South Atlantic red snapper (*Lutjanus campechanus*) monitoring in Florida for the 2013 season

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Saint Petersburg, FL

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Acknowledgments

We would like to thank the Florida east coast recreational anglers, charter and headboat fleets and tournament organizers collectively for taking the time out of their day to help us with the collection of catch and effort data as well as biosampling of catch. Without their cooperation, the sampling efforts could not have been a success. We would also like to acknowledge the marina and boat ramp operators who so graciously allowed us to set up shop for up to three days straight in some cases, and in several instances provided facilities, tables, buckets, and hoses and even directed anglers to make sure they allowed FWC field staff access to their catch. We would like to thank members of the FWC Division of Law Enforcement who helped greatly with communication with anglers and with our marine fisheries staff scattered along the coast. FWC LE also allowed staff to conduct observations on the water in 2012 and offered again in 2013. We are grateful for the support shown to us by National Marine Fisheries Service Southeast Regional Office, Southeast Science Center and MRIP staff at the Office of Science and Technology. Lastly, we would like to acknowledge FWC Division of Marine Fisheries Management staff as well Marine Fisheries Dependent and Independent staff members who worked long and hard before, during and after the field season to make sure we were ready for the 2013 season. If we have omitted anyone, we apologize but we owe thanks to many.

INTRODUCTION

Catch and harvest estimates for the recreational sector are achieved using a combination of established surveys. For all modes in Gulf of Mexico and Atlantic regions, catch information is obtained using the NOAA Fisheries MRIP Access Point Angler Intercept Survey (APAIS). Anglers are interviewed upon completion of their fishing trips at accessible sites such as docks, piers, boat ramps and marinas. For private boat and shore modes, catch information from the APAIS is coupled with effort data collected through the Coastal Household Telephone Survey (CHTS) to generate estimates of catch by species. For the charter or for-hire sector, the For-Hire Telephone Survey (FHTS) is used. In the CHTS, calls to obtain information on fishing effort are restricted to a two week period at the end of each two month-long wave. In the FHTS, industry representatives are called in a weekly 10% sample (with replacement) of the regional vessel fleets. Representatives for selected vessels, report on their for-hire activity for the previous week and this information is used to develop wave level estimates of for-hire effort. In theory because the survey is conducted on a weekly basis, by increasing sample size it should be possible to produce effort estimates of a higher resolution than those currently produced. However, fleet size and sample sizes for some regions limit the ability of the FHTS to produce effort estimates at resolutions higher than the wave level. The ability to produce reliable weekly level estimates is also dependent on the sampling levels in the APAIS to produce reliable CPUEs. Expanded FHTS sampling has been used in the past to produce for hire estimates below the wave level for red snapper. In 2008, 40% FHTS sampling was used to produce red snapper effort estimates for the Gulf of Mexico. FHTS effort estimates were coupled with a then 6X APAIS draw for the Gulf. However, the portion of the Florida for hire fleet operating in South Atlantic waters represents about 30% of the total number of for hire vessels within the state and the red snapper fleet is less concentrated than the its counterpart in the Gulf. Moreover, APAIS currently supports only a 2X sample draw for either coast. Also of consideration is the relatively new sample draw methodology which is still being refined. In the past, the for-hire mode APAIS sample was concentrated in terms of intercept totals in Southeast Florida which traditionally targets species other than red snapper. The current draw also shows some evidence of regional concentration of sample that may better reflect reality but does little to improve representation of so called “red snapper sites.” Since neither the FHTS nor the APAIS was originally intended to provide estimates of catch of a higher resolution than the eight- nine week waves it was apparent that current methodologies needed to be refined or changed substantively to produce harvest estimates of greater precision and accuracy.

The FHTS provides the basis for the survey instrument used to obtain effort information from vessel representatives. Fleet size is small enough (<550 vessels) that if criteria are assigned to eliminate vessels unlikely to participate in the red snapper fishery , then all or most of the remaining vessels could be surveyed for the additional information including catch which could be used to estimate red snapper harvest by the for-hire sector. For private boat mode effort and catch a different approach was taken to tacking the problem of higher resolution estimates of directed harvest. The scale of the private angler sector, the short duration of the red snapper opening and limitations within the CHTS design, meant that capturing catch and effort information by modifying methodologies already in place was not a practical option. The approach taken was to develop a field based method to measure of private boat effort that would complement catch information obtained at boat ramps and to a lesser extent, marinas. As the east coast of Florida has several major access points to open waters, boat counts at those points could be conducted to obtain boat level estimates of effort directed to offshore waters. Information gathered dockside could provide information to obtain an estimate of the proportion of vessel trips observed exiting the limited number of egress points were targeting red snapper. A major difference between angler intercept in this targeted approach to the APAIS was the luxury of being able to target specific information related to the catch of a single species rather than the non-preferential treatment of species in the APAIS.

As in 2012, the goal of the 2013 directed red snapper data collection exercise was to complement existing MRIP data collection efforts. Adaptation of FHTS methodology was done in a way that would minimize interference with ongoing data collection activities.

