

# Analysis of the Queen Conch Trip Ticket Data for Puerto Rico and the U.S. Virgin Islands

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## ABSTRACT

Queen conch trip ticket data for Puerto Rico and the U.S. Virgin Islands were analyzed for the purpose of examining recent trends in the respective fisheries. For Puerto Rico, the analysis was conducted on the 1988-93 period. For the U.S. Virgin Islands, the timeframe of analysis was the 1986-94 period. Several issues were examined including: (1) seasonal trends in queen conch catches, (2) the distribution of catch, and (3) catch of other species in relation to queen conch.

Key words: Puerto Rico, Queen Conch, U.S. Virgin Islands

## INTRODUCTION

Reported 1993 conch landings in Puerto Rico equalled 165.1 thousand pounds, or approximately 45% of total shellfish landings and 6.6% of total shellfish and finfish landings (Newlin, 1994). In the U.S. Virgin Islands, reported conch landings during the July 1992 through June 1993 period equalled 11.75 thousand pounds, or about 10% of total reported shellfish landings, but only one percent of total fish and shellfish landed for the period (Newlin, 1994).

While relatively small compared to some of the other fisheries in Puerto Rico and the Virgin Islands, the queen conch fishery has received considerable attention in recent years and is the subject of a management plan in preparation (Caribbean Fishery Management Council, 1995). The increased attention given to the conch fishery reflects, at least in part, the stressed nature of the stock. One indication of this is the decline in Puerto Rico queen conch landings which equalled only 100 thousand pounds in 1992 compared to approximately 400 thousand pounds in 1983 (Caribbean Fishery Management Council). To protect and rebuild the stock off St. Thomas and St. John, the fishery was just recently reopened after being closed for a five year period.

The purpose of this paper is to examine some recent trends in the queen conch fisheries of Puerto Rico and the Virgin Islands, based on unpublished trip data. Specifically, recent trends in annual conch catch per trip, monthly conch catch per trip, the distribution of conch catch per trip, and other species harvested

in association with conch trips are briefly examined. A more detailed analysis of the data will be available shortly in the completed Regulatory Impact Review (RIR) for the Queen Conch Fishery in the Queen Conch Fishery Management Plan developed by the Caribbean Fishery Management Council. The analysis presented herein was conducted for use in the RIR.

#### METHODOLOGY

The catch and related data collected by Puerto Rico and the Virgin Islands represents an important source of information to help evaluate the status of the queen conch fishery and changes therein over time. These data sets were used for the current analysis. For Puerto Rico, the relevant data were analyzed for the 1988-93 period. For the Virgin Islands, the relevant period of analysis was from July 1986 through June 1994.

Before reporting the results, some cautionary notes are in order. First and foremost, analysis for Puerto Rico was based on less than the complete available data set. Specifically, the complete data set for Puerto Rico includes information on multiple trips as well as for trips for which a "0" is assigned. These trips were excluded from the analysis presented herein due to difficulties in their interpretation. Second, two different data sets were used in the analysis of the status of the Puerto Rican queen conch fishery. These two data sets contained differing numbers of observations. Differences in the data sets will be discussed in the "RESULTS" section of the paper at the appropriate time. Finally, it needs to be noted that the analysis for the Virgin Islands is based only on trip ticket information supplied by the fishermen. To the extent that the information is not supplied by all fishermen, the analysis for the Virgin Islands is based only on a subsample of the population. If the sample is not representative of the population, or if the self reporting by the fishermen is not accurate, results may be somewhat skewed.

#### RESULTS

##### **Queen Conch Catch Per Trip by Year**

Average queen conch catch per trip by year for Puerto Rico and the Virgin Islands is presented in Table 1. For Puerto Rico, average annual queen conch catch per trip ranged from a low of about 42 pounds in 1991 to a high of about 86 pounds per trip in 1988. During the 1988-93 period, more than 50% of the total number of queen conch trips were west coast based. Another 30% were from the southern region of the Island. Approximately 18% of the total number of trips were east coast based while less than one percent were from the north coast. Generally, the average annual queen conch catch per trip from the northern side of the Island was significantly lower than that estimated for the other regions (Table 1). The one year for which this finding did not hold, *i.e.*, 1991, may be an artifact of the small sample size associated with the northern portion of the Island.

