

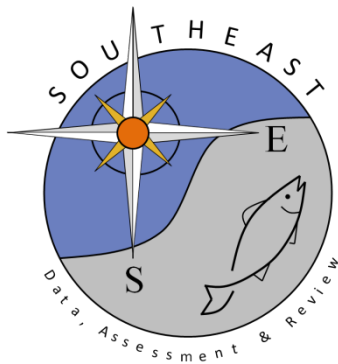
Summary of recreational catch and effort for blue tang and queen triggerfish caught in Puerto Rico since 2000

Meaghan D. Bryan

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Summary of recreational catch and effort for blue tang and queen triggerfish caught in
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By

Meaghan Bryan

National Marine Fisheries Service
Southeast Fisheries Science Center
Sustainable Fisheries Division

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Introduction

A summary of the recreational catch, effort, and size data for blue tang and queen triggerfish from the Marine Recreational Fisheries Sampling Survey (MRFSS) is presented in this document.

Data and Methods

A detailed description of the MRFSS sampling design can be found at <http://www.st.nmfs.noaa.gov/st1/recreational/overview/overview.html>; however, an abridged version will be provided here.

MRFSS data, in the US Caribbean, are collected in Puerto Rico, not the USVI, and sampling efforts began in 2000. The sampling design consists of two complementary components, an angler-site intercept survey and a fishing effort telephone survey. Data are collected to provide catch and effort estimates in two-month periods (i.e., waves) for three modes of fishing; shore fishing, private/rental boat fishing, and charterboat fishing. Port samplers interview fishers as part of the intercept survey and the collected information include; the number of fish landed and observed (i.e., type A catch), the number of fish reported as killed by the fishers (i.e. type B1 catch), and the number of fish reported as released alive by the fishers (i.e., type B2 catch). Additionally, length and weight measurements are occasionally obtained from the observed fish.

The telephone survey is used to provide estimates of fishing effort in two-month waves for the three modes of fishing and by county. This survey relies on random-digit dialing to contact full-time residences. Contacted residences are asked to identify the number of household members that actively fished during the given wave. Each active angler is then asked to recall the number of saltwater fishing trips that they took during the wave. County-wide effort estimates are expanded by the intercept survey adjustment factors to develop state-wide effort estimates. Catch rates from the intercept survey are combined with the estimates of effort from the telephone survey to produce catch estimates.

Summary

Angler trips

Table 1 and Figure 1 summarize the estimates of recreational fishing effort (i.e., angler trips). Overall, the number of angler trips has declined since 2000 (Table 1, Figure 1). This trend is also seen for the shore and private/rental boat fishing modes (Figure 1). Shore fishing has the highest effort in the majority of years, followed by the private/rental boat fishing (Figure 1). Charterboat effort is the least of the three fishing modes and represents approximately one percent of total annual effort (Figure 1).

Blue tang

Intercept data

The available MRFSS intercept data for blue tang was minimal and indicated that intercepted trips rarely captured blue tang. A total of two blue tang were measured between 2000 and 2011 (Table 2). A total of five blue tang were reported as either AB1 or B2 catch in association with five intercepted trips over a 12-year period (Table 3). Two blue tang were AB1 catch and three were B2 catch (Table 3). The only years with AB1 or B2 catch were 2001, 2003, 2007, and 2009 (Table 3). The proportion of intercepted trips capturing blue tang was less than 1% in all years.

The AB1 and B2 catch of blue tang aggregated over all years were associated with areas 3 (ocean area less than 10 miles) and 5 (inshore, Table 4). Annual estimates were re-calculated for these areas only and shown in Table 5. Less than one percent of intercepted trips that indicated fishing in areas 3 and 5 were associated with AB1 and B2 catch of blue tang (Table 5).

Estimates of catch

Annual estimates of AB1 catch and B2 catch were produced for 2001, 2003, 2007, and 2009, given that these were the only years with intercept data (Table 6). All estimates of AB1 and B2 were less than 1000 individuals and were highly variable with proportional standard error (PSE) values equal to one (Table 6).

Queen triggerfish

Intercept data

A total of 60 queen triggerfish were measured between 2000 and 2011 (Table 7). The majority, 54 individuals, were captured by private/rental boat fishers. Two queen triggerfish were captured by shore fishers and four fish were captured by charterboat fishers (Table 7). Figure 2 summarizes the cumulative length data. The measured fork length for the majority of measured individuals was between 225mm and 450mm, one fish had a fork length greater than 500mm (Figure 2).