SECTION 1: For Hire Harvest Estimates

METHODS

Fleet Characterization

The NOAA Fisheries For-Hire Telephone Survey (FHTS) vessel list used for calls in wave 3 (May-June, 2013) was used create a list of vessels likely to target red snapper off the Atlantic Coast of Florida for the single three-day weekend opening from Friday 23rd-Sunday 25th of August, 2013. The FHTS list is maintained by the Gulf States Marine Fisheries Commission (with input from the states involved in the survey) and is used to generate a vessel sample frame for weekly calls to saltwater for-hire operators to obtain information on their fishing activity for the previous week. The survey is used to estimate saltwater for-hire fishing effort by week and region within the state. The data are combined with NOAA Fisheries Marine Recreational Information Program (MRIP) angler intercept information on catch to produce catch estimates at the wave level. Although the list size may vary from wave to wave depending on the addition or removal of vessels, there are generally between 2,150 and 2,200 vessels operated as for-hire on the list for the entire state of Florida. The number varies in size as vessels enter or leave the fishery. A total of 2,197 vessels were listed on the wave 3 list used to select vessels for this survey. East coast vessels (Nassau – Dade Counties) accounted for 546 of the state's total. Only 10% of those vessels are sampled in the weekly FHTS calls, of which a small fraction would be expected to target red snapper. To increase the likelihood that for hire directed effort would be captured, additional calls were made to vessels considered accessible to the fishery. In 2012, vessel location as well as vessel size were the two main criteria used to exclude from consideration. Vessels unlikely to make directed red snapper trips. Vessels < 21' were omitted and counties included in the survey were Nassau – Broward. In 2013, because only one round of calls needed to be made, location was not considered. The sample frame was expanded to include all vessels from Nassau through Monroe County. Moreover, a list was already in place that included any vessels regardless of size that had signed up with FWC to assist with our MARFIN project on the Atlantic coast. All of the vessels on this list volunteered because they make offshore trip to federal waters. Actively chartering vessels less than 21' in length were considered to be too small to make trips into federal waters and as a result, were removed from the list for FHTS regions 3 (Monroe County), 4 (Nassau-Indian River) and 5 (Brevard-Dade) unless they were already included on the MARFIN list. The draw resulted in 214 vessels from Monroe County, 152 vessels from Northeast Florida and 152 vessels from Southeast Florida for a total of 518 (compared to 261 vessels for the 2012 season draws for Nassau-Broward). As alluded to earlier, the rationale was to include additional vessels from the more southern portions of the state including the Florida Keys as a way to assess the relative effectiveness of the 2012 draw in terms of fleet representation. The distribution of vessel sizes by region, is shown in figure 1. Even with the removal of vessels < 21' from consideration, the distributions are skewed toward the lower end (smaller vessels) in Monroe County and in NEFL. This probably reflects a large inshore component to the fleets. Vessels in SEFL tend to be larger although there is a broad overall distribution in lengths. Larger vessels are needed for "bluewater" fishing and the concentration of charter boats that target highly migratory (HMS) and pelagic species from South Florida marinas is evident from the distribution.

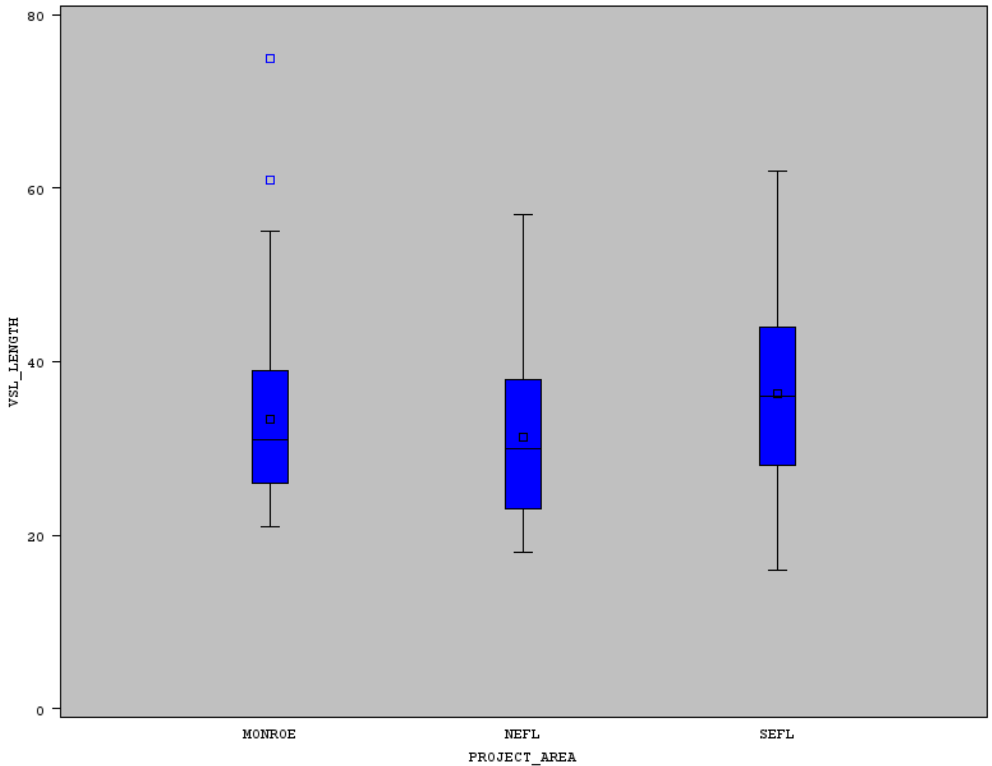

Figure 1. Distribution of vessel length for the three regions or project areas. Box plots show 25th, median and 75th quantiles. Mean is indicated by an open box with the shaded portion of the boxes, outliers are indicated as blue open boxes. Vessel length is measured in feet.

