	.	.	0.5
Loiza	0.9	0.1	0.0	1.1	0.9	0.5	0.0	0.5	2.6	2.5	1.4	3.3	1.7	0.4	0.9	0.9	0.3	0.1	0.7	0.8	1.3	0.9	0.4	0.9
Rio																								
Grande	0.8	1.1	0.4	0.9	0.6	0.2	0.3	0.2	0.1	0.6	0.6	0.0	0.4	0.8	1.2	0.7	0.8	0.7	0.8	1.0	0.6	0.6	0.8	0.7
Luquillo	1.2	1.1	1.5	4.0	4.0	0.8	0.3	.	4.7	3.6	1.1	0.4	0.9	0.6	0.8	0.5	0.7	0.3	0.2	0.4	0.1	0.2	0.0	0.9
Fajardo	4.2	3.2	4.7	7.2	10.6	3.3	4.5	0.2	0.3	0.7	0.9	1.3	2.7	5.0	3.8	2.9	2.8	2.3	4.4	3.2	3.1	4.4	2.0	3.3
Ceiba	1.1	1.0	1.0	0.4	5.7	2.3	2.3	2.0	2.7	2.1	4.1	1.5	1.6	1.8	1.7	2.8	1.7	2.6	3.2	3.2	2.2	4.4	1.4	2.2
Naguabo	1.9	1.8	1.9	3.7	4.2	0.3	2.6	1.5	0.5	0.8	0.7	2.9	1.5	0.9	1.6	2.7	1.6	3.7	3.2	2.1	4.0	3.0	2.6	2.2
Humacao	1.3	0.9	1.0	1.8	1.7	1.4	1.0	0.4	0.4	1.3	3.6	2.5	1.6	1.2	1.4	1.4	2.7	2.3	1.9	1.0	4.5	3.4	1.6	1.8
Yabucoa	0.0	0.5	0.3	0.9	0.2	1.3	0.9	0.4	4.0	3.0	5.1	1.4	1.9	1.0	0.5	0.4	0.8	1.8	1.8	1.0	2.2	0.6	1.2	1.3
Maunabo	0.3	0.6	0.4	0.8	0.2	0.8	0.2	0.0	0.0	0.1	0.1	0.3	0.2	0.7	1.5	1.4	1.9	2.2	0.2	0.2	0.2	0.3	0.2	0.7
Culebra	0.7	0.9	0.8	0.6	0.4	0.6	0.0	0.4	0.5	1.1	1.1	0.5	0.3	0.1	0.3	.	0.4	0.3	0.2	0.3	0.2	0.5	0.1	0.4
Vieques	2.6	0.8	2.1	7.0	4.4	3.1	5.0	3.1	0.7	2.1	3.3	0.5	0.9	3.4	2.6	4.1	1.8	1.0	4.8	7.2	6.6	8.3	1.2	3.4
Patillas	2.0	3.1	1.1	0.3	1.0	0.6	0.3	1.0	0.8	1.0	1.5	0.4	1.7	0.9	1.5	1.2	1.3	1.1	1.1	0.5	0.8	1.5	1.5	1.2
Arroyo	2.6	3.5	1.9	0.0	0.9	0.4	0.3	0.9	1.2	0.1	0.5	0.2	0.1	0.2	0.8	0.5	0.4	0.5	0.4	0.4	1.6	0.7	0.9	0.8
Guayama	7.2	3.8	2.6	4.8	2.7	0.9	1.0	2.2	3.8	4.6	4.8	5.4	4.3	5.6	5.9	5.6	4.8	3.2	3.4	3.3	3.8	6.2	5.6	4.4
Salinas	5.1	7.0	4.3	7.6	5.5	7.0	2.0	5.4	4.5	6.7	10.1	12.2	14.7	11.8	11.2	8.4	7.2	6.4	6.8	5.9	7.4	7.2	8.2	7.8
Santa																								
Isabel	0.4	0.3	.	.	.	0.3	7.5	0.8	0.7	.	.	0.4	1.4	2.6	1.8	1.9	2.0	2.9	2.1	1.9	1.4	1.6	2.0	1.6
Juana																								
Diaz	8.2	8.5	2.1	2.7	3.3	2.7	1.9	1.8	3.3	2.9	1.6	1.2	1.1	1.5	2.6	1.1	3.3	5.9	2.7	2.6	2.3	4.5	6.2	3.3
Ponce	1.4	1.5	0.6	.	.	.	.	.	.	.	0.5	2.1	1.5	2.2	0.8	1.6	1.5	4.2	1.5	1.6	2.3	2.0	2.5	1.5
Penuelas	0.2	0.0	0.2	0.2	0.3	0.1	0.2	0.3	0.3	0.3	0.7	0.2	0.4	0.4	0.3	0.6	0.2	0.7	0.4	0.3	1.1	1.4	1.8	0.5
Guayami-																								
lla	8.0	7.2	3.7	5.6	7.1	6.2	3.5	2.0	3.0	2.3	0.2	0.1	2.4	3.3	3.0	3.1	6.0	8.7	7.3	6.1	4.5	3.3	2.5	4.7
Guanica	2.9	3.4	3.2	2.6	4.7	5.5	2.0	2.3	3.2	10.1	4.4	6.7	8.9	4.5	2.4	6.5	7.5	4.8	2.8	7.5	3.5	1.3	0.7	4.7
Lajas	5.9	.	2.6	4.6	5.5	7.4	5.3	14.1	12.4	10.8	8.1	4.1	9.2	11.0	17.8	16.9	15.6	16.3	13.6	21.9	15.6	5.4	4.0	11.6
Cabo																								
Rojo	26.8	34.2	41.1	23.2	11.2	22.0	27.8	28.6	20.5	12.6	10.2	15.6	6.9	12.7	10.7	9.3	7.8	8.2	7.5	6.5	6.9	17.3	18.3	14.6
Mayaguez	7.8	9.3	7.0	8.4	8.8	12.0	10.3	12.2	9.2	12.3	10.8	15.0	17.2	13.7	8.9	9.0	12.6	8.7	9.5	9.9	13.0	7.1	15.4	10.8
Anasco	0.0	.	0.2	0.0	0.2	0.6	0.2	0.1	0.6	0.4	0.1	0.3	1.0	0.7	0.3	0.1	1.0	0.3	0.3	0.4	0.1	0.1	0.1	0.4
Rincon	0.4	0.1	0.5	1.5	0.9	2.0	0.4	0.6	0.9	0.2	0.7	0.4	1.4	0.7	0.7	0.5	0.4	0.3	0.2	1.7	2.2	0.4	0.1	0.7
Aguada	0.3	0.1	0.1	0.7	1.2	1.2	1.0	2.6	0.8	0.9	5.8	4.5	0.3	1.7	2.1	1.6	1.4	1.0	1.1	1.3	1.3	2.3	1.9	1.4
Aguadil-																								
la	1.0	0.9	1.8	2.2	4.9	8.9	10.3	5.4	5.7	4.1	4.0	1.8	2.6	2.8	3.9	4.1	3.9	1.0	1.8	1.8	2.2	7.1	8.2	3.3
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Shading depicts municipalities with combined annual landings of mutton snapper contributing 1 % or greater (by weight) .

Table 6. Annual value($) of Commercial mutton snapper, *Lutjanus analis*, landings in Puerto Rico since 1987. Data for 2005 preliminary, data available beginning in 1983.

	value
	Sum ($)
Calendar Year	
1983	70667
1984	58829
1985	58945
1986	40442
1987[1]	29828
1988	31656
1989	50843
1990	42534
1991	72655
1992	57924
1993	53586
1994	78347
1995	137981
1996	139088
1997	147226
1998	154667
1999	188864
2000	167735
2001	179053
2002	189157
2003	167002
2004	102876
2005	75442
All	2295348

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as "first class fish" (Matos-Caraballo, 2004).

. = No Reported Sales this cell

Table 7. Percentage value (% of $) of commercial landings of mutton snapper, *Lutjanus analis*, by month in Puerto Rico.

	month												
Cyear	1	2	3	4	5	6	7	8	9	10	11	12	All
1983	8.2	7.8	10.9	9.4	9.6	8.6	6.4	8.1	8.8	8.8	7.7	5.6	100.0
1984	9.3	9.9	8.9	10.7	5.7	7.3	11.3	9.2	8.0	7.2	8.2	4.4	100.0
1985	5.6	6.1	10.1	4.7	11.3	10.7	7.6	10.3	12.4	7.5	5.0	8.7	100.0
1986	10.3	10.9	14.9	10.7	9.1	7.4	7.1	5.8	6.2	8.4	4.6	4.5	100.0
1987	8.9	7.3	11.8	10.8	9.9	8.0	7.7	7.5	7.9	8.7	5.2	6.2	100.0
1988	4.7	7.9	11.8	10.0	14.0	9.3	6.9	8.1	11.1	7.7	5.7	2.7	100.0
1989	6.0	6.0	8.8	11.3	14.1	10.4	9.6	10.1	6.0	7.7	6.3	3.9	100.0
1990	8.1	7.3	5.6	8.9	8.1	7.0	8.5	9.9	11.7	10.4	7.9	6.7	100.0
1991	8.8	10.2	9.1	8.4	11.4	9.1	7.2	8.6	7.8	7.2	7.1	5.3	100.0
1992	9.4	8.1	10.1	17.5	10.8	3.7	5.3	5.3	10.2	9.7	4.5	5.4	100.0
1993	8.3	7.6	7.3	13.5	7.6	8.4	8.6	8.7	10.2	9.2	4.6	6.1	100.0
1994	4.5	8.6	9.6	13.6	10.7	10.2	9.9	7.6	6.1	8.6	6.2	4.5	100.0
1995	5.9	7.2	13.5	17.6	10.1	9.6	7.2	6.7	5.4	7.6	5.0	4.2	100.0
1996	7.2	8.3	11.8	11.5	8.9	7.1	9.0	9.2	7.1	7.2	6.6	6.1	100.0
1997	7.0	6.8	13.9	12.9	11.1	6.7	7.2	7.5	7.3	6.8	6.5	6.3	100.0
1998	8.5	8.4	13.1	14.8	11.0	9.5	8.5	7.4	5.0	4.2	4.7	4.7	100.0
1999	7.6	7.8	15.0	14.7	12.8	9.7	6.3	6.4	5.7	4.5	5.1	4.3	100.0
2000	7.8	9.9	10.2	10.3	14.7	8.5	8.0	7.4	7.1	6.4	5.4	4.3	100.0
2001	8.9	6.5	9.4	12.7	13.1	7.1	5.9	9.7	8.0	8.1	6.4	4.4	100.0
2002	7.9	7.6	9.1	16.3	12.1	7.6	9.4	8.4	6.3	6.4	5.0	3.9	100.0
2003	6.4	5.7	14.9	22.3	13.9	5.5	5.1	5.8	6.2	5.3	5.1	3.7	100.0
2004	9.9	12.1	8.4	11.2	9.0	8.9	5.8	7.6	8.8	6.1	5.6	6.5	100.0
2005	5.1	4.9	12.4	18.1	8.5	9.3	9.5	10.6	8.6	6.7	4.2	2.2	100.0
All	7.6	7.9	11.4	13.7	11.3	8.1	7.6	7.9	7.3	6.8	5.7	4.8	100.0