Table 1. Average Queen Conch Catch Per Trip (Lbs) by Year, Puerto Rico and U.S. Virgin Islands.

Year	Puerto Rico				Virgin Islands		
	North	East	South	West	Avg.	St. Croix	St. John
1986	-----	-----	-----	-----	-----	60.2 <sup>c</sup>	51.5
1987	-----	-----	-----	-----	-----	61.2	63.3
1988	47.3	118.5	66.6	75.7	85.8	85.0	50.7 <sup>a</sup>
1989 <sup>b</sup>	46.9	68.5	65.2	60.2	62.5	70.1	-----
1990	12.5	37.5	48.7	45.1	45.7	75.6	-----
1991	39.8	45.2	43.6	38.8	41.8	73.6	-----
1992	21.0	45.7	42.8	64.2	51.4	46.6	-----
1993	38.0	56.0	46.6	74.2	59.1	52.3	-----
1994	-----	-----	-----	-----	-----	53.3 <sup>d</sup>	-----

Source: Compiled from unpublished data provided by the Puerto Rico Dept. of Natural Resources and the U.S. Virgin Islands Division of Fish and Wildlife.

<sup>a</sup> 1988 estimate for St. Thomas and St. John should be received cautiously due to the small sample from which it was derived.

<sup>b</sup> Two observations for Puerto Rico were deleted in 1989 due to increasingly large catches of queen conch (> 6,000 lbs).

<sup>c</sup> The 1986 data for the Virgin Islands is limited to the July through December period.

<sup>d</sup> The 1994 data for St. Croix is limited to the July through December period.

Average annual queen conch catch per trip in St. Croix ranged from a high of 85 pounds in 1988 to a low of about 47 pounds in 1992 (Table 1). In general, average catch per trip appears to have fallen during the most recent three-year period of analysis, *i.e.*, 1992-94. The paucity of data for St. Thomas and St. John after 1987, in association with the moratorium placed on queen conch fishing in the Region, limits meaningful analysis of annual catch per trip for this area.

#### **Queen Conch Catch Per Trip by Month**

Average queen conch catch per trip by month in Puerto Rico for the 1988-93 period is presented in Table 2. Average percentage of trips by month for the same period is presented in Table 3. Comparable statistics for the Virgin Islands over the 1986-94 period are also presented in Table 2.

Average monthly queen conch catch per trip in Puerto Rico during 1988-93, as indicated, ranged from a low of about 53 pounds per trip (April and May) to a high of more than 80 pounds per trip in January. Reported queen conch trips in Puerto Rico tended to be highest in May (11.5% of the total), and then gradually declined to less than five percent in December (Table 3). Beginning in January, trips gradually increased until the May peak.

Average monthly queen conch catch per trip in St. Croix ranged from a low of about 53 pounds in April to a high of almost 80 pounds in July. However, reported queen conch trips in the Virgin Islands during the summer months tended to be relatively small as a percentage of the total (Table 3) due to the recent moratorium placed on queen conch fishing activities in the July 1 through September period. In fact, almost all of the reported trips in the Virgin Islands during the July through September period occurred in the earlier years of analysis.

#### **Distribution of Queen Conch Catch**

As illustrated by the information in Table 4, almost 30% of the total number of the queen conch trips (*i.e.*, trips for which queen conch catch was indicated) in Puerto Rico during the 1988-93 period reported a catch of less than 20 pounds. Similarly, less than 100 pounds of queen conch were reported on 80% of the total trips during the 1988-93 period of analysis. Conversely, 200 or more pounds of queen conch were reported on only 3.5% of the total number of trips.

While the distribution of queen conch catch in Puerto Rico varied substantially on a yearly basis during 1988-93 (Table 4), no apparent trend was evident in the data. An exceptionally high proportion of the catches at the low end of the distribution were evident in 1990 and 1991 which is consistent with the low average annual catch per trip for these years (Table 1). Conversely, a relatively high proportion of the catches were at the upper end of the

Table 2. Average Queen Conch Catch Per Trip (Lbs) by Month, Puerto Rico and U.S. Virgin Islands.