Survey methods

As was the case in 2012, vessel representatives were notified by mail that the FWC was conducting a survey of vessel operators and this survey would be conducted in concert with the NOAA Fisheries FHTS (FWC conducts the FHTS calls to captains). Similar to 2012, vessel operators were advised thatin addition to effort information they would also be asked questions on the numbers of fish harvested and released on each trip if they made any "red snapper trips" (defined as trips that targeted and/or caught red snapper. Similar to the FHTS, the notification was accompanied by a log sheet to track catch and trip information. To minimize the response burden and any confusion, it was considered important that the directed survey questionnaire utilize the basic FHTS survey design. This would allow vessels on the directed survey list already selected for the FHTS in both weeks of the red snapper season to quickly and easily complete a single questionnaire. Moreover, a level of validation of the assumption that vessels selected for the red snapper survey were representative would be provided from information gathered from vessels selected for the FHTS but not selected for the directed survey. Presumably, these vessels would not have caught or targeted red snapper.

Although the goal was to be as consistent as possible with the FHTS, the FHTS is not used to collect catch information. Catch information is provided from the NOAA Fisheries MRIP Access Point Angler Interview Survey (APAIS). Rather, the FHTS is used to obtain information on fishing effort and trip characteristics (e.g., numbers of trips, number of anglers, days fished, waters fished, time fished, primary and secondary species targeted) through a weekly sample of 10% of active for-hire vessels. Generally, fishing activity for a given week is obtained the following week. If a vessel representative is unavailable during this call period and requests that they be called later, callers may extend the period so that the information can be obtained. Generally, up to five calls are made in the week following the reporting period. Extending the call period into the following week increases the call load for surveyors and can result in recall issues for vessel representatives. As the red snapper season represented a total of three days (Friday-Sunday) and the goal of the survey was to provide estimates of harvest for red snapper only, a modified FHTS survey form developed for the 2012 season to track directed effort and numbers of red snapper harvested and released on each trip. In addition to the incorporation of catch information, an initial screener question to immediately identify ocean-based for-hire activity was included to expedite information gathering by focusing the survey on relevant vessel trips (the front and back of the modified FHTS survey form is shown in appendix A). The portion of the fleet that could not be reached (non-responses) was assumed to have similar for-hire/fishing activity to the respondents.

Estimation of for-hire effort and catch.

Calls were made in the week immediately following the three day recreational season as part of the regular FHTS call schedule (week 34). For the purposes of estimation, the mean number of directed red snapper vessel trips per vessel and the mean numbers of red snapper harvested and released per trip were summed for the portion of the fleet contacted. Upper and lower bounds were calculated as 95% confidence levels. The portion of the fleet that was not contacted was assumed to have had similar activity to vessels for which a response was obtained. For each region (Monroe, NEFL and SEFL) effort was calculated as follows.

Raw Total effort (region):

$$E_r = \sum_{i}^{n} T_i$$

Where E_r = Number of red snapper directed trips reported in a given region, T_i= number of vessel trips reported by each vessel that targeted and/or caught red snapper, n = number of vessel reporting. For the purposes of calculating variance, the above formula can be represented as follows:

$$E_r = n\bar{T}$$

Calculation of confidence limits/coefficients followed Snedecor and Cochran (1989).

Expansion Factor for non response:

$$C = \left(\frac{n}{N}\right)^{-1}$$

Where C = Expansion for non response ($C \geq 1$), n = number of vessels reporting, N = total number of vessels for which contact attempts were made. Since only a portion of vessels

Total Effort corrected for non-response:

$$E_c = CE_r$$

Where E_c = Effort estimate adjusted for non response, R= raw total effort for the portion of the for-hire fleet that responded to the survey and C=the adjustment for non-response. An adjustment is also required to correct for eligible vessels not called.

Expansion Factor for vessels selected but not called:

$$V_c = (\frac{N}{N+a})^{-1}$$

Where V_c = Expansion for vessels omitted from survey calls, N = number of vessels for which contact attempts were made (i.e., vessels called), a = vessels selected but not called. As there is also the possibility of vessels reporting that were not originally selected (e.g., through the addition of new vessels or movement of vessels between regions), an adjustment must also be made to include their activity.

Adjustment for vessels not selected:

$$A_{ns} = \frac{(N + a + b)}{(N + a)}$$

Where A_n = Adjustment for unselected vessels, N = number of vessels selected and called, a = vessels selected but not called, and b = number of vessels not selected that reported in the survey.

Total Effort is estimated as:

$$E_t = A_{ns}\, E_c V_c$$

Note that the product of A_{ns} and V_c can be simplified as:

$$A_{ns} V_c = \frac{(N + a + b)}{N}$$

Further, total effort can be represented by:

$$E_t = E_r \frac{(N + a + b)}{n}$$

Where E_r = raw total effort for n, the number of vessels reporting, N = number of selected vessels called, a = number of selected vessels not called, b = number of unselected vessels that reported and n = number of vessels reporting.