A total of 107 intercepted queen triggerfish were AB1 catch and seven queen triggerfish were B2 catch between 2000 and 2011 (Table 8). The annual AB1 catch was generally less than 10 queen triggerfish per year. In 2001, 2008, and 2009, 20 or greater queen triggerfish were AB1 catch; the maximum AB1 catch of queen triggerfish was 23 in 2009 (Table 8). Very few queen triggerfish were considered B2 catch (Table 8). The maximum B2 catch of queen triggerfish was three in 2009 (Table 8).

The number of intercepts reporting the capture of queen triggerfish was quite small as compared to the total number of recreational fishing trips (Table 8). Between 2000 and 2011, a

total of 63 intercepts reported the capture of queen triggerfish; this represents less than 0.5% of the total number of recreational fishing trips in Puerto Rico. Annually, the proportion of intercepted recreational fishing trips capturing queen triggerfish was also small and ranged between 0.003 and 0.02 (Table 8).

The majority of intercepted trips capturing queen triggerfish was associated with area 3, ocean less than 10 miles (Table 9). Intercepted trips capturing queen triggerfish were also associated with areas 4, ocean greater than 10 miles, and 5, inshore (Table 9). Table 10 summarizes the intercept data for queen triggerfish for areas 3, 4, and 5. The proportion of intercepted trips capturing queen triggerfish in areas 3, 4, or 5 was still small and ranged between 0.003 and 0.03 (Table 10).

Estimates of catch

Table 11 summarizes the estimates of AB1 and B2, as well as the uncertainty in these estimates. The estimates of queen triggerfish AB1 catch ranged between 0 and 17045.15 individuals over the 12 year time period, with considerable inter-annual variability. The uncertainty in these estimates ranged between 0.35 and 0.95 (Table 11).

Conclusions

The MRFSS intercept data is sometimes used to develop relative indices of abundance for many species. Given the limited number of trips capturing blue tang or queen triggerfish and the fact that these species seem to be rarely caught in Puerto Rico, the MRFSS intercept data presented here is not recommended for use to develop indices of abundance for these species.

Tables

Table 1. The estimated number of recreational trips (effort) and the associated proportional standard error ($PSE = \sqrt{\sum variance} / \sum Effort$) for Puerto Rico.

Year	Effort (number of trips)	PSE
2000	1,362,704	0.099
2001	1,411,943	0.069
2002	1,301,059	0.073
2003	1,111,405	0.079
2004	1,050,298	0.101
2005	866,723	0.08
2006	955,123	0.093
2007	1,080,097	0.086
2008	798,551	0.091
2009	636,151	0.094
2010	536,183	0.095
2011	424,587	0.105

Table 2. The number of length measurements in the MRFSS database for blue tang.

Platform	Mode	Gear	Year	Number of observations
PR	Shore	Hook and line	2001	1
			2003	1

Table 3. Summary of the MRFSS intercept data for blue tang. Annual intercepted AB1(observed landed catch and catch reported as dead) and B2 (released alive) catch, measured in numbers, of blue tang; annual number of trips catching blue tang; total number of intercepted trips catching any recreationally caught species in Puerto Rico; the proportion of trips catching blue tang; and the number of angler hours.

Year	AB1	B2	# of positive trips	Total # of trips	Proportion positive	Angler Hours
2000	0	0	0	737	0	3658
2001	1	1	2	768	0.003	4349
2002	0	0	0	517	0	3098.5
2003	1	0	1	812	0.001	5022
2004	0	0	0	621	0	3643.5
2005	0	0	0	426	0	2329
2006	0	0	0	366	0	2118.5
2007	0	1	1	572	0.002	2953.5
2008	0	0	0	623	0	3393.5
2009	0	1	1	581	0.002	3148.5
2010	0	0	0	588	0	3054.5
2011	0	0	0	774	0	3530.5
Total	2	3	5	7385	0.0006	40299

Table 4. The MRFSS intercept data summarized by area for blue tang. Annual AB1 (observed landed catch and catch reported as dead) and B2 (released alive) catch of blue tang; annual number of intercepted trips catching blue tang; total number of intercepted trips catching any species in Puerto Rico; the proportion of intercepted trips catching blue tang; and the number of angler hours by area. Areas are: 2 – ocean greater than 10 miles, 3 – ocean less than 10 miles, 4 – ocean greater than 10 miles, and 5 – inshore.