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

Table 8a. Annual value ($) of annual mutton snapper, *Lutjanus analis*, commercial sales in Puerto Rico by gear category, 1983-2005. 2005 Preliminary data. Data available beginning in 1983.

	agear								
	Cast Net	Dive, Spear, Scuba	Net	Other	Pot	Rod and Reel	Seine	Verticcal Line	All
	value	value	value	value	value	value	value	value	value
cyear	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
1983	89	3538	3477	.	38641	19821	4018	1083	70667
1984	72	850	3601	.	28024	19649	5250	1384	58829
1985	.	1613	7840	.	24359	21125	1350	2657	58945
1986	90	4299	8121	.	13602	11961	1558	812	40442
1987	274	1894	5332	.	8325	11056	1992	955	29828
1988	15	3729	4101	29	7336	14027	1057	1362	31656
1989	595	6831	3986	7	14169	21740	2656	860	50843
1990	15	6476	4295	.	11914	18175	1168	491	42534
1991	537	7035	8477	.	19359	34111	2194	941	72655
1992	18	4178	3878	.	15458	30054	2701	1638	57924
1993	219	6312	4646	.	15401	23669	3039	300	53586
1994	3058	4299	9447	.	18527	36329	3811	2876	78347
1995	1288	6088	14741	.	27694	82205	3088	2877	137981
1996	709	6867	21914	.	31616	70487	2957	4538	139088
1997	1934	6863	22397	.	36194	73147	3191	3500	147226
1998	404	10515	18702	.	41032	78475	2229	3311	154667
1999	163	10811	22100	.	48025	100714	1881	5172	188864
2000	291	13488	25838	.	43876	79097	695	4449	167735
2001	337	13251	24376	.	45199	88069	4594	3225	179053
2002	202	17859	23725	.	47875	89782	4866	4848	189157
2003	.	9463	14580	.	45192	89501	4328	3939	167002
2004	.	13682	9986	.	31544	41089	2535	4040	102876
2005	.	11819	5627	.	20241	35076	571	2108	75442
All	10308	171757	271187	36	633604	1089361	61727	57368	2295348

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 8b. Percentage value (% of $) of annual mutton, *Lutjanus analis*, snapper commercial sales in Puerto Rico by gear category, 1983-2005. 2005 Preliminary data. Data available beginning in 1983.

agear									
	Cast Net	Dive, Spear, Scuba	Net	Other	Pot	Rod and Reel	Seine	Verticcal Line	All
	value	value	value	value	value	value	value	value	value
	RowPct	RowPct	RowPct	RowPct	RowPct	RowPct	RowPct	RowPct	RowPct
	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
cyear									
1983	0.1	5.0	4.9	.	54.7	28.0	5.7	1.5	100.0
1984	0.1	1.4	6.1	.	47.6	33.4	8.9	2.4	100.0
1985	.	2.7	13.3	.	41.3	35.8	2.3	4.5	100.0
1986	0.2	10.6	20.1	.	33.6	29.6	3.9	2.0	100.0
1987	0.9	6.3	17.9	.	27.9	37.1	6.7	3.2	100.0
1988	0.0	11.8	13.0	0.1	23.2	44.3	3.3	4.3	100.0
1989	1.2	13.4	7.8	0.0	27.9	42.8	5.2	1.7	100.0
1990	0.0	15.2	10.1	.	28.0	42.7	2.7	1.2	100.0
1991	0.7	9.7	11.7	.	26.6	46.9	3.0	1.3	100.0
1992	0.0	7.2	6.7	.	26.7	51.9	4.7	2.8	100.0
1993	0.4	11.8	8.7	.	28.7	44.2	5.7	0.6	100.0
1994	3.9	5.5	12.1	.	23.6	46.4	4.9	3.7	100.0
1995	0.9	4.4	10.7	.	20.1	59.6	2.2	2.1	100.0
1996	0.5	4.9	15.8	.	22.7	50.7	2.1	3.3	100.0
1997	1.3	4.7	15.2	.	24.6	49.7	2.2	2.4	100.0
1998	0.3	6.8	12.1	.	26.5	50.7	1.4	2.1	100.0
1999	0.1	5.7	11.7	.	25.4	53.3	1.0	2.7	100.0
2000	0.2	8.0	15.4	.	26.2	47.2	0.4	2.7	100.0
2001	0.2	7.4	13.6	.	25.2	49.2	2.6	1.8	100.0
2002	0.1	9.4	12.5	.	25.3	47.5	2.6	2.6	100.0
2003	.	5.7	8.7	.	27.1	53.6	2.6	2.4	100.0
2004	.	13.3	9.7	.	30.7	39.9	2.5	3.9	100.0
2005	.	15.7	7.5	.	26.8	46.5	0.8	2.8	100.0
All	0.4	7.5	11.8	0.0	27.6	47.5	2.7	2.5	100.0

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cel. = No Reported Sales this cell.

Table 9a. Annual summary of value ($) Puerto Rico commercial by fishing center mutton snapper, *Lutjanus analis*, all years, all gears

	cyear																							
fishcent	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	All
Isabela	363	472	3643	470	.	.	161	395	879	808	538	153	983	1041	1111	266	135	173	535	1481	117	.	.	13723
Camuy	512	251	687	25	227	417	110	96	117	373	84	.	341	230	677	1723	829	1112	268	405	1236	188	329	10233
Hatillo	660	500	1143	251	748	500	760	280	.	835	24	72	496	1050	1116	48	1033	.	185	253	118	93	.	10163
Arecibo	.	.	.	.	8	.	53	.	293	.	25	394	87	526	406	735	446	553	2489	425	2148	2792	2088	13464
Barcelo-neta	264	34	43	5	101	100	48	16	15	.	25	444	329	465	775	840	447	273	4823	407	209	120	54	9835
Manati	.	.	.	18	.	.	33	45	27	108	195	120	575	452	601	662	260	105	821	273	33	.	550	4875
Vega Baja	91	16	74	220	47	.	10	.	184	260	.	130	335	288	631	2520	1239	2117	2911	1702	917	.	.	13689
Vega Alta	236	74	283	190	23	93	57	334	145	103	248	218	574	395	124	237	186	95	516	607	649	544	88	6015
Dorado	153	.	14	284	.	12	77	28	388	27	.	362	158	1463	875	128	271	41	2482	692	306	39	137	7935
Toa Baja	65	.	.	.	50	.	.	.	52	.	.	.	.	.	.	.	12	60	350	.	.	.	.	589
Catano	189	80	59	303	234	176	325	1050	3648	3225	3155	3518	7043	1798	2767	1878	1792	1259	1194	1796	1041	426	480	37435
San Juan	2702	3346	3511	2026	1702	1185	3247	2967	5488	3447	4805	7296	7394	4794	7817	8939	10962	10775	10546	6720	3279	1699	3173	117822
Carolina	16	78	98	36	84	582	798	154	514	785	303	827	676	754	327	904	1136	838	2963	671	.	.	.	12541
Loiza	648	48	29	516	272	228	8	240	1815	1307	706	3229	2422	543	1427	1109	524	169	1300	1393	1988	967	373	21259
Rio Grande	863	1046	308	453	191	80	240	117	58	459	387	23	762	1278	2294	1319	1537	1354	1625	2121	1161	656	704	19032
Luquillo	1059	905	1084	2177	1421	310	213	.	3757	2267	589	285	1289	997	1409	1272	1604	656	350	1253	117	212	26	23249
Fajardo	3331	2200	2875	3034	3299	1150	2301	85	198	412	514	1057	4260	8327	5987	5102	5936	4206	8504	6596	5650	5605	1700	82328
Ceiba	763	556	511	130	2185	864	1526	985	2283	1375	2393	1575	2941	3213	2932	5107	3540	5372	7327	7674	4810	5137	1147	64344
Naguabo	1324	1041	1085	1485	1043	99	1215	560	350	406	363	2195	2021	1550	2509	5448	3367	7013	5971	4259	7537	3262	2601	56701
Humacao	1083	581	613	750	468	410	466	152	336	735	2082	1787	2231	1827	2278	2318	5737	4140	4139	2313	9480	3735	1318	48976
Yabucoa	25	263	187	421	73	413	493	157	2528	1873	2578	1219	3089	1572	969	660	1797	3172	3313	1895	3485	556	849	31583
Maunabo	141	246	127	208	48	208	90	2	20	45	53	259	241	1029	2096	2468	3555	1280	382	308	303	414	189	13708
Culebra	527	499	432	214	113	166	15	161	346	670	653	395	456	79	478	.	833	564	488	582	297	506	58	8531
Vieques	1720	525	1193	2739	1120	1017	2372	1157	443	1040	1446	316	1081	4865	3934	6644	3584	1793	9235	13373	11164	8254	825	79838
Patillas	1344	1634	549	150	236	204	212	676	805	710	1087	378	2762	1731	2850	2471	3200	2402	3137	1292	2027	2051	1495	33401
Arroyo	1686	1897	879	16	852	102	132	430	1041	69	227	111	170	401	1269	861	1076	1044	774	671	2361	622	613	17301
Guayama	4557	1897	1100	1393	793	306	464	738	2126	2658	2396	4433	5719	8212	8317	8513	8696	5279	6347	6703	7356	6556	4580	99138
Salinas	3187	3492	1898	3676	1516	1950	997	2398	3261	4057	4930	9550	21350	17749	18285	14582	15251	12555	13648	12473	13766	8005	6831	195404
Santa Isabel	287	140	.	.	.	126	3395	255	494	.	.	391	2088	4536	3234	3577	5118	6641	5438	5005	3119	2196	2020	48058
Juana Diaz	5361	4844	891	675	891	520	674	469	1407	954	461	868	1507	2143	3517	1594	6101	9638	4463	4529	3789	3803	3820	62917
Ponce	1475	830	287	.	.	.	.	.	.	.	293	1586	2048	3383	1322	2684	2940	7387	3089	3483	4063	2112	1866	38847
Penuelas	213	27	114	65	89	28	138	122	223	149	380	141	558	574	443	916	371	1264	894	701	2202	1621	1458	12688
Guayami-lla	5241	3828	1672	1679	1430	1438	1292	598	1560	929	75	50	2551	3901	3484	3248	7919	10697	8841	8242	5221	2853	1836	78585
Guanica	1891	1849	1867	1135	1313	1742	1095	937	2144	5325	2232	4663	10754	5590	3215	8260	13266	7832	4924	14664	5729	1245	550	102222
Lajas	3959	.	1835	1640	1399	2145	2959	6391	9299	5655	4071	2842	12314	14073	23616	23109	27081	24719	22261	37312	22535	5101	2506	256819
Cabo Rojo	17734	19051	23523	9106	3348	7395	14411	11672	14269	6971	5471	12171	9230	15229	13318	12993	13788	13890	12409	11149	10466	16268	13688	287550
Mayaguez	5640	5786	4677	3029	2475	3813	4876	5536	6713	7056	5838	10555	20412	16547	11922	12993	20423	13313	14483	16566	19058	6588	10805	229104
Anasco	19	.	91	15	49	192	73	60	527	242	66	394	1491	853	496	232	3029	548	712	870	149	135	113	10354
Rincon	347	58	313	649	269	608	209	275	562	107	419	300	1669	800	1047	674	885	488	253	3476	3741	429	65	17639
Aguada	188	45	64	274	290	356	457	992	521	423	2589	2757	363	1468	2171	2171	2523	1384	1825	1908	2208	2005	1257	28236
Aguadil-la	805	691	1191	989	1422	2726	4847	2007	3822	2062	1890	1287	3218	3366	5185	5463	6440	1536	2840	2919	3175	6084	5252	69218
All	70667	58829	58945	40442	29828	31656	50843	42534	72655	57924	53586	78347	137981	139088	147226	154667	188864	167735	179053	189157	167002	102876	75442	2295348