For estimation purposes, catch per unit effort (CPUE) was calculated for all vessel trips that targeted red snapper. Red snapper catch was averaged for targeting vessels. Vessels were considered to be targeting red snapper if they fished in ocean waters and named red snapper as their target or they fished in ocean waters and caught red snapper.

Catch Per Unit Effort:

$$C_t = \sum_{i=1}^{t} H_t / n_t$$

Where C_t = mean catch per vessel trip, H_t = number of red snapper harvested per vessel trip, n_t = number of vessel trips. Note:

$$n_t C_t = \sum_{i=1}^{t} H_t$$

Similarly to effort, 95% upper and lower confidence levels can be calculated for the mean harvest and mean number released per trip.

Harvest (region):

$$H_{total} = n_t C_t E_t$$

Where H_{total} = harvest, n_t = number of vessel trips, C_t = CPUE and E_t = Total Effort. Harvest was summed across regions to generate a final coast wide estimate of red snapper harvest and released catch.

RESULTS

Summary of telephone call information

A total of 518 vessels were surveyed. Those vessels were distributed as follows: Monroe County N=214, NEFL = 152, SEFL = 152. Response rates measured as successful contacts were 64%, 74% and 64%, respectively. Complete interviews (all questions answered) were obtained for 62%, 55%, and 64%. The results of call outcomes (= RESULT in FHTS) and call status (= STATUS in FHTS) are represented in figures 2 and 3, respectively. Although there was a low number of refusals, of note is the relatively high number of voicemails obtained, which essentially functions as a passive refusal. In terms of call status, callers were unable to contact 32% (Monroe), 21% (NEFL), and 33% (SEFL) of vessel representatives. Ineligible vessel made up 3%, 4% and 2% of vessels called. In the production of estimates, these vessels were subtracted from the total number of vessels called initially to produce a modified total and to reflect their non-contribution to overall fishing effort.

In the FHTS, calls can be categorized depending the call results or status. Tables 1 and 2 contain summaries call status and call outcome results shown graphically in figures 2 and 3. Success rates for calls made in 2013 in terms of completed calls and interviews were much improved relative to 2012 results. Improved response rates (+ ~10% overall) probably were the result of a combination of factors. In 2012, two back to back rounds of calls were made which meant that vessels representatives could report for both weeks in the final round of calls. Moreover, vessel representatives called in week 1 of 2012 who did not express an interest in participating in the fishing season were excluded from calls made for week 2. Adjustments had to be made to the calculations for non-response to reflect differences in protocols for the two weeks. The 2013 season was restricted to a three day season which required a single round of calls, thereby simplifying methodology. Other factors for consideration included that this was the second year of sampling and vessel operators that participated previously had knowledge of the survey and the need for trip information, FWC and NMFS outreach efforts were directed at informing participating fishers of the importance of cooperation with data collection. There was an appreciation dockside that charter clients that data collected from their fish would contribute to the stock assessment. Lastly, ongoing FWC MARFIN sampling activities along the Atlantic coast of Florida required for-hire participation and has been received well. All of these factors contributed to improved success rates contacting vessel representatives. As in 2012, callers made five attempts to reach vessel representatives.

As in 2012, callers made five call attempts to contact vessel operators. If the vessel could not be reached by the fifth call, the vessel operator was considered non-responsive. There was a single incident where zero calls were made to a boat operator because information was provided directly to the caller (also a sampler) dockside. In general if a vessel operator was not reached by the third call, they were unlikely to be contacted. A summary of call attempts for the successful contacts is shown for each region (project_area) in figure 4. In Monroe County, more than 90% of the successful contacts were obtained with the first two calls. In NEFL and the SEFL, the success rates were 74% and 77%, respectively for two attempts. Interestingly, in NEFL, the success rate for the fourth attempt was better than the third attempt. A more in depth characterization of the data is needed to provide a meaningful interpretation but possible factors include which day the calls were made, how many callers were used and the number of calls made. Captains usually prefer evening calls and have preferences for particular time blocks and days but if weather is considered bad, callers will attempt calls earlier in the day.

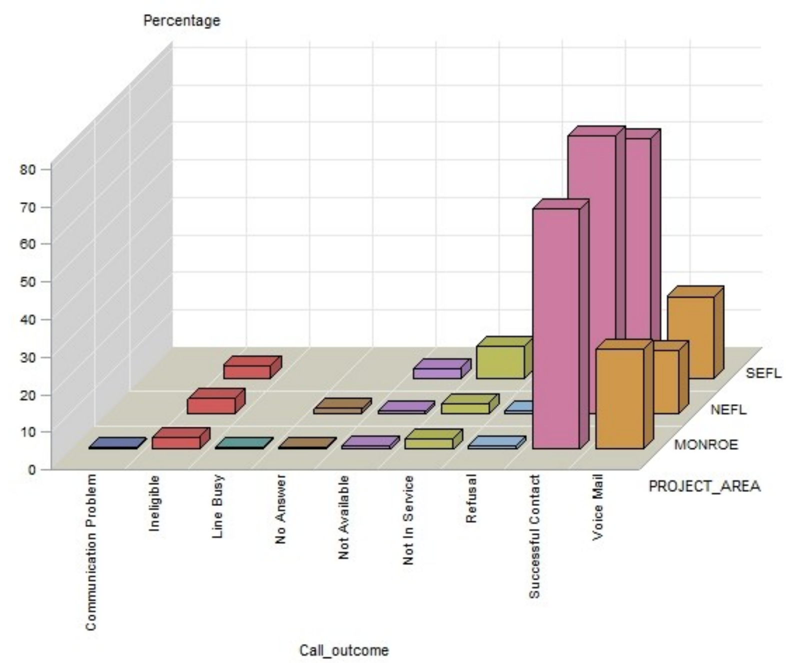

Figure 2. A summary of call results (Call_outcome) by region (Project_area). Nine possible outcomes are represented by the various bars and are expressed as a percentage of all results.