Areas	AB1	B2	Positive trips	Trips	Proportion positive	Angler hours
2	0	0	0	3	0	15
3	1	3	4	4334	0.0009	22447
4	0	0	0	1119	0	10039
5	1	0	1	1929	0.0005	7797
Total	2	3	5	7385	0.0006	40299

Table 5. MRFSS intercept data for areas 3 (ocean < 3 miles) and 5 (inshore) only. Annual AB1(observed landed catch and catch reported as dead) and B2 (released alive) catch of blue tang; annual number of intercepted trips catching blue tang; total number of intercepted trips catching any species in Puerto Rico; the proportion of intercepted trips catching blue tang; and the number of angler hours.

Year	AB1	B2	# of positive trips	Total # of trips	Proportion positive	Angler Hours
2000	0	0	0	628	0	2850
2001	1	1	2	656	0.003	3161
2002	0	0	0	419	0	2121
2003	1	0	1	657	0.002	3412.5
2004	0	0	0	520	0	2682.5
2005	0	0	0	378	0	1854.5
2006	0	0	0	287	0	1384
2007	0	1	1	450	0.002	2106.5
2008	0	0	0	547	0	2665
2009	0	1	1	513	0.002	2668
2010	0	0	0	485	0	2215
2011	0	0	0	723	0	3124.5
Total	2	3	5	6263	0.0007	30244.5

Table 6. Estimated AB1 (observed landed catch and catch reported as dead) and B2 (released alive) catch (numbers) and the associated proportional standard error

($PSE = \sqrt{\sum variance / \sum Catch}$) for blue tang in years when there was either AB1 or B2 catch.

Year	AB1	PSE	B2	PSE
2001	323.3488	1.00	927.7702	1.00
2003	554.285	1.00	0	-
2007	0	-	1004.015	1.00
2009	0	-	121.2523	1.00
Total	877.334		2053.037	

Table 7. Number of length measurements in the MRFSS database for queen triggerfish caught in Puerto Rico by year and fishing mode.

Year	Shore	Charterboat	Private	Total
2000			7	7
2001	1		15	16
2002			2	2
2003			5	5
2004			2	2
2005			4	4
2006		1	1	2
2007		1	2	3
2008			7	7
2009	1		2	3
2010		2	5	7
2011			2	2
Total	2	4	54	60

Table 8. Summary of the MRFSS intercept data for queen triggerfish. Annual reported AB1(observed landed catch and catch reported as dead) and B2 (released alive) catch in numbers of queen triggerfish, annual number of trips catching queen triggerfish, total number of intercepted trips catching any species in Puerto Rico, and the proportion of trips catching queen triggerfish.

Year	AB1	B2	# of positive trips	Total # of trips	Proportion positive	Angler hours
2000	9	0	6	737	0.008	3658
2001	22	0	13	768	0.017	4349
2002	2	0	2	517	0.004	3098
2003	5	0	5	812	0.006	5022
2004	2	1	3	621	0.005	3643
2005	4	1	4	426	0.009	2329
2006	2	0	2	366	0.005	2118
2007	3	0	2	572	0.003	2953
2008	23	2	13	623	0.021	3393
2009	23	3	16	581	0.028	3148
2010	10	0	5	588	0.009	3054
2011	2	0	2	774	0.003	3530
Total	107	7	73	27614	0.009	40295

Table 9. Summary of the MRFSS intercept data for queen triggerfish by area. Annual reported AB1(observed landed catch and catch reported as dead) and B2 (released alive) catch in numbers of queen triggerfish, annual number of trips catching queen triggerfish, total number of intercepted trips catching any species in Puerto Rico, and the proportion of trips catching queen triggerfish. Areas are: 2 – ocean greater than 10 miles, 3 – ocean less than 10 miles, 4 – ocean greater than 10 miles, and 5 – inshore.

Areas	AB1	B2	Positive trips	Trips	Proportion positive	Angler hours
2	0	0	0	3	0	15
3	93	6	62	4334	0.014	22447
4	12	0	8	1119	0.007	10039
5	2	1	3	1929	0.002	7797
Total	107	7	73	7385	40298	Total

Table 10. Summary of MRFSS intercept data for queen triggerfish for areas 3, 4, and 5. Areas: 3 – ocean less than 3 miles, 4 – ocean greater than 10 miles, and 5 – inshore. Annual reported AB1(observed landed catch and catch reported as dead) and B2 (released alive) catch in numbers of queen triggerfish, annual number of trips catching queen triggerfish, total number of intercepted trips catching any species in Puerto Rico, and the proportion of trips catching queen triggerfish.

