Queen Triggerfish (*Balistes vetula*) Commercial Trip Interview Program Length Compositions - Puerto Rico

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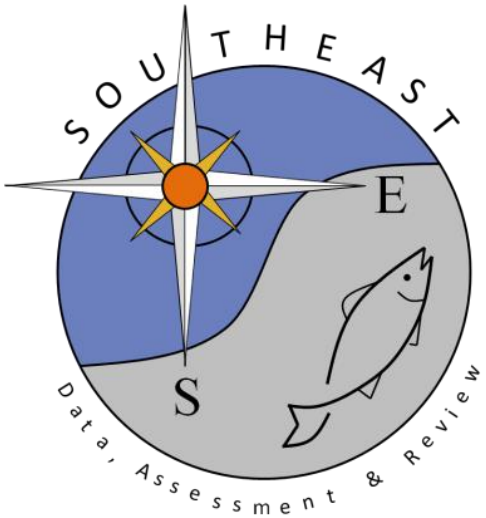

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Queen Triggerfish (*Balistes vetula*) Commercial Trip Interview Program Length Compositions
Puerto Rico

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1 Introduction
This document outlines the methodologies used to estimate commercial length compositions for the SEDAR 80 Caribbean Queen Triggerfish Assessment for Puerto Rico. These compositions were estimated using the Trip Interview Program (TIP) samples through 2019.

2 Data Description
SEDAR 80 assesses all Queen Triggerfish in US Caribbean federal waters encompassing Puerto Rico, St Thomas/St John, and St Croix. Length data from the commercial fisheries of Puerto Rico are collected by the Trip Interview Program (TIP, 1983-2019). These were compiled to estimate annual length compositions within commercial fleets.

This species is primarily measured using fork length (FL), with a handful of standard length (SL) estimates that were converted to FL using the equation below. Natural total length types were recorded in the TIP database beginning approximately 2011-12, coinciding with a clarification in the manual that this length type does not include any trailing tendrils and was assumed to be fork length. This assumption was validated with weight-length plots of individual fish which cannot be shown here due to the confidential nature of these data (e.g. violates the rule of 3).

$$FL = 0.97855 + 1.104 * SL$$

The TIP database is kept current and accurate with quality control measures, but occasionally there are sources of error that find their way into the main database. The minimum Queen Triggerfish length recorded throughout the US Caribbean was 24mm FL, with 6 fish under 50mm FL. These smaller samples were included but recommended to be dropped from further analyses if these samples are confirmed to be from the seafood trade only (e.g. not the live aquarium trade). Otherwise, they could represent selectivity to the various gear types. The largest queen triggerfish sample recorded was 840mm FL, and the IGFA recreational world record database includes a fish measuring 723mm (length type not specified). The Caribbean TIP database includes 5 fish above this size and can be filtered at the discretion of the lead assessment analyst.

3 Commercial Length Compositions of Landings

3.1 Length Samples
Length samples of US Caribbean Queen Triggerfish commercial landings were obtained from the TIP database maintained by the NMFS Southeast Fisheries Science Center (SEFSC). These

data were filtered to include fish landed and sampled in Puerto Rico, and the remaining portion of the document will focus on these samples.

3.2 Fleet definitions

Fleet aggregations were explored considering gear characteristics such as depth of operation and resulting selectivity. All gears that landed more than three Queen Triggerfish since 1983 are shown within their respective fleets in Figure 1. The resulting aggregated length compositions for the final fleets are shown in Figure 2.

3.3 Length Compositions

Length compositions were estimated separately for each commercial fleet defined above. Within each fleet, Island-specific nominal length compositions were estimated using length bins of 1 cm, where for each year i and length bin j

$$LC_{i,j} = \frac{n_{i,j}}{n_i}$$

$n_{i,j}$ is the number of samples in year i and lower inclusive length bin j; n_i is the number of samples in year i; and $LC_{i,j}$ is the proportion of the total number of sampled fish in each year i within each lower inclusive length bin j. A minimum sample size threshold was applied annually within each strata, LC_i, where these were flagged to be excluded from further analyses if $n_i < 30$.

Number of annual commercial length samples within fleets are shown in Table 1 and estimated number of trips, defined by the number of recorded unique interviews, are shown in Table 2. Resulting annual length compositions are shown for each fleet in Figure 3.

4 Tables

Table 1: Annual number of Queen Triggerfish length samples landed in Puerto Rico. Length compositions may be dropped from further analyses if the fleet has n<30 for that year.