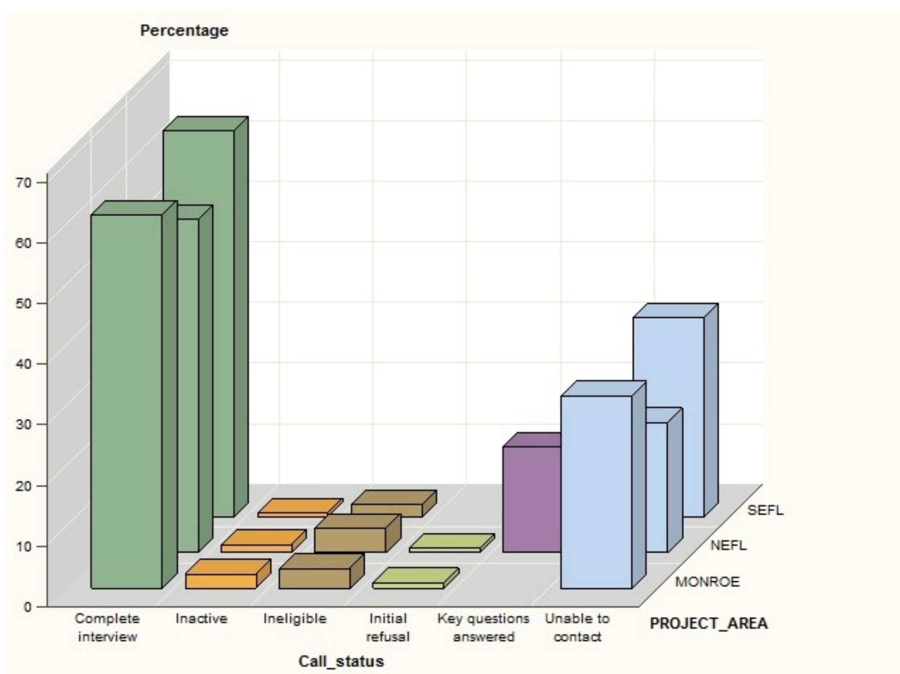

Figure 3. A summary of call status (Call_status) by region (Project_area), showing how calls considered successful contacts were catageorized. Tallied ineligible vessels were used to adjust the final sample frame size for estimation purposes.