Month	Puerto Rico <sup>a</sup>				Virgin Islands		
	North	East	South	West	Avg.	St. Croix <sup>b</sup>	St. Thomas & St. John <sup>c</sup>
January	60.0	138.4	57.9	68.7	81.1	62.0	50.7
February	19.1	94.1	50.3	54.1	60.2	65.1	37.0
March	19.0	125.1	46.9	61.7	72.5	59.9	76.5
April	39.8	64.2	45.8	53.7	52.9	52.6	109.4
May	33.4	75.9	47.5	49.6	53.2	62.2	-----
June	17.6	99.0	44.0	70.7	70.0	55.7	60.7
July	8.0	80.5	59.9	68.2	68.5	78.6	41.6
August	72.2	87.0	47.7	71.8	66.5	69.2	56.7
September	44.7	77.5	44.6	68.0	62.6	75.9	53.7
October	60.2	69.4	49.9	57.8	56.9	64.3	58.1
November	-----	73.0	44.6	91.9	70.4	61.9	61.7
December	24.6	46.8	68.4	54.1	58.0	60.2	69.7

Source: Compiled from unpublished data provided by the Puerto Rico Dept. of Natural Resources and the U.S. Virgin Islands Division of Fish and Wildlife.

<sup>a</sup>Averages of queen conch catch per trip by month in Puerto Rico reflect the 1988-93 period.

<sup>b</sup>St. Croix monthly averages reflect the period from July 1986 through July 1994.

<sup>c</sup>Monthly estimates for St. Thomas and St. John during June and July should be received cautiously due to small sample size. Also, the monthly averages are based primarily on the 1986-87 period.

Table 3. Percentage of Annual Queen Conch Trips by Month for Puerto Rico and the U.S. Virgin Islands.

Month	Puerto Rico <sup>a</sup>					Avg.	Virgin Islands
	North	East	South	West	Avg.		
January	1.7	6.7	4.1	6.6	5.8	10.4	
February	8.6	7.2	6.0	7.8	7.1	10.6	
March	12.1	10.8	7.3	8.0	8.3	12.7	
April	6.9	9.1	10.4	8.4	9.1	10.4	
May	13.8	10.2	11.7	11.7	11.5	9.7	
June	13.8	11.4	7.7	9.2	9.2	7.8	
July	3.4	12.8	10.2	7.7	9.4	3.4	
August	13.8	8.3	10.7	10.2	10.0	3.3	
September	12.1	10.1	10.4	10.5	10.4	3.2	
October	10.3	6.2	8.9	9.6	8.8	11.6	
November	-----	5.5	7.6	5.1	5.9	8.6	
December	3.4	1.9	4.9	5.2	4.5	8.4	

Source: Compiled from unpublished data provided by the Puerto Rico Dept. of Natural Resources, Fisheries Research Laboratory and the U.S. Virgin Islands Division of Fish and Wildlife.

<sup>a</sup>Data for Puerto Rico reflects the 1988-93 period.

<sup>b</sup>Data for the Virgin Islands reflects the July 1986 through June 1994 period.

Table 4. Percentage of Trips Resulting in Different Levels of Queen Conch Catch, Puerto Rico, 1988-93.

Conch Lbs/Trip	Year						Avg.
	1988	1989	1990	1991	1992	1993	
< 20 lbs	18.5	27.3	40.9	38.0	29.9	30.7	28.9
20 lbs - < 40 lbs	10.7	20.4	21.1	24.9	24.9	21.2	19.1
40 lbs - < 60 lbs	9.8	16.1	13.7	14.6	12.9	16.5	13.5
60 lbs - < 80 lbs	11.7	13.2	7.6	9.6	15.0	11.2	11.4
80 lbs - < 100 lbs	14.6	8.4	7.4	5.0	7.0	8.5	9.4
100 lbs - < 120 lbs	13.3	4.7	3.2	2.6	3.8	5.7	6.7
120 lbs - < 140 lbs	7.0	2.5	2.4	1.7	2.1	1.8	3.5
140 lbs - < 160 lbs	3.3	1.6	1.4	0.8	1.2	1.0	1.8
160 lbs - < 180 lbs	2.0	1.0	0.6	0.9	0.7	0.5	1.1
180 lbs - < 200 lbs	1.9	1.0	0.8	0.7	1.0	0.6	1.1
≥ 200 lbs	7.2	3.8 <sup>a</sup>	0.9	1.2	1.5	2.3	3.5
No obs.	2,313	1,359	888	1,371	815	1,365	8,111

Source: Compiled from unpublished data provided by the Puerto Rico Dept. of Natural Resources.