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 9b. Annual summary (percentage $) of Puerto Rico commercial landings value (U.S. $) by fishing center for mutton snapper, *Lutjanus analis*, all years, all gears.

	Cyear																							
fishcent	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	All
Isabela	0.5	0.8	6.2	1.2	.	.	0.3	0.9	1.2	1.4	1.0	0.2	0.7	0.7	0.8	0.2	0.1	0.1	0.3	0.8	0.1	.	.	0.6
Camuy	0.7	0.4	1.2	0.1	0.8	1.3	0.2	0.2	0.2	0.6	0.2	.	0.2	0.2	0.5	1.1	0.4	0.7	0.1	0.2	0.7	0.2	0.4	0.4
Hatillo	0.9	0.8	1.9	0.6	2.5	1.6	1.5	0.7	.	1.4	0.0	0.1	0.4	0.8	0.8	0.0	0.5	.	0.1	0.1	0.1	0.1	.	0.4
Arecibo	.	.	.	.	0.0	.	0.1	.	0.4	.	0.0	0.5	0.1	0.4	0.3	0.5	0.2	0.3	1.4	0.2	1.3	2.7	2.8	0.6
Barcelo-neta	0.4	0.1	0.1	0.0	0.3	0.3	0.1	0.0	0.0	.	0.0	0.6	0.2	0.3	0.5	0.5	0.2	0.2	2.7	0.2	0.1	0.1	0.1	0.4
Manati	.	.	.	0.0	.	.	0.1	0.1	0.0	0.2	0.4	0.2	0.4	0.3	0.4	0.4	0.1	0.1	0.5	0.1	0.0	.	0.7	0.2
Vega Baja	0.1	0.0	0.1	0.5	0.2	.	0.0	.	0.3	0.4	.	0.2	0.2	0.2	0.4	1.6	0.7	1.3	1.6	0.9	0.5	.	.	0.6
Vega Alta	0.3	0.1	0.5	0.5	0.1	0.3	0.1	0.8	0.2	0.2	0.5	0.3	0.4	0.3	0.1	0.2	0.1	0.1	0.3	0.3	0.4	0.5	0.1	0.3
Dorado	0.2	.	0.0	0.7	.	0.0	0.2	0.1	0.5	0.0	.	0.5	0.1	1.1	0.6	0.1	0.1	0.0	1.4	0.4	0.2	0.0	0.2	0.3
Toa Baja	0.1	.	.	.	0.2	.	.	.	0.1	.	.	.	.	.	.	.	0.0	0.0	0.2	.	.	.	.	0.0
Catano	0.3	0.1	0.1	0.7	0.8	0.6	0.6	2.5	5.0	5.6	5.9	4.5	5.1	1.3	1.9	1.2	0.9	0.8	0.7	0.9	0.6	0.4	0.6	1.6
San Juan	3.8	5.7	6.0	5.0	5.7	3.7	6.4	7.0	7.6	6.0	9.0	9.3	5.4	3.4	5.3	5.8	5.8	6.4	5.9	3.6	2.0	1.7	4.2	5.1
Carolina	0.0	0.1	0.2	0.1	0.3	1.8	1.6	0.4	0.7	1.4	0.6	1.1	0.5	0.5	0.2	0.6	0.6	0.5	1.7	0.4	.	.	.	0.5
Loiza	0.9	0.1	0.0	1.3	0.9	0.7	0.0	0.6	2.5	2.3	1.3	4.1	1.8	0.4	1.0	0.7	0.3	0.1	0.7	0.7	1.2	0.9	0.5	0.9
Rio Grande	1.2	1.8	0.5	1.1	0.6	0.3	0.5	0.3	0.1	0.8	0.7	0.0	0.6	0.9	1.6	0.9	0.8	0.8	0.9	1.1	0.7	0.6	0.9	0.8
Luquillo	1.5	1.5	1.8	5.4	4.8	1.0	0.4	.	5.2	3.9	1.1	0.4	0.9	0.7	1.0	0.8	0.8	0.4	0.2	0.7	0.1	0.2	0.0	1.0
Fajardo	4.7	3.7	4.9	7.5	11.1	3.6	4.5	0.2	0.3	0.7	1.0	1.3	3.1	6.0	4.1	3.3	3.1	2.5	4.7	3.5	3.4	5.4	2.3	3.6
Ceiba	1.1	0.9	0.9	0.3	7.3	2.7	3.0	2.3	3.1	2.4	4.5	2.0	2.1	2.3	2.0	3.3	1.9	3.2	4.1	4.1	2.9	5.0	1.5	2.8
Naguabo	1.9	1.8	1.8	3.7	3.5	0.3	2.4	1.3	0.5	0.7	0.7	2.8	1.5	1.1	1.7	3.5	1.8	4.2	3.3	2.3	4.5	3.2	3.4	2.5
Humacao	1.5	1.0	1.0	1.9	1.6	1.3	0.9	0.4	0.5	1.3	3.9	2.3	1.6	1.3	1.5	1.5	3.0	2.5	2.3	1.2	5.7	3.6	1.7	2.1
Yabucoa	0.0	0.4	0.3	1.0	0.2	1.3	1.0	0.4	3.5	3.2	4.8	1.6	2.2	1.1	0.7	0.4	1.0	1.9	1.9	1.0	2.1	0.5	1.1	1.4
Maunabo	0.2	0.4	0.2	0.5	0.2	0.7	0.2	0.0	0.0	0.1	0.1	0.3	0.2	0.7	1.4	1.6	1.9	0.8	0.2	0.2	0.2	0.4	0.3	0.6
Culebra	0.7	0.8	0.7	0.5	0.4	0.5	0.0	0.4	0.5	1.2	1.2	0.5	0.3	0.1	0.3	.	0.4	0.3	0.3	0.2	0.2	0.5	0.1	0.4
Vieques	2.4	0.9	2.0	6.8	3.8	3.2	4.7	2.7	0.6	1.8	2.7	0.4	0.8	3.5	2.7	4.3	1.9	1.1	5.2	7.1	6.7	8.0	1.1	3.5
Patillas	1.9	2.8	0.9	0.4	0.8	0.6	0.4	1.6	1.1	1.2	2.0	0.5	2.0	1.2	1.9	1.6	1.7	1.4	1.8	0.7	1.2	2.0	2.0	1.5
Arroyo	2.4	3.2	1.5	0.0	2.9	0.3	0.3	1.0	1.4	0.1	0.4	0.1	0.1	0.3	0.9	0.6	0.6	0.6	0.4	0.4	1.4	0.6	0.8	0.8
Guayama	6.4	3.2	1.9	3.4	2.7	1.0	0.9	1.7	2.9	4.6	4.5	5.7	4.1	5.9	5.6	5.5	4.6	3.1	3.5	3.5	4.4	6.4	6.1	4.3
Salinas	4.5	5.9	3.2	9.1	5.1	6.2	2.0	5.6	4.5	7.0	9.2	12.2	15.5	12.8	12.4	9.4	8.1	7.5	7.6	6.6	8.2	7.8	9.1	8.5
Santa Isabel	0.4	0.2	.	.	.	0.4	6.7	0.6	0.7	.	.	0.5	1.5	3.3	2.2	2.3	2.7	4.0	3.0	2.6	1.9	2.1	2.7	2.1
Juana Diaz	7.6	8.2	1.5	1.7	3.0	1.6	1.3	1.1	1.9	1.6	0.9	1.1	1.1	1.5	2.4	1.0	3.2	5.7	2.5	2.4	2.3	3.7	5.1	2.7
Ponce	2.1	1.4	0.5	.	.	.	.	.	.	.	0.5	2.0	1.5	2.4	0.9	1.7	1.6	4.4	1.7	1.8	2.4	2.1	2.5	1.7
Penuelas	0.3	0.0	0.2	0.2	0.3	0.1	0.3	0.3	0.3	0.3	0.7	0.2	0.4	0.4	0.3	0.6	0.2	0.8	0.5	0.4	1.3	1.6	1.9	0.6
Guayami-lla	7.4	6.5	2.8	4.2	4.8	4.5	2.5	1.4	2.1	1.6	0.1	0.1	1.8	2.8	2.4	2.1	4.2	6.4	4.9	4.4	3.1	2.8	2.4	3.4
Guanica	2.7	3.1	3.2	2.8	4.4	5.5	2.2	2.2	3.0	9.2	4.2	6.0	7.8	4.0	2.2	5.3	7.0	4.7	2.8	7.8	3.4	1.2	0.7	4.5
Lajas	5.6	.	3.1	4.1	4.7	6.8	5.8	15.0	12.8	9.8	7.6	3.6	8.9	10.1	16.0	14.9	14.3	14.7	12.4	19.7	13.5	5.0	3.3	11.2
Cabo Rojo	25.1	32.4	39.9	22.5	11.2	23.4	28.3	27.4	19.6	12.0	10.2	15.5	6.7	10.9	9.0	8.4	7.3	8.3	6.9	5.9	6.3	15.8	18.1	12.5
Mayaguez	8.0	9.8	7.9	7.5	8.3	12.0	9.6	13.0	9.2	12.2	10.9	13.5	14.8	11.9	8.1	8.4	10.8	7.9	8.1	8.8	11.4	6.4	14.3	10.0
Anasco	0.0	.	0.2	0.0	0.2	0.6	0.1	0.1	0.7	0.4	0.1	0.5	1.1	0.6	0.3	0.2	1.6	0.3	0.4	0.5	0.1	0.1	0.1	0.5
Rincon	0.5	0.1	0.5	1.6	0.9	1.9	0.4	0.6	0.8	0.2	0.8	0.4	1.2	0.6	0.7	0.4	0.5	0.3	0.1	1.8	2.2	0.4	0.1	0.8
Aguada	0.3	0.1	0.1	0.7	1.0	1.1	0.9	2.3	0.7	0.7	4.8	3.5	0.3	1.1	1.5	1.4	1.3	0.8	1.0	1.0	1.3	1.9	1.7	1.2
Aguadil-la	1.1	1.2	2.0	2.4	4.8	8.6	9.5	4.7	5.3	3.6	3.5	1.6	2.3	2.4	3.5	3.5	3.4	0.9	1.6	1.5	1.9	5.9	7.0	3.0
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 10. Annual Puerto Rico commercial landings average price per pound ($) mutton snapper, *Lutjanus analis*, by gear, years combined .