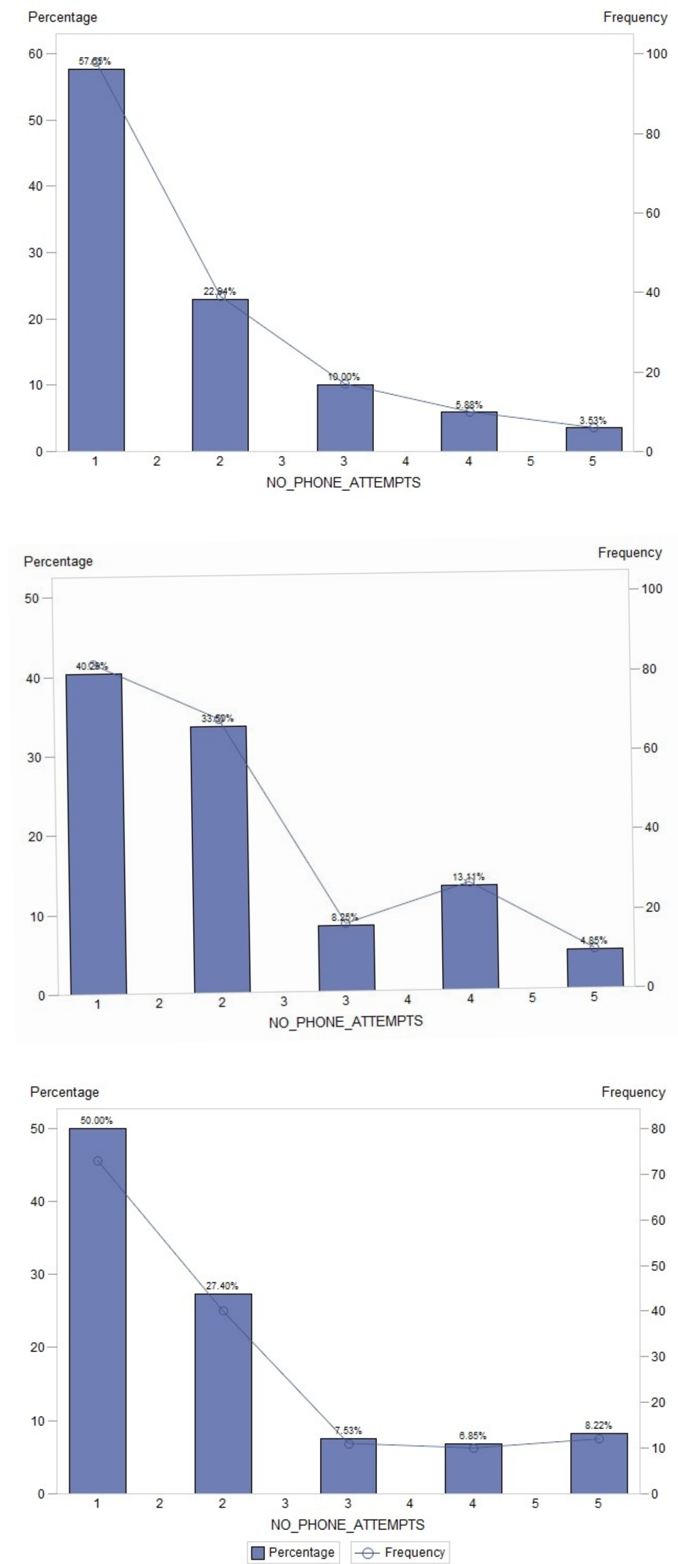

Figure 4. Summary of call attempts for successful contacts by region. From top to bottom, graphs depict calls for Monroe County, NEFL and SEFL vessels, respectively. Up to five attempts per vessel were made for each vessel sampled. Unsuccessful contacts on the fifth attempt are not shown.

Table 2. Summary of telephone call status and results for week 1 (September 14-16, 2012) for each FHTS region. Northeast = Nassau-Indian River counties, Southeast = Brevard – Dade counties.

	Monroe		NEFL		SEFL	
Call_status	No.	%	No.	%	No.	%
Complete interview	132	61.68	82	55.03	97	63.82
Inactive	5	2.34	2	1.34	1	0.66
Ineligible	7	3.27	6	4.03	3	1.97
Initial refusal	2	0.93	1	0.67	1	0.66
Key questions answered	0	0.00	26	17.45	0	0.00
Unable to contact	68	31.78	32	21.48	50	32.89
Total	214		149	*	152	

	Monroe		NEFL		SEFL	
Call_outcome	No.	%	No.	%	No.	%
Refusal	2	0.93	1	0.67	0	0
Line Busy	1	0.47	0	0	0	0
No Answer	1	0.47	2	1.34	0	0
Ineligible	7	3.27	6	4.03	5	3.29
Voice Mail	57	26.6	25	16.8	33	21.7
Not Available	2	0.93	1	0.67	4	2.63
Not In Service	6	2.8	4	2.68	13	8.55
Successful Contact	137	64	110	73.8	97	63.8
Communication Problem	1	0.47	0	0	0	0
Total	214		149	*	152	

* Three vessels in NEFL had missing status or outcome information.

Trip information

In addition to effort information and trip characteristics, calls to vessel operators also obtained information on catch. Care was taken to make the survey as effective as possible given the slight increase in the response burden. Information collected on the telephone calls to vessel representatives included number of trips (including non-charter trips so that field validation matched all trip types), number of for-hire trips, number of passengers on for-hire trips, trip start and end times, number of hours fished, depth fished, whether they fished in state or federal waters, numbers of red snapper harvested and number of red snapper released. Table 3 shows the distribution of trips by vessels. Most vessels reported no trips. For Monroe County more than 75% of vessels for which complete interviews were done, reported no trips during the three day season. More than 57% of vessels reported inactivity in SEFL with about 40% of vessels inactive in NEFL. Of the Monroe County boats, none made more than three trips. However, in NEFL and SEFL boats made up to 6 trips during the three day period. Interestingly, after inactivity (0 trips), the highest category was 3 trips at 28%, which translates into just under 50% of the boats that reported trips. Mean numbers of trips by charter vessels is shown in table 4. Charter vessels that made trips averaged less than two trips for the period (note the low number of vessels/trips) in Monroe County and SEFL. Charter vessels reported more than two trips in the NEFL region.

Trip start and end times provide information on the basic trip type (½, ¾, full day trips). Frequency distributions are shown for trip start and end times in figure 6. In SEFL and NEFL, the majority of trips started before 7:00am. In NEFL, trips started as early as 5:00am. Trips began a little later in the Keys (Monroe County) compared to the other two regions, although there was a low number of trips to examine. Trip end times were between 1:00pm and 5:00pm in the Keys but in SEFL, some trips ended before 10:00am but in general ended before 5:00pm. There were noticeable peaks at about noon and 4:30pm. In NEFL, most rips ended between 12:30pm and 5:00pm with a peak towards 5:00pm. However, there were a number of trips that ended as late as 8:00pm. It is clear that of the various trip types that ½ day trips are more prevalent in SEFL than in NEFL. The majority of the trips in NEFL were considered full day trips 8-11 hours in duration. As mentioned earlier, NEFL boats made on average > 2 trips, which translates to making two or more full day trips during the three day season. In general, the excursion to deeper waters takes longer in NEFL than in SEFL where deeper waters are closer to shore. In all three regions, Friday represented the day with the least amount of charter activity with less than half the trips of Saturday. For NEFL and Monroe County, activity on Saturday and Sunday was similar with roughly equivalent proportions of the charter trips occurring in those days. Interestingly, charter activity peaked on Saturday for SEFL boats with a little less than half of the trips on Saturday. A small number of vessel representatives in NEFL and to a lesser extent in SEFL did express some anxiety over the amount of notice given regarding the season dates and that some had difficulties booking trips as a result for the first day of the season. It is clear that most of those that reported activity were booked for the majority of the days. It is not clear how vessels that reported no trips or non-respondent vessels were impacted.