<sup>a</sup> Two records with unreasonably large catches of queen conch (> six thousand pounds) were deleted in 1989.

distribution was evident in 1988, again consistent with the relatively high average annual catch per trip (85.8 pounds) presented in Table 1.

Overall, less than 10% of the total number of queen conch trips in the Virgin Islands during the 1986-94 period reported a catch of less than 20 pounds; a significantly lower proportion than that reported for Puerto Rico. However, just over 80% of the total number of trips during the 1986-94 period reported queen conch catches of less than 100 pounds, a figure consistent with that reported for Puerto Rico. Only 1.4% of the total Virgin Island trips represented queen conch catches of 200 pounds or more.

When the data in Table 5 is examined on an annual basis, it becomes evident that the distribution of queen conch catch per trip in the Virgin Islands trended towards a lower catch per unit of effort during the later years of analysis, particularly in 1993 and 1994. This may reflect several factors including, but not limited to: (1) a declining stock abundance, (2) increased restrictions placed on the fishery, and (3) improved self reporting of catches by fishermen. This last point may be of particular relevance in light of the fact that fishermen are now required to submit catch records on a monthly basis as opposed to annual submission of records in the past.

#### Catch of Other Species in Association with Conch Trips

The fisheries of Puerto Rico and the Virgin Islands are diverse and, as a result, several species can be harvested on any given trip. Catch of other species associated with different levels of queen conch catch per trip in Puerto Rico was therefore analyzed for the 1988-93 period, the results of which are presented in Table 6 (Note: data used in this analysis was provided by the NMFS Laboratory in Galveston, and the number of observations differed from earlier data acquired from the Puerto Rico Department of Natural Resources). Comparable information on revenues is presented in Table 7.

Among trips with reported queen conch catch of less than 20 pounds, total catch was estimated to equal 29 pounds (Table 6). Average queen conch landings of 10.4 pounds constituted only about 35% of this total catch. Within the 20 lbs - < 40 lbs range, queen conch comprised 57% of total catch by weight. Among other different levels of queen conch catch, the percentage of queen conch catch in relation to total catch is as follows: 40 lbs - < 60 lbs, 70.5%; 60 lbs - < 80 lbs, 80.9%; 80 lbs - < 100 lbs, 77.8%; 100 lbs - < 120 lbs, 88.3%; 120 lbs - < 140 lbs, 68.6%; 140 lbs - < 160 lbs, 75.0%; 160 lbs - < 180 lbs, 80.0%; 180 lbs - < 200 lbs, 84.4%, and > 200 lbs, 82.6%. In general, queen conch catch per trip as a percentage of total catch increased up to about 100 lbs - < 120 lbs pounds of conch per trip, and thereafter fluctuated in the range of about 70% to 85%.

Average total revenues per trip, *i.e.*, conch and other species, associated with different levels of queen conch catch per trip in Puerto Rico, as indicated by the information in Table 7, increased in relation to queen conch catch per trip. In



Table 5. Percentage of Trips Resulting in Different Levels of Queen Conch Catch, U.S. Virgin Islands, 1986-94.