	cyear																							
agear	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	All
Cast Net	1.25	1.00	.	1.20	1.47	1.00	1.50	1.00	1.44	2.00	1.83	2.23	2.13	2.25	1.89	2.21	1.63	2.12	1.75	2.75	.	.	.	1.92
Dive, Spear, Scuba	1.33	1.42	1.45	1.51	1.68	1.65	1.67	1.81	1.88	2.00	1.94	1.91	1.94	2.04	2.03	2.08	2.15	2.24	2.29	2.30	2.36	2.31	2.37	2.10
Net	1.09	1.10	1.22	1.22	1.47	1.45	1.51	1.61	1.64	1.75	1.96	1.99	1.90	1.81	1.78	1.89	1.91	1.92	1.87	2.00	1.90	1.90	2.10	1.80
Other	.	.	.	.	.	1.75	1.75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.75
Pot	1.02	1.04	1.16	1.26	1.33	1.35	1.59	1.79	1.67	1.72	1.79	1.91	1.90	1.98	1.98	2.14	2.12	2.10	2.21	2.19	2.26	2.22	2.31	1.89
Rod and Reel	1.29	1.31	1.38	1.48	1.60	1.55	1.65	1.70	1.79	1.94	1.90	2.03	2.02	1.87	2.03	2.03	2.17	2.10	2.14	2.18	2.19	2.26	2.31	1.98
Seine	0.99	1.00	1.11	1.50	1.38	1.27	1.44	1.46	1.65	1.81	1.64	1.68	1.95	2.06	1.93	1.85	1.72	1.95	2.00	1.86	2.09	2.10	2.60	1.62
Verticc-al Line	1.16	1.14	1.42	1.26	1.44	1.51	1.69	1.67	1.98	2.27	2.11	2.15	1.95	1.98	2.13	2.06	2.41	2.49	2.50	2.43	2.53	2.46	2.29	2.18
All	1.11	1.13	1.25	1.35	1.47	1.48	1.61	1.73	1.74	1.86	1.87	1.98	1.96	1.91	1.97	2.05	2.11	2.09	2.14	2.17	2.20	2.22	2.30	1.94

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as “first class fish” (Matos-Caraballo, 2004).

. = No Reported Sales this cell.

Table 11. Summary statistics for mutton snapper commercial sales records in Puerto Rico, 1983-2004, all gears and years combined. Q1 and Q3 =lower25th and upper 75th percentiles on variable CPUE (pounds per trip).

Ntrips	N-# sales	CumN	CumPct	Mean	Min	Max	StdDev	Q1	Q3		% Diff in StdDev and CPUE) Value
1	33839	33839	0.68	17.3	0.5	1900	35.4	6	18		104.62
2	3114	36953	0.74	10	0.5	200	11.2	4	12.5		12.00
3	2563	39516	0.79	7.8	0.3	133.7	9.5	3.3	8.7		21.79
4	1953	41469	0.83	6.8	0.3	256.3	9.6	2.5	7.5		41.18
5	1668	43137	0.86	5.1	0.2	120	8.1	2	5.4		58.82
6	1354	44491	0.89	4.6	0.2	223.3	9.5	1.5	4.8		106.52
7	829	45320	0.90	3.6	0.2	211.4	8.8	1.1	3.1		144.44
8	823	46143	0.92	4.3	0.1	100	6.9	1.4	4.4		60.47
9	409	46552	0.93	4.2	0.1	113.9	7.3	1.2	4.9		73.81
10	740	47292	0.94	7.6	0.1	790	36.7	1.2	4.8		382.89
11	234	47526	0.95	6.8	0.1	240	20.2	1.1	4.4		197.06
12	438	47964	0.96	5.4	0.3	472	24.8	1	3.3		359.26
13	129	48093	0.96	4.9	0.2	90	11.4	1	3.1		132.65
14	226	48319	0.96	4.7	0.1	210	15.4	0.9	3.6		227.66
15	282	48601	0.97	5.1	0.1	310	22.3	0.8	2.8		337.25
16	238	48839	0.98	2.4	0.1	34	4	0.9	2.4		66.67
17	113	48952	0.98	7.5	0.1	245	26.7	1	2.8		256.00
18	158	49110	0.98	2	0.1	15.3	2.2	0.8	2.5		10.00
19	111	49221	0.98	2.2	0.2	17.2	2.9	0.6	2.7		31.82
20	321	49542	0.99	2.7	0.1	96	6.4	0.8	2.5		137.04
21	70	49612	0.99	3.1	0.2	32.5	5	0.7	3.4		61.29
22	62	49674	0.99	1.8	0.2	12.7	2.4	0.5	2		33.33
23	46	49720	0.99	2.6	0.1	27.5	5.8	0.4	2.1		123.08
24	70	49790	0.99	2.6	0.1	28.5	4	0.5	2.9		53.85
25	65	49855	1.00	1.8	0.1	12.4	2	0.5	2.3		11.11
26	34	49889	1.00	1	0.1	4	0.8	0.5	1.3		-20.00
27	24	49913	1.00	0.8	0.2	2.2	0.6	0.3	1.4		-25.00
28	22	49935	1.00	0.8	0.1	2.4	0.7	0.4	1.4		-12.50
29	4	49939	1.00	0.2	0.1	0.4	0.1	0.2	0.3		-50.00
30	44	49983	1.00	1.5	0.1	10.8	1.8	0.4	1.8		20.00
31	5	49988	1.00	0.5	0	0.8	0.3	0.4	0.8		-40.00
32	3	49991	1.00	1.1	0.4	2.2	0.9	0.4	2.2		-18.18
33	5	49996	1.00	2.5	0	9.1	3.8	0.2	2.6		52.00
34	1	49997	1.00	2.9	2.9	2.9	.	2.9	2.9		
36	4	50001	1.00	1.2	0.4	2.8	1.1	0.5	1.9		-8.33
37	1	50002	1.00	0.8	0.8	0.8	.	0.8	0.8		
38	4	50006	1.00	0.9	0.4	1.6	0.6	0.4	1.4		-33.33
39	2	50008	1.00	0.2	0.1	0.4	0.2	0.1	0.4		0.00
40	17	50025	1.00	4.1	0.1	50	11.9	0.5	1.9		190.24
41	1	50026	1.00	0.2	0.2	0.2	.	0.2	0.2		
42	2	50028	1.00	0.3	0.2	0.5	0.2	0.2	0.5		-33.33
43	1	50029	1.00	0.1	0.1	0.1	.	0.1	0.1		
44	2	50031	1.00	0.5	0.2	0.8	0.4	0.2	0.8		-20.00
45	1	50032	1.00	0	0	0	.	0	0		
46	1	50033	1.00	0.1	0.1	0.1	.	0.1	0.1		
47	2	50035	1.00	1	0.1	1.9	1.3	0.1	1.9		30.00