Table 5 contains more detailed trip information for the three regions. Variables included at the trip level, are number of anglers, hours fished, depth fished, number of red snapper harvested and number of red snapper released. Trips in Monroe County averaged less anglers per trip (mean = 3.86 anglers) than the other two regions (NEFL mean = 5.34 anglers, SEFL mean = 4.89 anglers). Trips varied quite a bit in each location with 2-6 anglers in the Keys (Monroe County) compared to 1-12 anglers in NEFL and 1-10 anglers in SEFL. Time fished averages were comparable with less an hour separating means. Hours fished averaged about 4 hours overall, but longer trips were made in NEFL with a maximum of 9.5 hours reported. The maximum trip lengths reported for Monroe and SEFL were 7 and 6 hours, respectively. As a reminder, hours fished does not include transit time so trip lengths would be up to several hours longer. The range of depths fished varied considerable but the mean depth fished in the Keys at 170 ft was approximately twice that of the other two regions. Mean depths fished for SEFL and NEFL were similar; 98' and 95', respectively. It should be noted that the depth range was greatest for NEFL trips at 185' whereas SEFL trips had a range of only 80'.

Also contained in table 5 is the mean catch per trip information. Trips in SEFL averaged a single red snapper per trip or 0.2 fish per angler trip. SEFL charter anglers fared a little better at 0.26 fish released per angler trip. Monroe County charter trips averaged about 2.6 fish per trip harvested and 0.43 fish released which translates to 0.67 red snapper harvested and 0.11 fish released per angler trip. In NEFL, red snapper trips came close to bag limits for harvested catch with almost five fish per boat trip harvested. The number of fish released per trip was about 7.8. In terms of catch per angler trip, harvest was close to one fish per angler (0.9 fish harvested) and close to three fish released for every two anglers that fished (1.46). In terms of the gross geographic extent of the fishery, red snapper were caught in all three regions but the fishery is clearly concentrated in terms of charter effort and catch in NEFL. In 2012, only the FHTS calls were used to validate the assumption that red snapper fishing was unlikely in the Florida Keys. Moreover, charter vessels from the Southernmost counties in the SEFL region were also excluded although their exclusion was largely validated by including vessels from those counties in the calls. This year, the expansion of the vessel list to include all boats from the three regions that were 21' or greater in length and the inclusion of vessels known to in fish federal waters for reef fish species provided for a more comprehensive sample frame.

Table 3. Distribution of charter vessel activity in terms of all trips (Trips) and charter fishing trips (Fishing trips) for the three regions. The column entitled "Trips" refers to all trips made whereas the column "Fishing trips" refers to only charter trips. Rows refer to the number of trips made (0-6) for the Friday-Sunday season. "No." refers to the number to the number of records and "Total" refers to the number of trips or fishing trips.

Region	Trips	No.	Total	%	Fishing trips	No.	Total	%
Monroe	0	101	0	75.37	0	104	0	77.61
	1	16	16	11.94	1	14	14	10.45
	2	11	22	8.21	2	11	22	8.21
	3	6	18	4.48	3	5	15	3.73
	Sum	134	56		Sum	134	51	
NEFL	0	43	0	40.19	0	49	0	45.79
	1	15	15	14.02	1	12	12	11.21
	2	15	30	14.02	2	15	30	14.02
	3	30	90	28.04	3	27	81	25.23
	4	1	4	0.93	4	1	4	0.93
	5	2	10	1.87	5	2	10	1.87
	6	1	6	0.93	6	1	6	0.93
	Sum	107	155		Sum	107	143	
SEFL	0	56	0	57.14	0	58	0	59.18
	1	18	18	18.37	1	17	17	17.35
	2	12	24	12.24	2	11	22	11.22
	3	6	18	6.12	3	6	18	6.12
	4	5	20	5.1	4	5	20	5.1
	6	1	6	1.02	6	1	6	1.02
	Sum	98	86		Sum	98	83	