YEAR	Hook and Line	Other	Trap	Spear
1983	20	4	231	0
1984	23	0	696	3
1985	6	0	696	1
1986	23	16	644	3
1987	37	39	364	1
1988	62	38	301	6
1989	26	22	205	15
1990	3	40	83	0
1991	72	26	279	1
1992	94	16	194	23
1993	66	12	140	6
1994	17	5	57	34
1995	32	3	77	9
1996	15	23	27	4
1997	8	26	22	0
1998	33	39	69	57
1999	47	31	157	65
2000	6	35	142	38
2001	4	66	60	44
2002	23	45	108	61
2003	113	58	49	20
2004	29	31	141	44
2005	34	124	36	124
2006	37	163	54	104
2007	0	43	48	42
2008	33	64	20	104
2009	53	98	4	65
2010	7	148	0	138
2011	26	41	280	324
2012	31	29	105	179

YEAR	Hook and Line	Other	Trap	Spear
2013	12	66	60	408
2014	29	32	463	330
2015	18	23	206	389
2016	26	0	168	355
2017	1	4	72	251
2018	10	1	7	201
2019	0	0	9	188

Table 2: Approximate estimates of the number of trips that landed Queen Triggerfish in Puerto Rico. These were distinguished by unique interview IDs and are likely an underestimate of the true number of trips sampled annually for each fleet.

YEAR	Hook and Line	Other	Trap	Spear
1983	2	1	50	0
1984	8	0	147	1
1985	5	0	91	1
1986	12	10	121	1
1987	13	14	88	1
1988	17	9	33	1
1989	9	12	38	3
1990	2	15	25	0
1991	29	16	57	1
1992	31	11	47	5
1993	23	6	33	3
1994	8	3	13	2
1995	6	3	15	3
1996	7	8	7	2
1997	4	5	7	0
1998	10	14	13	15
1999	12	15	19	14
2000	4	11	16	9
2001	3	25	11	9

YEAR	Hook and Line	Other	Trap	Spear
2002	5	12	16	5
2003	12	20	7	5
2004	9	11	25	5
2005	9	24	5	38
2006	8	25	10	19
2007	0	13	6	13
2008	8	22	4	24
2009	10	26	2	20
2010	1	22	0	40
2011	8	6	27	79
2012	6	5	16	49
2013	6	10	10	93
2014	11	6	44	81
2015	9	6	22	111
2016	12	0	25	85
2017	1	2	11	59
2018	4	1	2	68
2019	0	0	2	55