48	4	50039	1.00	1	0.1	1.5	0.6	0.5	1.4	-40.00
50	2	50041	1.00	0.1	0.1	0.1	0	0.1	0.1	-100.00
51	1	50042	1.00	0.5	0.5	0.5	.	0.5	0.5	
52	1	50043	1.00	0.4	0.4	0.4	.	0.4	0.4	
53	2	50045	1.00	0.4	0.2	0.6	0.2	0.2	0.6	-50.00
54	1	50046	1.00	0.2	0.2	0.2	.	0.2	0.2	
55	2	50048	1.00	0.3	0.2	0.4	0.2	0.2	0.4	-33.33
56	1	50049	1.00	0.7	0.7	0.7	.	0.7	0.7	
58	3	50052	1.00	0.2	0.1	0.3	0.1	0.1	0.3	-50.00
59	1	50053	1.00	0.6	0.6	0.6	.	0.6	0.6	
60	3	50056	1.00	0.4	0.1	0.7	0.3	0.1	0.7	-25.00
62	1	50057	1.00	0.4	0.4	0.4	.	0.4	0.4	
63	2	50059	1.00	1	0.1	1.9	1.3	0.1	1.9	30.00
64	1	50060	1.00	1.2	1.2	1.2	.	1.2	1.2	
70	1	50061	1.00	0.4	0.4	0.4	.	0.4	0.4	
78	1	50062	1.00	0.6	0.6	0.6	.	0.6	0.6	
79	1	50063	1.00	0.4	0.4	0.4	.	0.4	0.4	
87	1	50064	1.00	0.5	0.5	0.5	.	0.5	0.5	
88	1	50065	1.00	0.1	0.1	0.1	.	0.1	0.1	
90	1	50066	1.00	0.4	0.4	0.4	.	0.4	0.4	
94	1	50067	1.00	0.1	0.1	0.1	.	0.1	0.1	
97	3	50070	1.00	0.4	0.3	0.6	0.2	0.3	0.6	-50.00
99	8	50078	1.00	0.5	0	1.3	0.4	0.2	0.9	-20.00
All	50078	50078	1.00	13.8	0	1900	30.5	4	15	121.01
										-121.01

.= No Data in this cell, excluded from CPUE calculations if the observation equaled zero, if n=1 excluded from calculation of the Standard Deviation of CPUE (StdDev).

Table 12a. Nominal unadjusted catch per unit of effort (CPUE) for mutton snapper commercial catches in Puerto Rico, 1983-2005, by gear and year for fisher sales where the 'ntrips' variable was coded as ntrips=1 trip. CPUE calculated as pounds per landed trip.

	Cast Net		Dive, Spear, Scuba		Net		Pot		Rod and Reel		Seine		Verticcal Line		All Gears	
	cpue		cpue		cpue		cpue		cpue		cpue		cpue		cpue	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean		
1983	1	10	41	26.4	19	14.7	306	13.1	210	15.2	18	11.8	12	9.4	607	14.7
1984	1	60	3	11.7	6	89.7	85	44.8	18	63.3	7	152	2	179	122	57.4
1985	.	.	3	8.3	36	19.1	69	16.6	68	17.7	4	23.3	2	35	182	17.7
1986	1	10	1	7	10	38.7	10	19.2	12	22.1	1	6	.	.	35	24.8
1987	.	.	1	12	1	72	8	11.5	9	13.2	1	30	.	.	20	16.3
1988	2	7.5	97	17.7	135	21.1	237	13.9	366	19.5	28	23.1	36	22.4	903	18.3
1989	4	73	138	23.1	120	15.4	303	18.9	376	21.2	25	30.6	19	21	986	20.4
1990	1	15	147	13.5	78	17	125	17.1	267	15.4	2	85	3	9.7	623	15.7
1991	4	34	149	11.7	156	13.9	215	16.6	399	17.3	3	15.7	26	12.4	952	15.6
1992	1	9	64	16.1	107	13.4	130	12.4	275	19.1	9	29.7	21	17.4	607	16.4
1993	3	11.7	93	12.1	83	10	132	13.7	297	15.2	50	35.5	18	7.1	676	15.1
1994	11	76.6	81	14.3	122	19.6	229	13.4	421	27	26	76.8	23	19.7	913	23.3
1995	26	23.3	109	12.2	163	17.9	488	11.6	798	27.5	59	18.6	39	13.3	1682	20.3
1996	4	18	149	10.1	260	16.9	431	12.1	807	26.2	38	18.7	45	13.1	1734	19.4
1997	26	21.8	171	12.1	281	13.7	323	12	778	29.5	12	30.3	10	23.3	1601	21.2
1998	5	16	130	14.1	160	18	413	12.1	649	23.4	8	39.2	66	6.9	1431	18
1999	1	30	197	12	366	16.7	736	13.6	833	23.7	5	70	61	9.6	2199	17.8
2000	4	9.6	246	16.5	380	18.1	758	15.1	940	18.9	10	28.4	85	12.9	2423	17.2
2001	10	21.6	290	15	488	17.9	781	12.6	1238	22.8	30	73.7	66	9.9	2903	18.7
2002	2	18.6	279	21.2	513	15.2	861	12.5	1202	17.9	52	56	107	9.9	3016	16.6
2003	.	.	385	10.7	661	11.2	1641	11.7	1484	29.2	61	40.3	129	12.6	4361	17.9
2004	.	.	689	8.8	410	12.8	1214	11.4	990	19.3	39	33.1	84	16.5	3426	13.7
2005	.	.	536	9.4	234	10.4	801	11	903	17.7	12	19.3	73	13.1	2559	13.1
All	107	28.7	3999	12.9	4789	15.3	10296	13	13340	22.5	500	38.6	927	13.2	33961	17.5

[1]Prior to 1987 mutton snapper was classified in the Puerto Rico commercial landings as "first class fish" (Matos-Caraballo, 2004).
. = No Reported Sales this cell.
Also, there were 3 positive landings observations from gear = unknown that were excluded.
Shading (in all column) denotes very low levels of sussessful landings reports for mutton snapper.

Table 12b. .Relative contribution (number of positive landings) of mutton snapper from Puerto Rico commercial landings by gear and year for 1983 through 2005 (data from Table 12a).

	Cast Net		Dive, Spear, Scuba		Net		Pot			Rod and Reel		Vertical line		All Gears		
	N	RowPctN	N	RowPctN	N	N	RowPctN	N	RowPctN	N	RowPctN	N	RowPctN	N	RowPctN	
Cear									210.0	34.6	18.0	3.0	12.0	2.0	607.0	100.0
1983	1.0	0.2	41.0	6.8	19.0	3.1	306.0	50.4								
1984	1.0	0.8	3.0	2.5	6.0	4.9	85.0	69.7	18.0	14.8	7.0	5.7	2.0	1.6	122.0	100.0
1985	.	.	3.0	1.6	36.0	19.8	69.0	37.9	68.0	37.4	4.0	2.2	2.0	1.1	182.0	100.0
1986	1.0	2.9	1.0	2.9	10.0	28.6	10.0	28.6	12.0	34.3	1.0	2.9	.	.	35.0	100.0
1987	.	.	1.0	5.0	1.0	5.0	8.0	40.0	9.0	45.0	1.0	5.0	.	.	20.0	100.0
1988	2.0	0.2	97.0	10.7	135.0	15.0	237.0	26.2	366.0	40.5	28.0	3.1	36.0	4.0	903.0	100.0
1989	4.0	0.4	138.0	14.0	120.0	12.2	303.0	30.7	376.0	38.1	25.0	2.5	19.0	1.9	986.0	100.0
1990	1.0	0.2	147.0	23.6	78.0	12.5	125.0	20.1	267.0	42.9	2.0	0.3	3.0	0.5	623.0	100.0
1991	4.0	0.4	149.0	15.7	156.0	16.4	215.0	22.6	399.0	41.9	3.0	0.3	26.0	2.7	952.0	100.0
1992	1.0	0.2	64.0	10.5	107.0	17.6	130.0	21.4	275.0	45.3	9.0	1.5	21.0	3.5	607.0	100.0
1993	3.0	0.4	93.0	13.8	83.0	12.3	132.0	19.5	297.0	43.9	50.0	7.4	18.0	2.7	676.0	100.0
1994	11.0	1.2	81.0	8.9	122.0	13.4	229.0	25.1	421.0	46.1	26.0	2.8	23.0	2.5	913.0	100.0
1995	26.0	1.5	109.0	6.5	163.0	9.7	488.0	29.0	798.0	47.4	59.0	3.5	39.0	2.3	1682	100.0
1996	4.0	0.2	149.0	8.6	260.0	15.0	431.0	24.9	807.0	46.5	38.0	2.2	45.0	2.6	1734	100.0
1997	26.0	1.6	171.0	10.7	281.0	17.6	323.0	20.2	778.0	48.6	12.0	0.7	10.0	0.6	1601	100.0
1998	5.0	0.3	130.0	9.1	160.0	11.2	413.0	28.9	649.0	45.4	8.0	0.6	66.0	4.6	1431	100.0
1999	1.0	0.0	197.0	9.0	366.0	16.6	736.0	33.5	833.0	37.9	5.0	0.2	61.0	2.8	2199	100.0
2000	4.0	0.2	246.0	10.2	380.0	15.7	758.0	31.3	940.0	38.8	10.0	0.4	85.0	3.5	2423	100.0
2001	10.0	0.3	290.0	10.0	488.0	16.8	781.0	26.9	1238	42.6	30.0	1.0	66.0	2.3	2903	100.0
2002	2.0	0.1	279.0	9.3	513.0	17.0	861.0	28.5	1202	39.9	52.0	1.7	107.0	3.5	3016	100.0
2003	.	.	385.0	8.8	661.0	15.2	1641	37.6	1484	34.0	61.0	1.4	129.0	3.0	4361	100.0
2004	.	.	689.0	20.1	410.0	12.0	1214	35.4	990.0	28.9	39.0	1.1	84.0	2.5	3426	100.0
2005	.	.	536.0	20.9	234.0	9.1	801.0	31.3	903.0	35.3	12.0	0.5	73.0	2.9	2559	100.0
All	107.0	0.3	3999	11.8	4789	14.1	10296	30.3	13340	39.3	500.0	1.5	927.0	2.7	33961	100.0