Year	AB1	B2	# of positive trips	Total # of trips	Proportion positive	Angler hours
2000	5	0	4	628	0.006	2850
2001	18	0	10	656	0.015	3161
2002	2	0	2	419	0.005	2121
2003	5	0	5	657	0.008	3412.5
2004	2	1	3	520	0.006	2682.5
2005	4	1	4	378	0.011	1854.5
2006	2	0	2	287	0.007	1384
2007	2	0	1	450	0.002	2106.5
2008	22	2	12	547	0.022	2665
2009	23	3	16	513	0.031	2668
2010	8	0	4	485	0.008	2215
2011	2	0	2	723	0.003	3124.5
Total	95	7	65	6263	0.010	30244.5

Table 11. Estimated AB1 (observed landed catch and catch reported as dead) and B2 (released alive) catch and the associated proportional standard error ($PSE = \sqrt{\sum variance / \sum Catch}$).

Year	AB1	PSE	B2	PSE
2000	0	0.46	0	-
2001	8995.36	0.43	0	-
2002	891.23	0.71	0	-
2003	1789.47	0.50	0	-
2004	558.46	0.71	237.81	1
2005	4472.38	0.65	304.42	1
2006	308.28	0.91	0	-
2007	392.15	0.95	0	-
2008	17045.15	0.55	829.49	0.71
2009	4379.75	0.35	729.30	0.73
2010	3707.98	0.53	0	-
2011	240.05	0.71	0	-
Total	47624.75		2101.02	

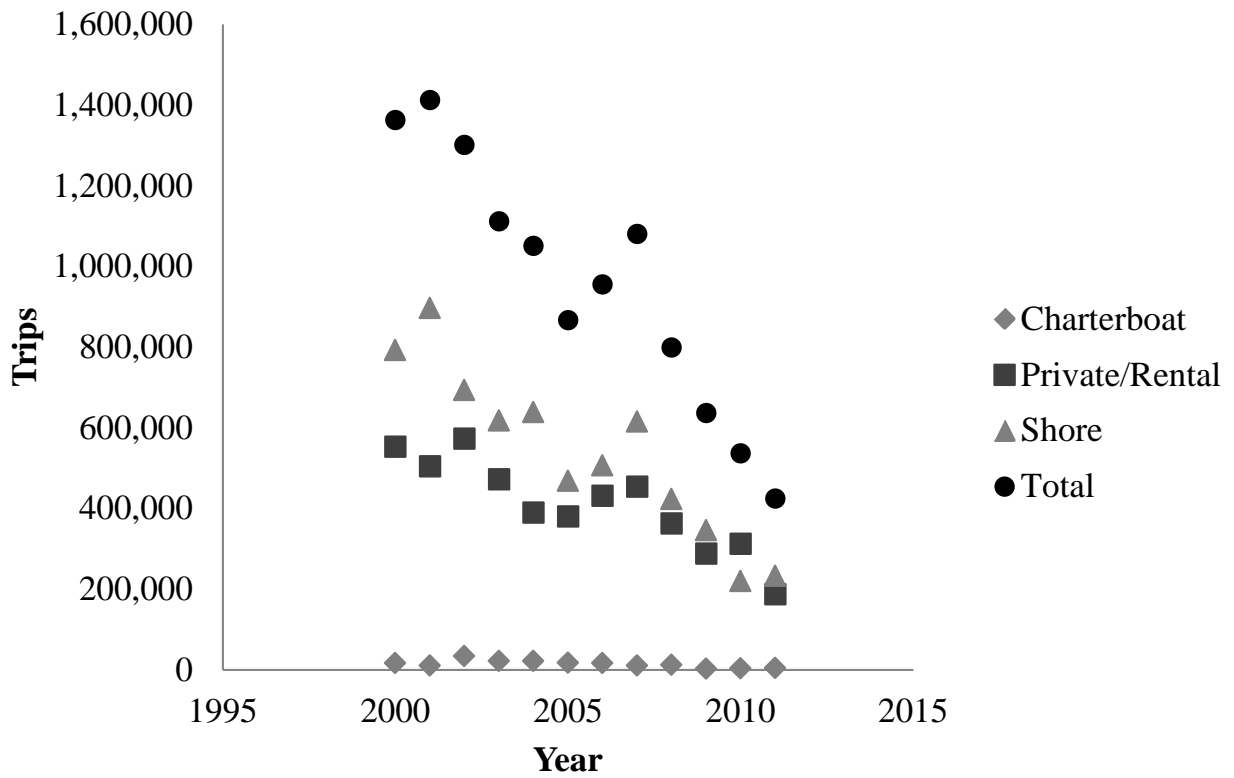


Figure 1. Estimated number of recreational fishing trips catching any US Caribbean species and the estimated number of recreational fishing trips separated by fishing mode.