5 Figures

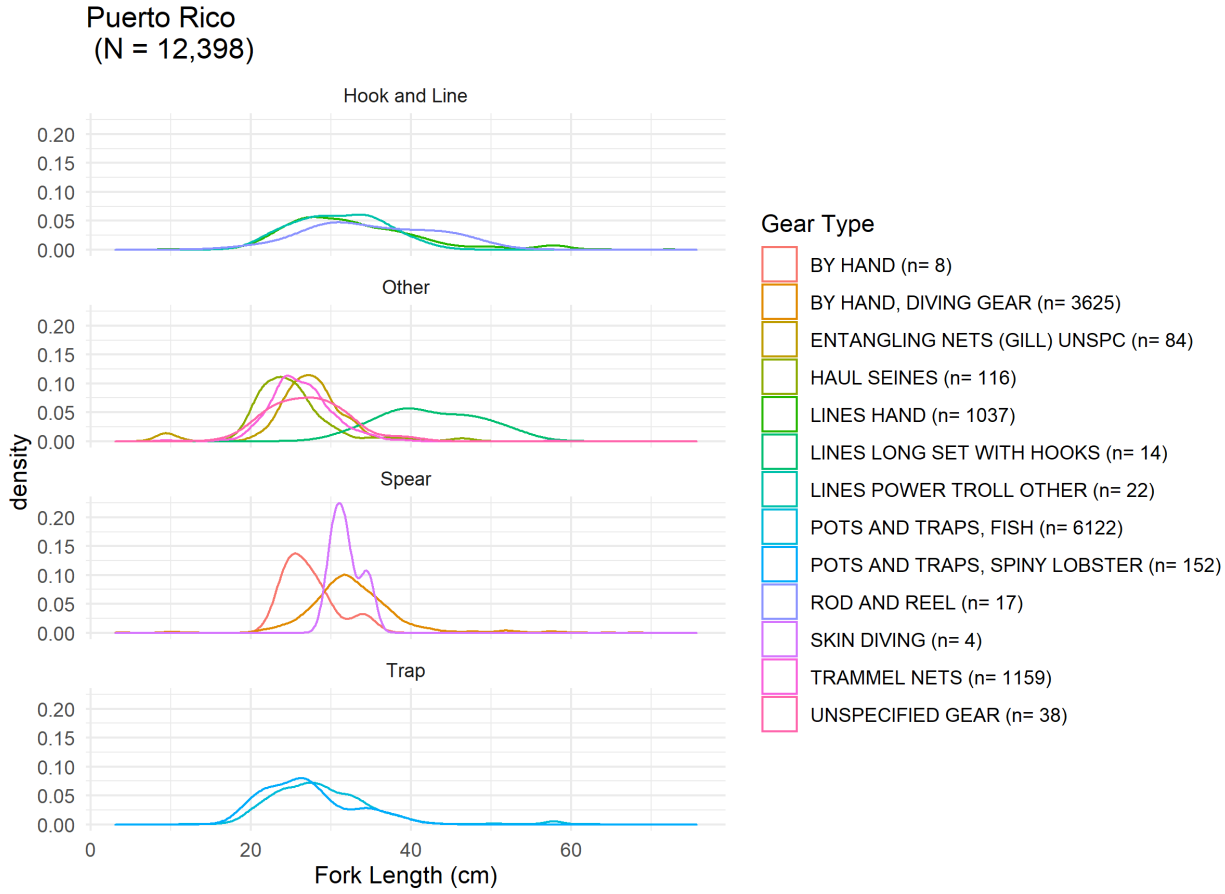

Figure 1: Gear aggregations defined for Queen Triggerfish landed in Puerto Rico all years combined. Longline gear (LINES LONG SET WITH HOOKS) was aggregated with the "Other" fleet because its length composition was dissimilar from the rest of the "Hook and Line" fleet. The "Spear" fleet included all diving gears, and subtle differences observed in the length compositions are due to low sample sizes in BY HAND and SKIN DIVING. Lobster and fish traps were sufficiently similar and were aggregated as a single Trap fleet.

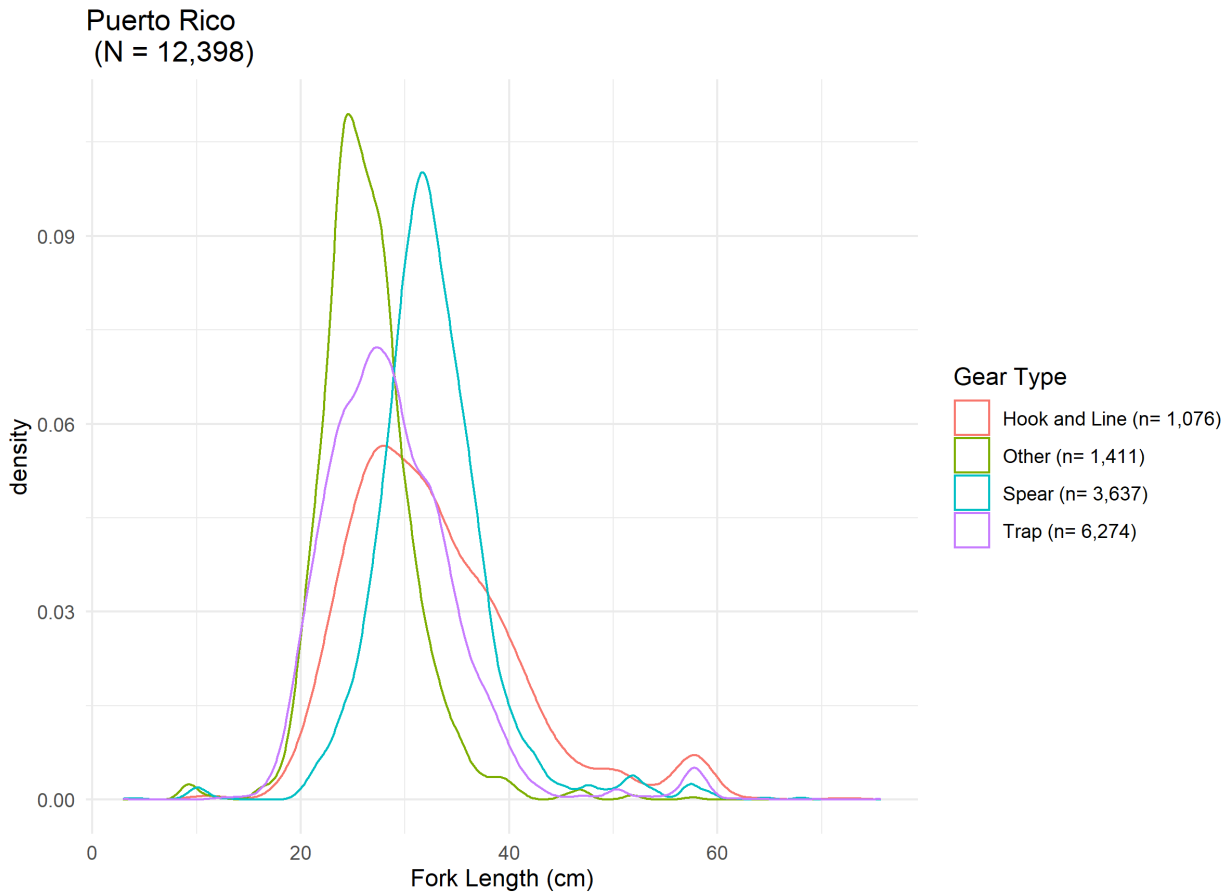

Figure 2: Length compositions of Queen Triggerfish landed in Puerto Rico aggregated by fleet. Overall, the "Spear" fleet landed the largest fish, followed by "Hook and Line", "Trap", and "Other" fleet landing the smallest fish.