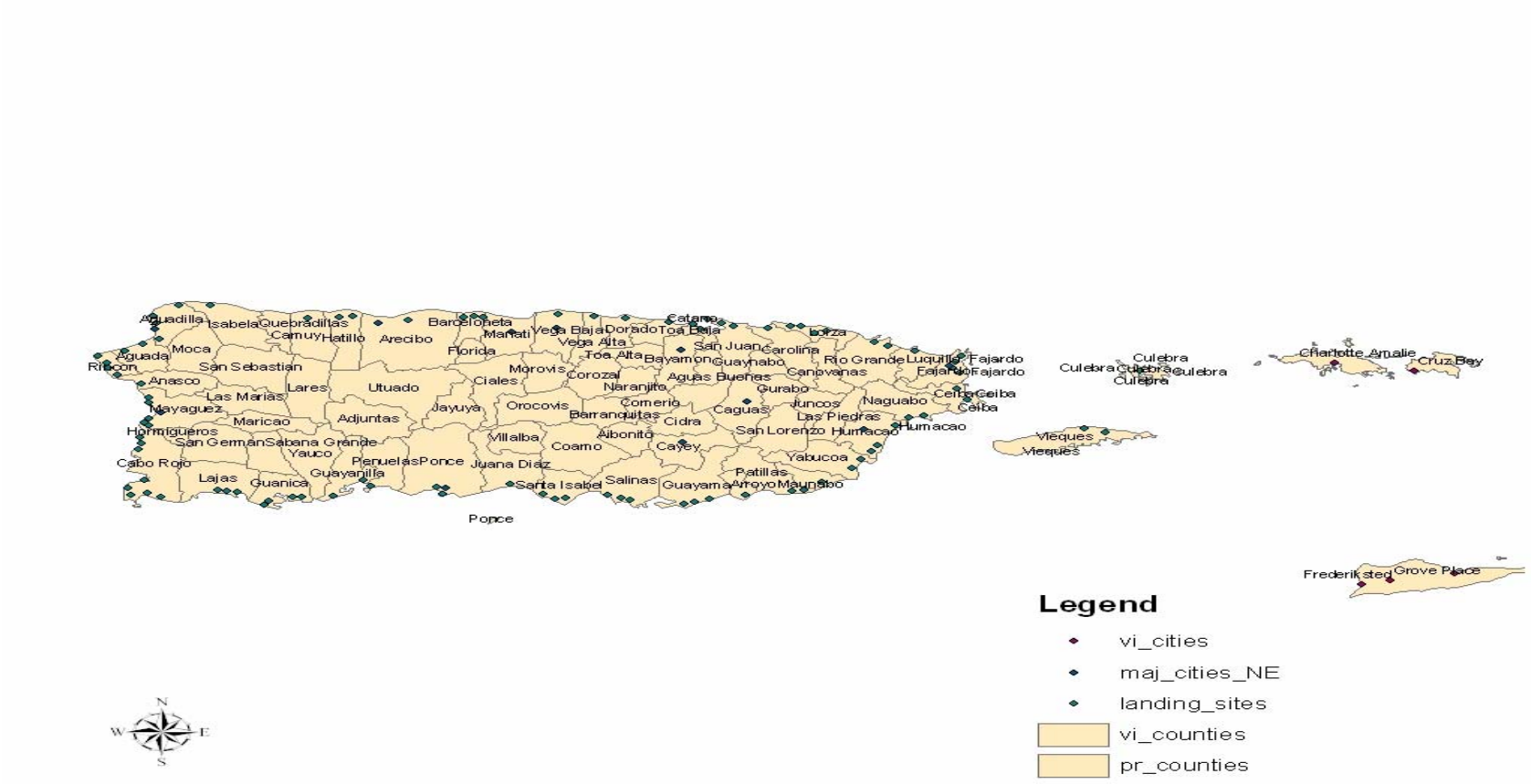

Figure 1. Puerto Rico fishing center locations used by the PR DNER, CSP, FSP in the landings data recording. [Landing site location GIS shape file, courtesy of H. Stone)

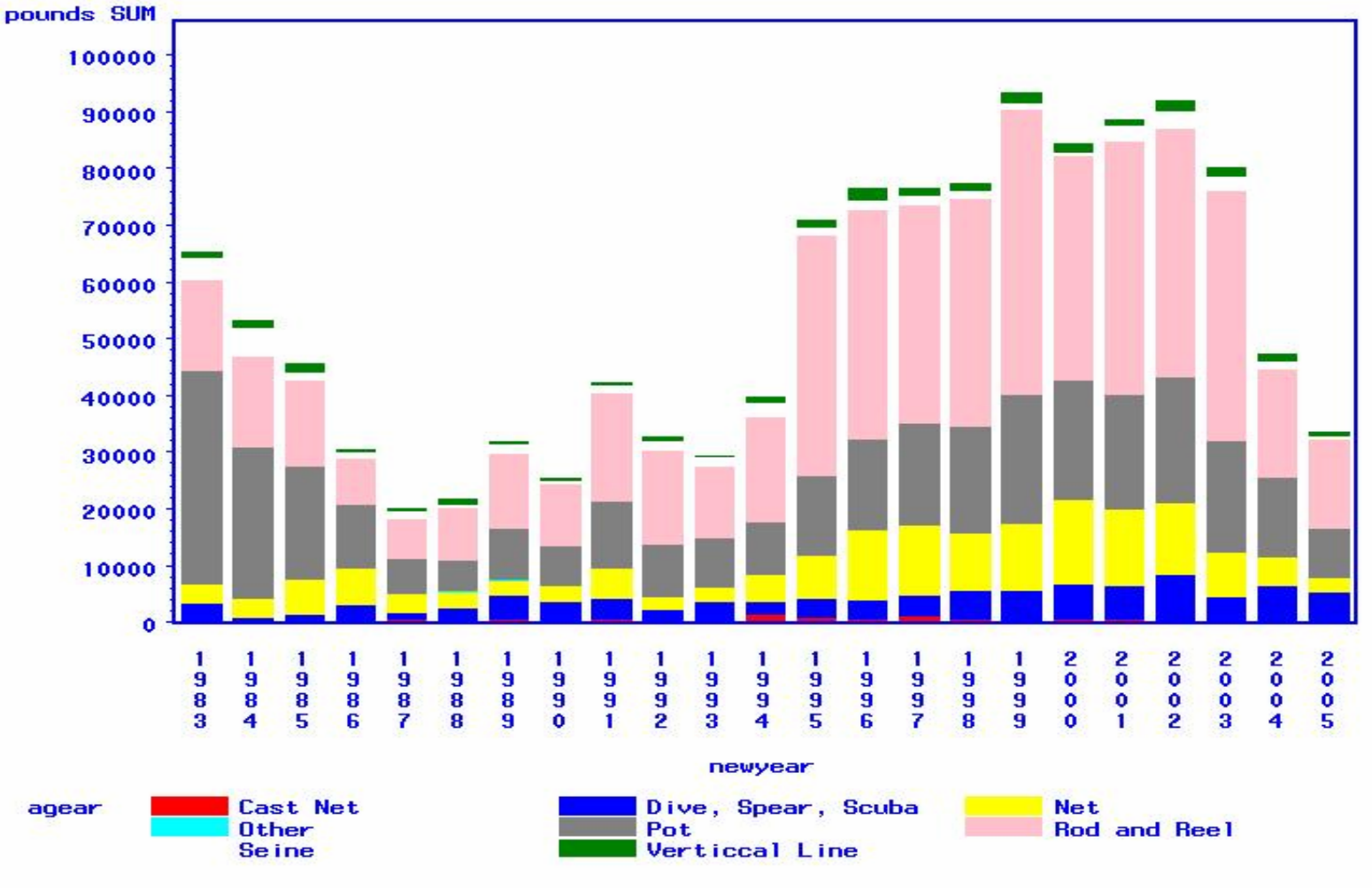

Figure 2a. Reported commercial landings (pounds) of mutton snapper, *Lutjanus analis*, sold in Puerto Rico, 1983 through 2005, by gear category.