Conch Lbs/Trip	Year <sup>a</sup>										Avg.
	1986	1987	1988	1989	1990	1991	1992	1993	1994 <sup>b</sup>		
< 20 lbs	8.4	1.9	3.5	5.9	3.7	7.4	8.6	11.6	19.5	9.1	
20 lbs - < 40 lbs	10.9	14.6	15.5	20.2	12.5	14.6	25.5	26.5	27.6	20.6	
40 lbs - < 60 lbs	26.1	31.9	13.5	10.1	23.5	16.1	32.2	26.8	19.3	22.4	
60 lbs - < 80 lbs	26.9	24.4	9.0	11.7	22.8	15.8	28.5	13.5	9.6	17.2	
80 lbs - < 100 lbs	18.4	8.9	14.0	21.3	15.4	22.2	3.7	11.1	8.1	12.9	
100 lbs - < 120 lbs	6.7	15.5	25.1	22.9	8.1	16.8	1.4	6.0	8.4	11.4	
120 lbs - < 140 lbs	0.0	0.9	9.0	4.2	3.0	1.0	0.0	2.4	2.7	2.3	
140 lbs - < 160 lbs	1.6	1.9	7.0	2.7	3.6	1.0	0.0	1.7	1.4	2.0	
160 lbs - < 180 lbs	0.0	0.0	0.0	1.0	1.4	0.8	0.0	0.2	0.2	0.4	
180 lbs - < 200 lbs	0.8	0.0	1.0	0.0	1.5	0.8	0.0	0.0	0.2	0.4	
≥ 200 lbs	0.0	0.0	2.0	0.0	4.3	2.6	0.0	0.0	2.7	1.4	
No obs.	119	213	199	188	136	486	407	414	405	2,568	

Source: Unpublished data provided by the Virgin Islands Division of Fish and Wildlife.

<sup>a</sup>Data for 1986 reflects the July through December period.

<sup>b</sup>Data for 1994 reflects the January through June period.

Table 6. Catch of Different Species Associated With Different Levels of Queen Conch Catch Per Trip, Puerto Rico, 1988-93 avg.

Conch Lbs./Trip	No. of Trips	% of Trips	Catch Per Trip (lbs)			Total
			Conch	Lobster	Other	
< 20 lbs	1,218	26.3	10.4	4.7(312) <sup>a</sup>	14.1(509)	29.2
20 lbs - < 40 lbs	809	17.5	28.0	5.8(194)	15.4(282)	49.1
40 lbs - < 60 lbs	606	13.1	47.9	4.4(153)	15.5(159)	67.9
60 lbs - < 80 lbs	526	11.4	68.0	5.1(177)	11.0 (98)	84.0
80 lbs - < 100 lbs	444	9.6	87.4	9.8(162)	15.2(71)	112.4
100 lbs - < 120 lbs	336	7.3	107.6	5.4(117)	9.0(39)	121.9
120 lbs - < 140 lbs	176	3.8	126.4	8.4(54)	49.3(21)	184.1
140 lbs - < 160 lbs	94	2.0	147.2	15.5(27)	33.5(20)	196.3
160 lbs - < 180 lbs	70	1.5	167.5	12.0(20)	30.8(15)	210.3
180 lbs - < 200 lbs	70	1.5	186.5	16.4(20)	18.0(13)	220.9
≥ 200 lbs	279	6.0	332.9	26.5(109)	43.5(82)	402.9
Avg.	4,628 <sup>b</sup>	100.0	71.0	7.4(1,345)	17.7(1,309)	96.2

Source: Compiled from data provided by the National Marine Fisheries Service Laboratory in Galveston, Texas.

<sup>a</sup>Numbers in parantheses refer to the number of trips where the identified species was harvested.

<sup>b</sup>Note: The reported number of queen conch trips in the data set received from the NMFS Laboratory in Galveston equalled only 4,628 after deleting all multiple and "0" trips. This number was significantly less than the 8,111 trips derived from the data set obtained from the Puerto Rico Dept. of Natural Resources. However, the distribution of trips by size of catch is similar (see Table 4).

Table 7. Average Revenues Per Trip Associated With Different Levels of Queen Conch Catch Per Trip, Puerto Rico, 1988-93 avg.