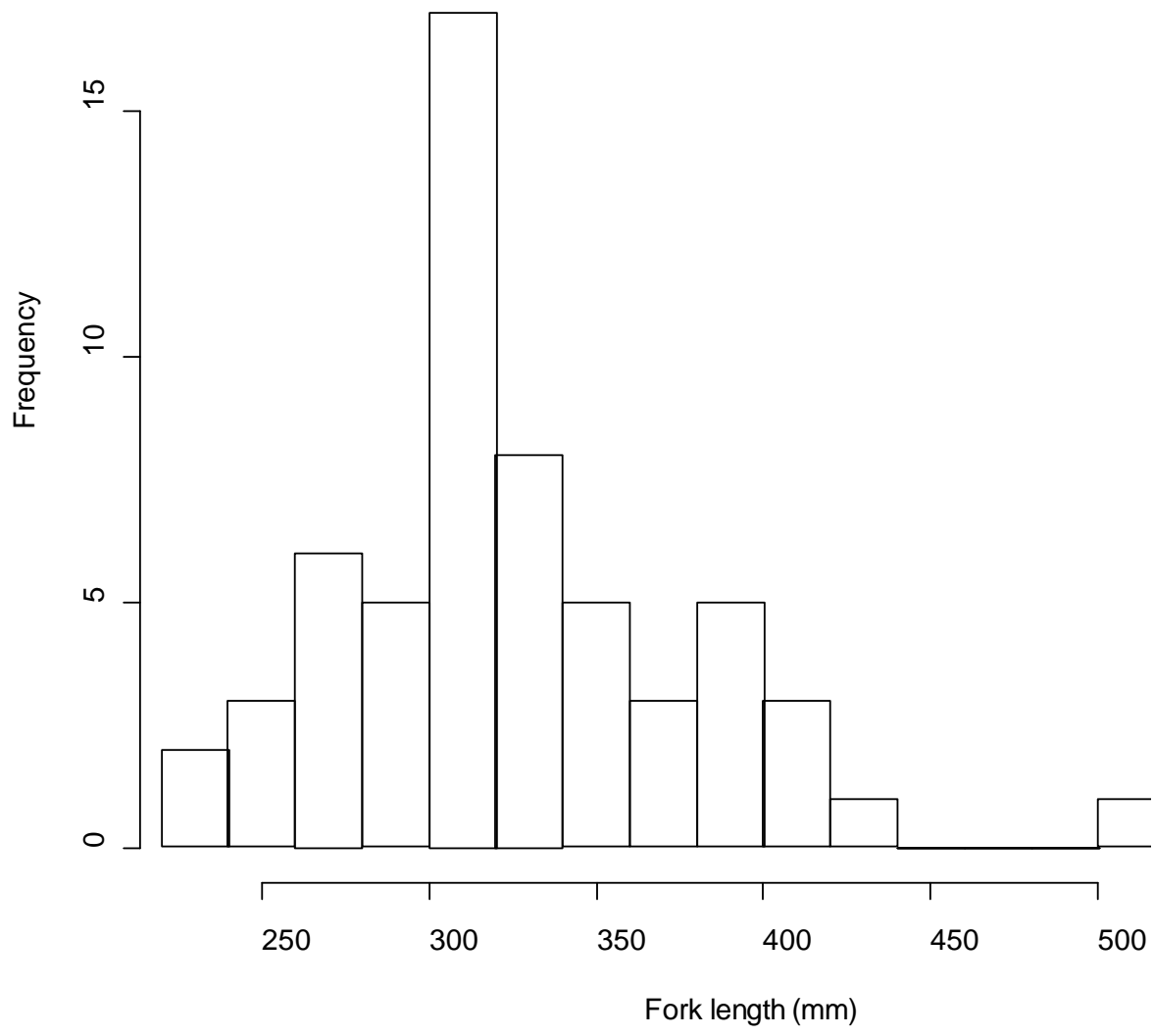


Figure 2. Length-frequency plot for queen triggerfish caught in Puerto Rico and intercepted by MRFSS between 2000 and 2011. N = 60.