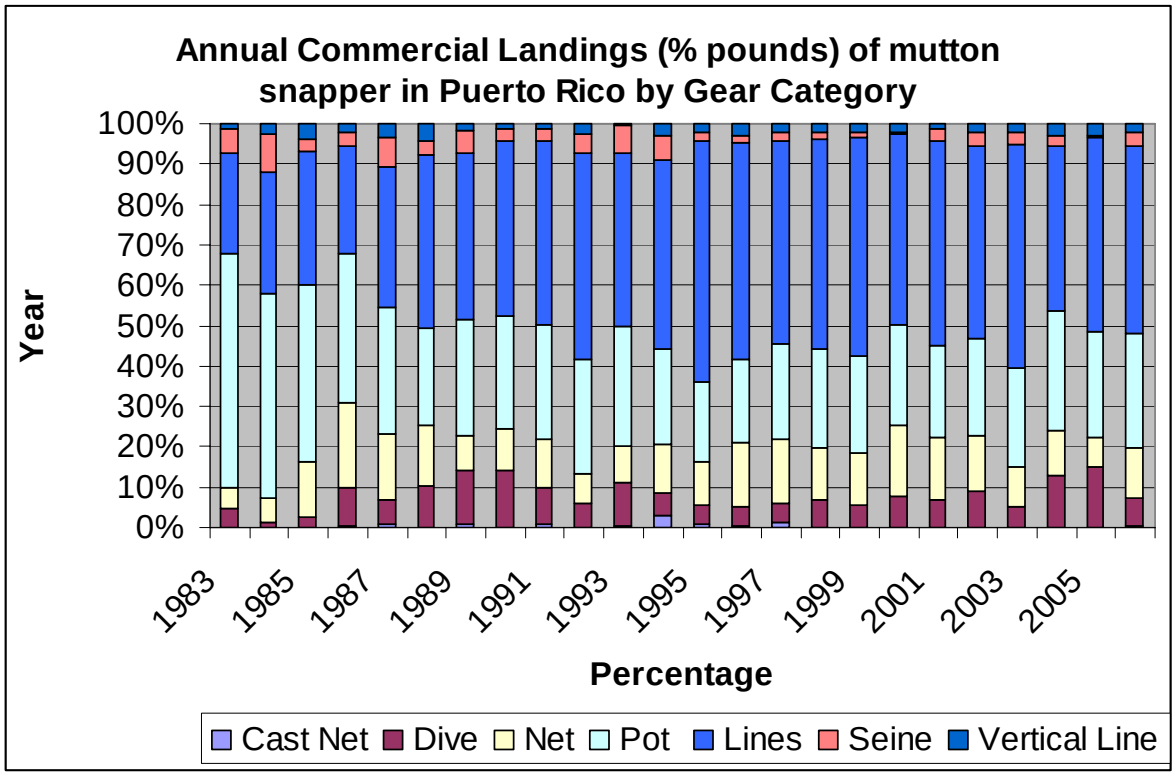

Figure 2b. Percentage composition of reported commercial landings of mutton snapper, *Lutjanus analis*, in Puerto Rico by gear category, 1983-2004.

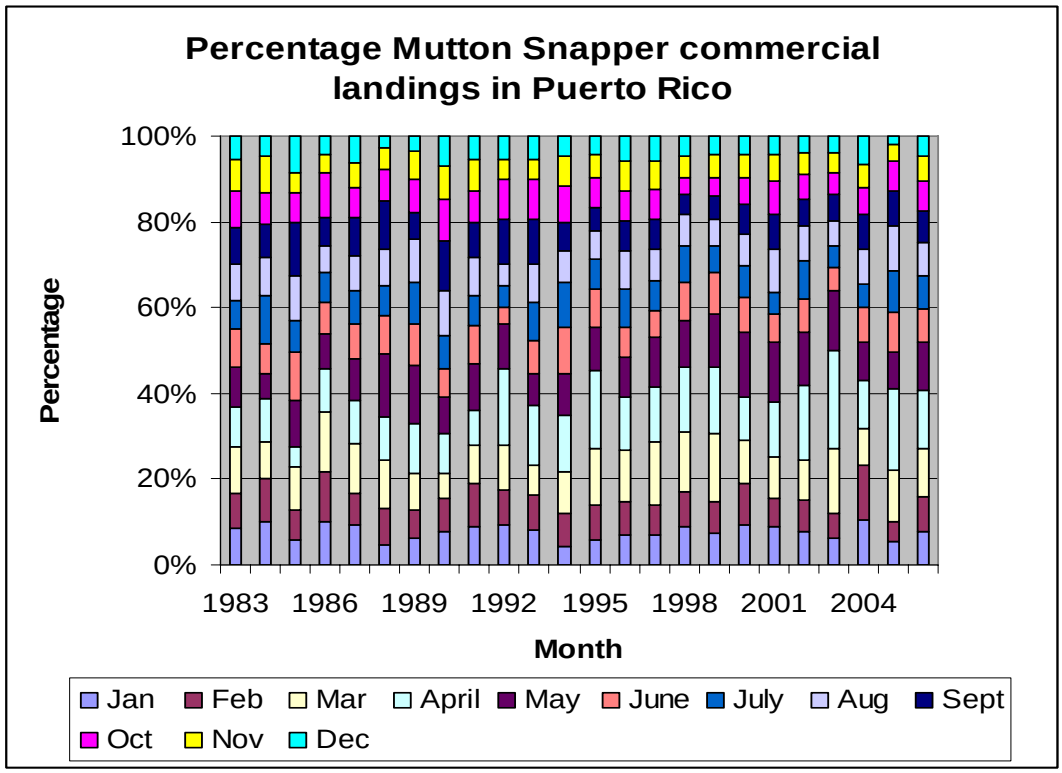

Figure 3a. Monthly distribution (%) of annual landings by year of mutton snapper, Lutjanus anali. Percentages sum to 1.0 within a year, across months, reflecting intra annual change in reported landings.

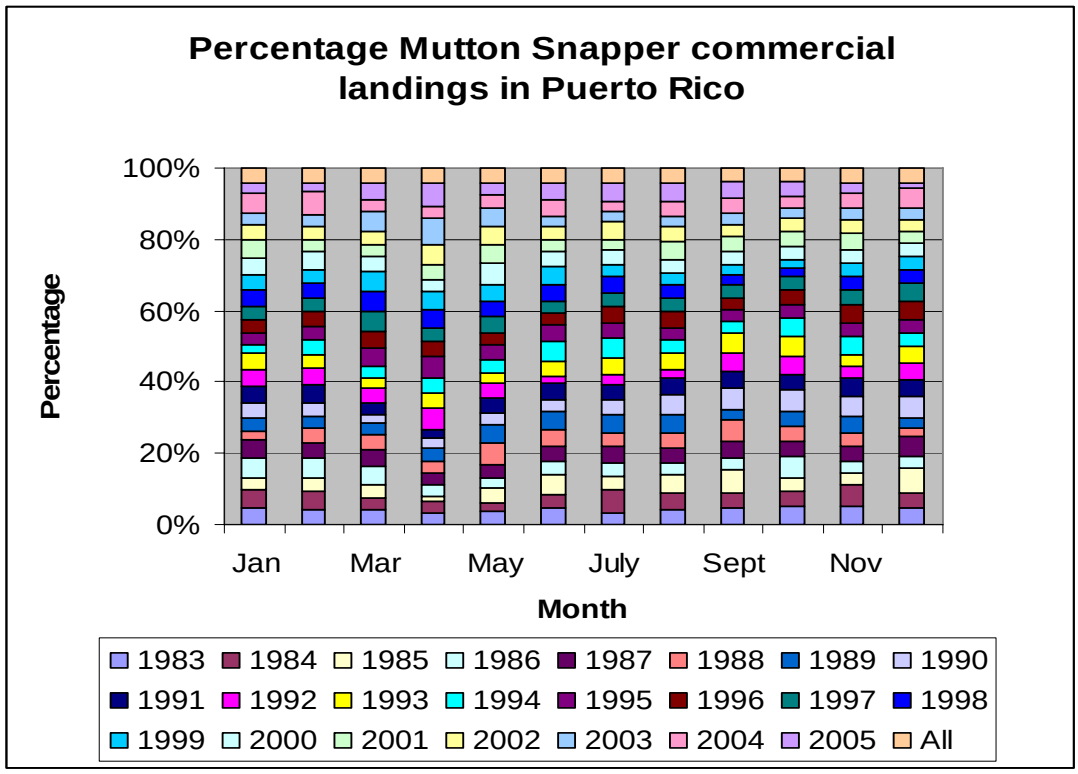

Figure 3b. Distribution (%) of annual landings by month of mutton snapper, , *Lutjanus analis.* *P*ercentages add to 1.0 within across years, reflecting change in reported landings within a month across years.

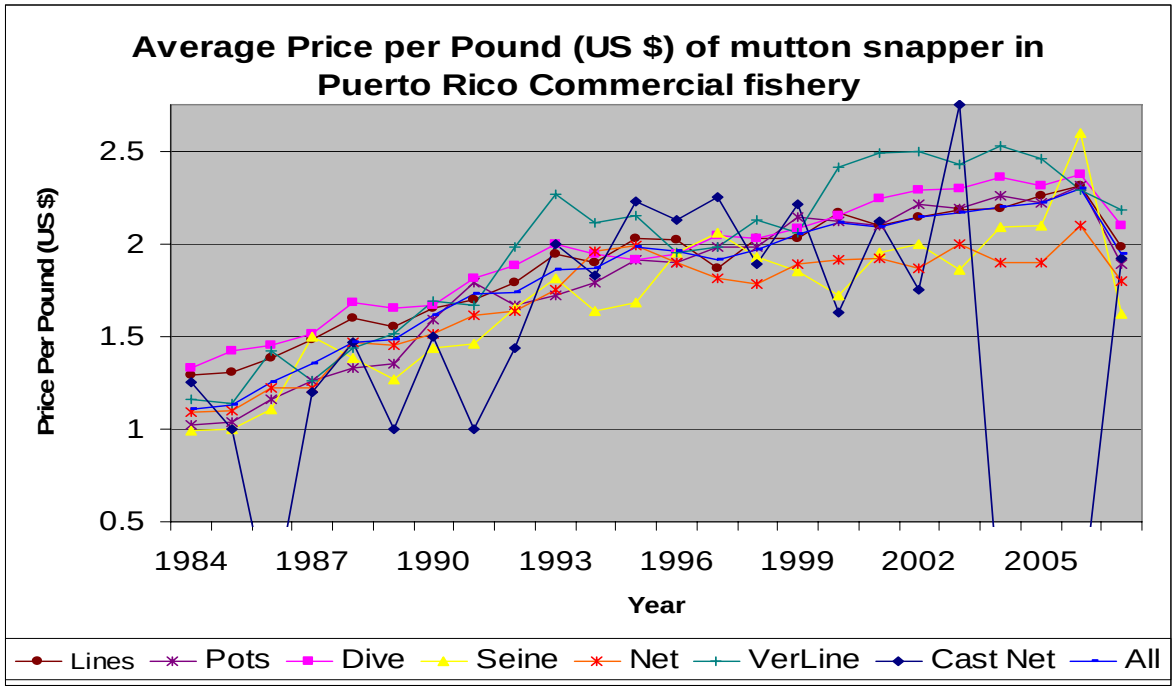

Figure 4. Average annual price per pound of mutton snapper landed in the commercial landings off Puerto Rico from 1983 through 2005 by gear category. Gaps in trend line for castnet indicates no observations these years.