Conch Lbs./Trip	No. of Obs.	Revenues Per Trip (\$) <sup>a</sup>		Total
		Conch	Other	
< 20 lbs	1,218	19.84	39.77	59.61
20 lbs - < 40 lbs	809	52.30	43.73	96.03
40 lbs - < 60 lbs	606	89.09	38.74	127.83
60 lbs - < 80 lbs	526	126.72	36.71	163.43
80 lbs - < 100 lbs	444	160.21	61.69	221.90
100 lbs - < 120 lbs	336	195.12	33.79	228.91
120 lbs - < 140 lbs	176	225.10	91.99	317.09
140 lbs - < 160 lbs	94	264.51	113.81	378.32
160 lbs - < 180 lbs	70	296.83	62.93	359.76
180 lbs - < 200 lbs	70	331.29	93.38	424.67
≥ 200 lbs	279	591.43	171.63	763.06
Avg.	4,628	\$129.06	\$54.25	\$183.31

Source: Compiled from data provided by the National Marine Fisheries Service, Galveston Laboratory.

<sup>a</sup> In the estimation of revenues, price data were not always provided with catch. In these cases, an average price based on observed data was employed.

Table 8. Catch of Queen Conch and Other Species Related to Different Levels of Queen Conch Catch Per Trip, Virgin Islands, 1986-94 avg.<sup>a</sup>

Conch_Lbs/Trip	Conch_Trips	Catch Per Conch Trip (lbs)				Total
		Conch	Lobster	Reeffish	Other	
< 20 lbs	235	13.1	4.4(29) <sup>b</sup>	5.1(27)	1.2(18)	23.8
20 lbs - < 40 lbs	527	27.8	10.5(167)	8.7(70)	3.3(41)	50.3
40 lbs - < 60 lbs	575	46.1	11.2(202)	15.3(133)	3.9(47)	76.5
60 lbs - < 80 lbs	443	65.7	6.3(101)	17.8(98)	3.3(98)	93.0
80 lbs - < 100 lbs	332	85.5	3.9(38)	25.1(109)	2.0(12)	116.5
100 lbs - < 120 lbs	293	102.7	2.0(16)	22.4(79)	----- <sup>c</sup>	127.9
120 lbs - < 140 lbs	58	125.5	9.7(10)	21.8(15)	0.0	157.0
140 lbs - < 160 lbs	51	146.8	7.6(7)	20.7(14)	-----	175.6
160 lbs - < 180 lbs	9	168.3	19.3(3)	49.0(4)	0.0	235.6
180 lbs - < 200 lbs	10	188.9	0.0(0)	55.0(3)	0.0	243.9
≥ 200 lbs	35	231.8	10.7(5)	17.4(7)	0.0	259.9

Source: Compiled from unpublished data provided by the Virgin Islands Division of Fish and Wildlife.

<sup>a</sup>The 1986 data are for the July-December period while the 1994 data are for the January-June period.  
<sup>b</sup>Numbers in parentheses refer to the number of conch trips where the relevant species was also reported landed.

<sup>c</sup>A "-----" indicates less than one-half of one pound.

general, the revenues per trip derived from conch as a percentage of total revenues per trip followed a similar pattern to that estimated for poundage. Average total revenues during the 1988-93 period were estimated to equal \$183 per trip. Revenues from conch, estimated to equal \$129, comprised 70% of this total.

As was the case for Puerto Rico, conch catch per trip in the Virgin Islands as a proportion of the total catch per trip trended upwards until roughly the 100 lbs - < 120 lbs range of conch catch per trip (Table 8). Thereafter, the proportion generally fell in the 75% to 85% range.

Interestingly, lobster was a major component of total catch at low levels of queen conch catch per trip and declined in relevant importance as conch catch per trip increased (Table 8). Similarly, catches of "other" species, primarily baitfish, were also more prevalent in those instances where conch catch per trip were relatively low. As conch catch per trip increased, reefish became the dominant species harvested in relation to conch. This observation may, to some extent, reflect different fishing patterns. Specifically, low catches of conch per trip may indicate nearshore fishing activities where reefish are not as abundant.

#### LITERATURE CITED

- Caribbean Fishery Management Council. 1995. Draft Fishery Management Plan/RIR/EIS for the Queen Conch Resources of Puerto Rico and the United States Virgin Islands.
- Newlin, K. [editor]. 1994. "Fishing Trends and Conditions in the Southeast Region, 1993." NOAA Technical Memorandum, NMFS-SEFSC-354.