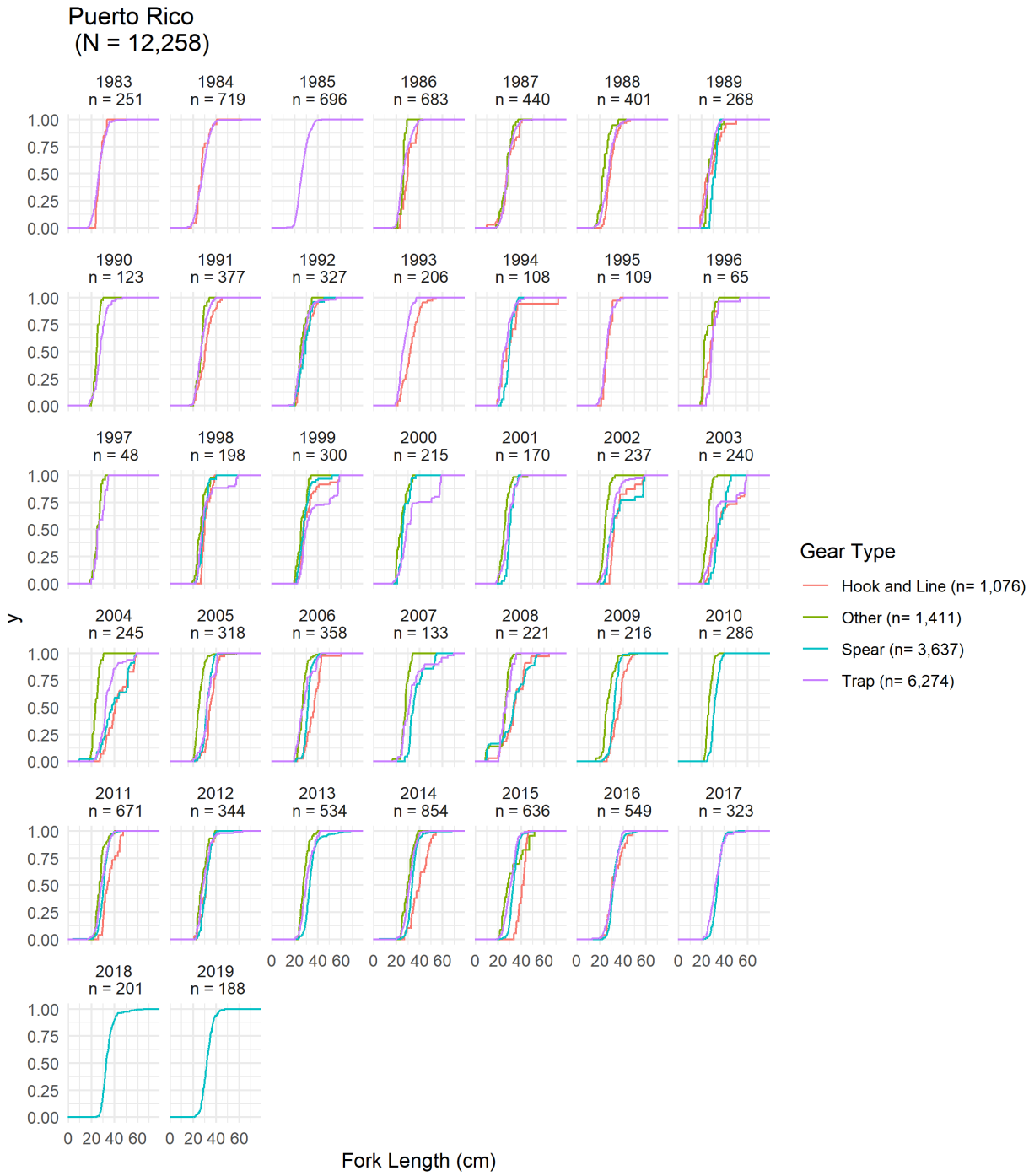

Figure 3: Annual cumulative length distributions of Queen Triggerfish landed in Puerto Rico. Fleets with less than 15 samples in any year were excluded from these figures to conservatively protect confidentiality (and therefore sample sizes presented here do not match the other Tables or Figures presented in this report). Years with less than 15 samples may be included in the final model at the discretion of the lead assessment analyst.