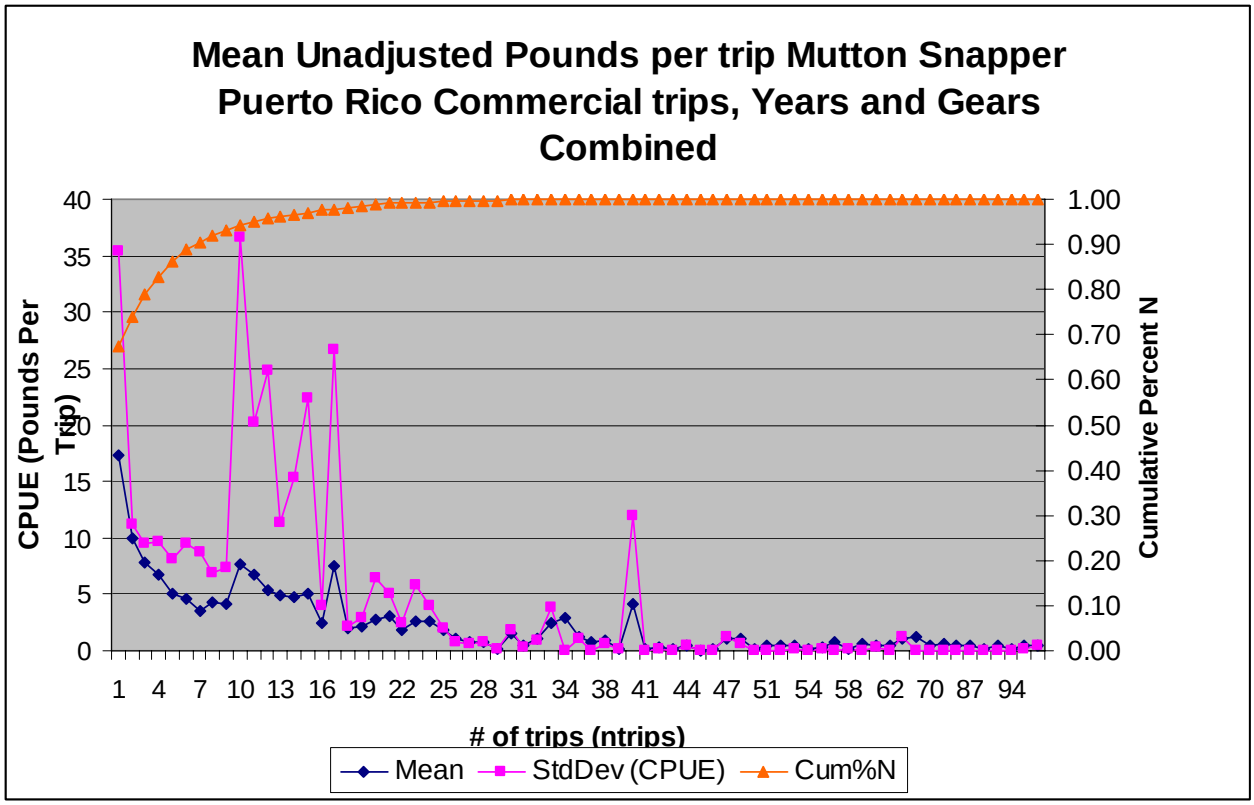

Figure 5. Mean CPUE (Pounds per Trip), Standard deviation of CPUE and Cumulative Percent of total observations for each unique category of the ntrip variable.

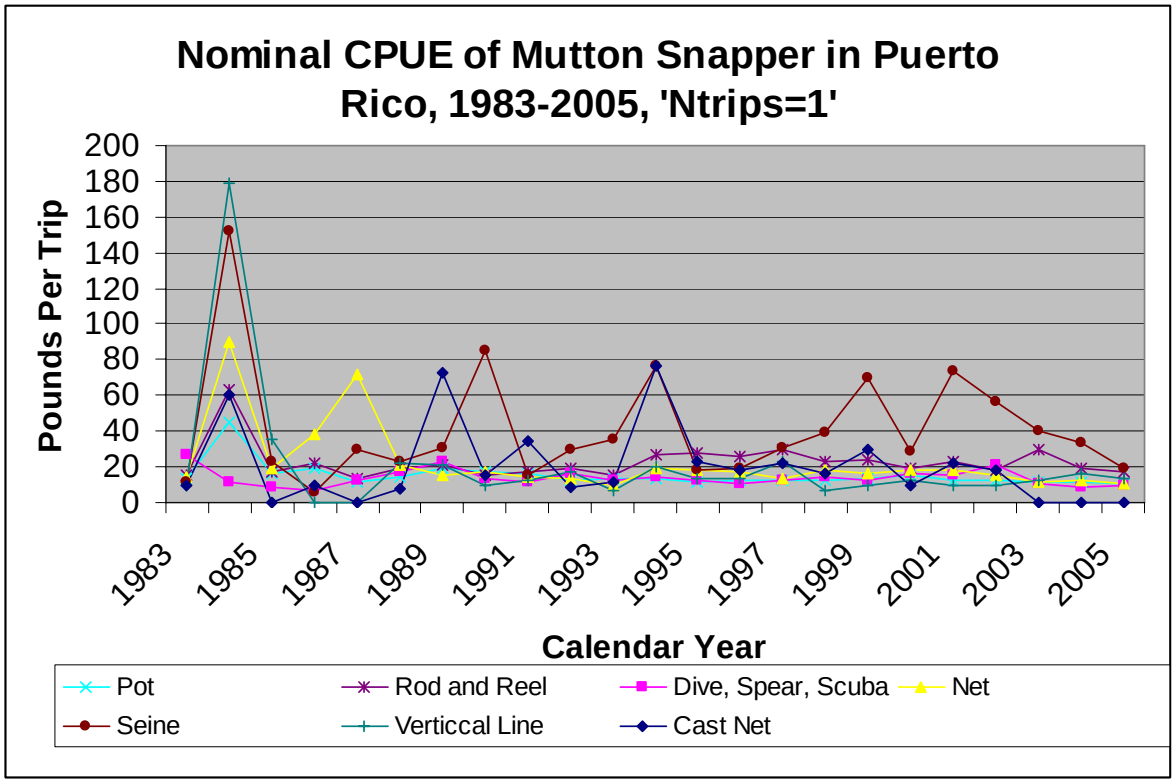

Figure 6a. Figure 6b. Nomianl CPUE of mutton snapper from Puerto Rico commercial fisheries, 1983-2005, for "Ntrips-1' for all gears harvesting this species.

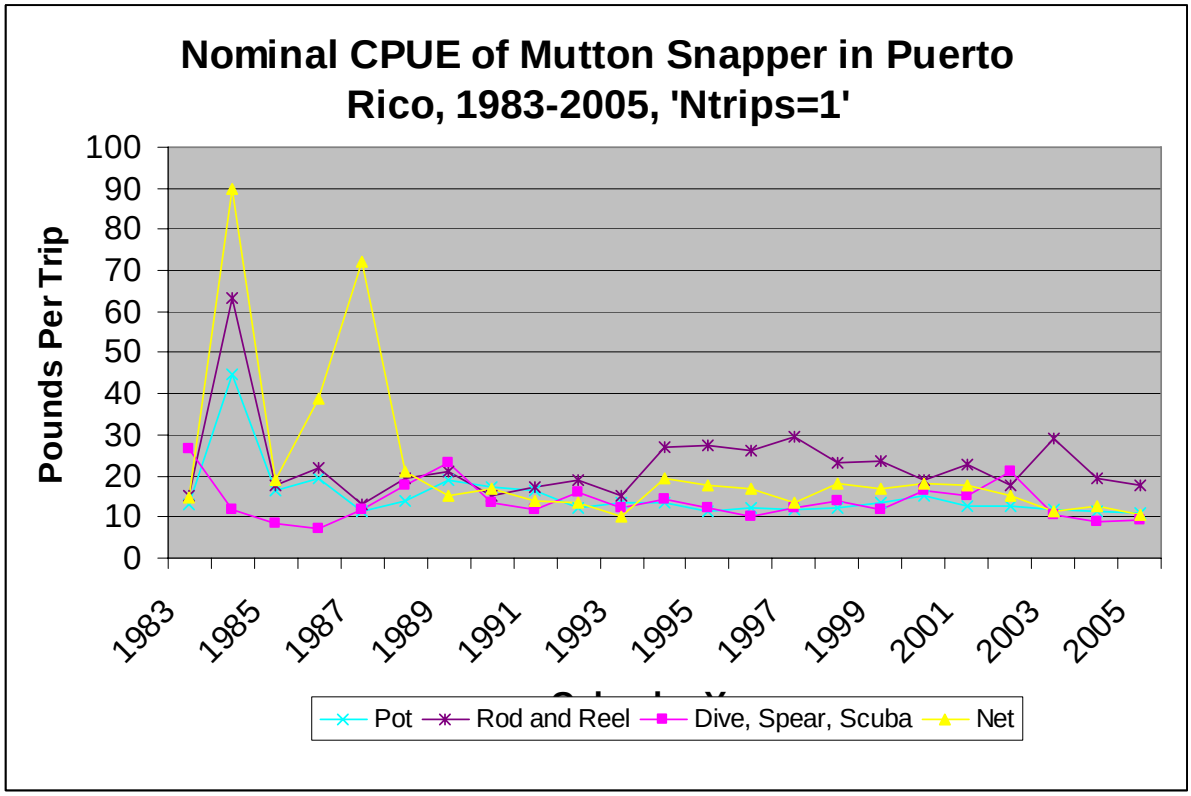

Figure 6b. Nomianl CPUE of mutton snapper from Puerto Rico commercial fisheries, 1983-2005, for "Ntrips-1' for major gears harvesting this species.