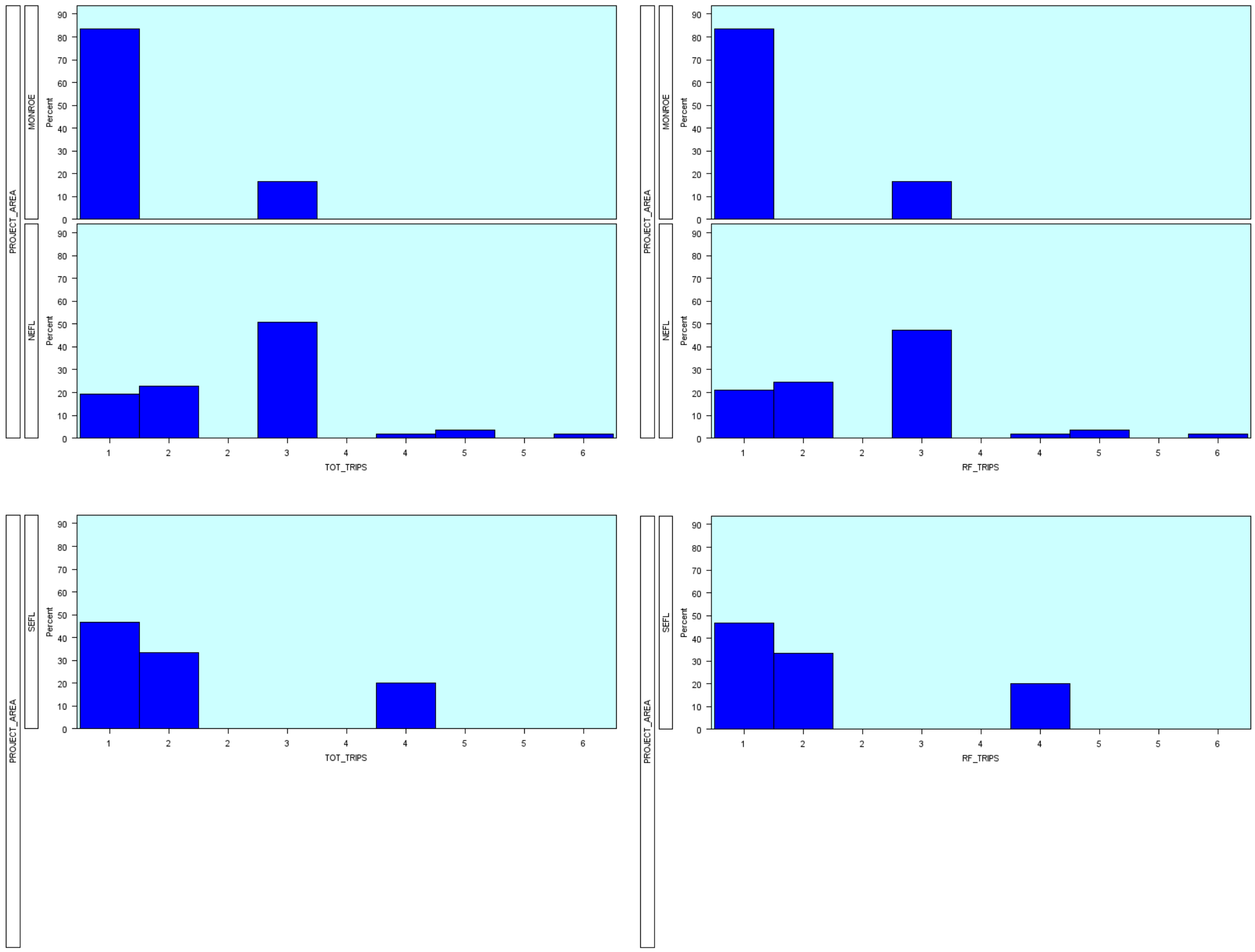

Figure 5. A graphical representation of information contained in table 4 for boats that reported fishing activity (0 trip reports excluded). All trips (TOT_TRIPS) are compared to charter fishing trips (RF_TRIPS) by region.

Table 4. Trip activity expressed in terms of the mean number of trips reported. L95% CL and U95% CL refer to Lower and upper confidence limits. CV refers to coefficient of variation (% of mean). *refers to aborted trip.

PROJECT_AREA	N	Variable	Mean	Min	Max	L95% CL	U95% CL	CV
MONROE	6	Total Trips	1.3333	1	3	0.4765	2.1902	61.2372
	6	Charter Trips	1.3333	1	3	0.4765	2.1902	61.2372
NEFL	60	Total Trips	2.5000	1	6	2.2289	2.7711	41.9847
	57	Charter Trips	2.3500	0*	6	2.0461	2.6539	50.0592
SEFL	15	Total Trips	1.9333	1	4	1.2893	2.5773	60.1510
	15	Charter Trips	1.9333	1	4	1.2893	2.5773	60.1510

Table 5. A summary of trip characteristics by region. Variables include number of anglers (ANGLERS), hours fished (HRSF), depth fished (DEPTH: m), number of red snapper harvested (NUM_HARV), number of red snapper released (NUM_REL).

PROJECT_AREA	N Total	Variable	Mean	Min	Max	n	L95% CL	U95% CL	CV
MONROE	7	ANGLERS	3.8571	2	6	7	2.3070	5.4073	43.4561
		HRSF	4.2857	2	7	7	2.5176	6.0538	44.6073
		DEPTH	170.0000	100	260	5	83.0835	256.9165	41.1765
		NUM_HARV	2.5714	0	6	7	0.2527	4.8901	97.4996
		NUM_REL	0.4286	0	3	7	-0.6201	1.4772	264.5751
NEFL	137	ANGLERS	5.3431	1	12	137	5.0375	5.6486	33.8501
		HRSF	4.7273	1	9.5	77	4.3479	5.1066	35.3533
		DEPTH	95.4648	55	240	71	87.5188	103.4108	35.1651
		NUM_HARV	4.8456	0	12	136	4.3869	5.3043	55.8228
		NUM_REL	7.7803	0	45	132	5.9846	9.5760	134.0462
SEFL	28	ANGLERS	4.8929	1	10	28	4.2143	5.5714	35.7645
		HRSF	3.8542	2	6	24	3.3700	4.3383	29.7504
		DEPTH	98.3333	70	150	9	73.4999	123.1668	32.8547
		NUM_HARV	1.0000	0	6	28	0.2103	1.7897	203.6700
		NUM_REL	1.2963	0	10	27	-0.0010	2.5936	252.9884

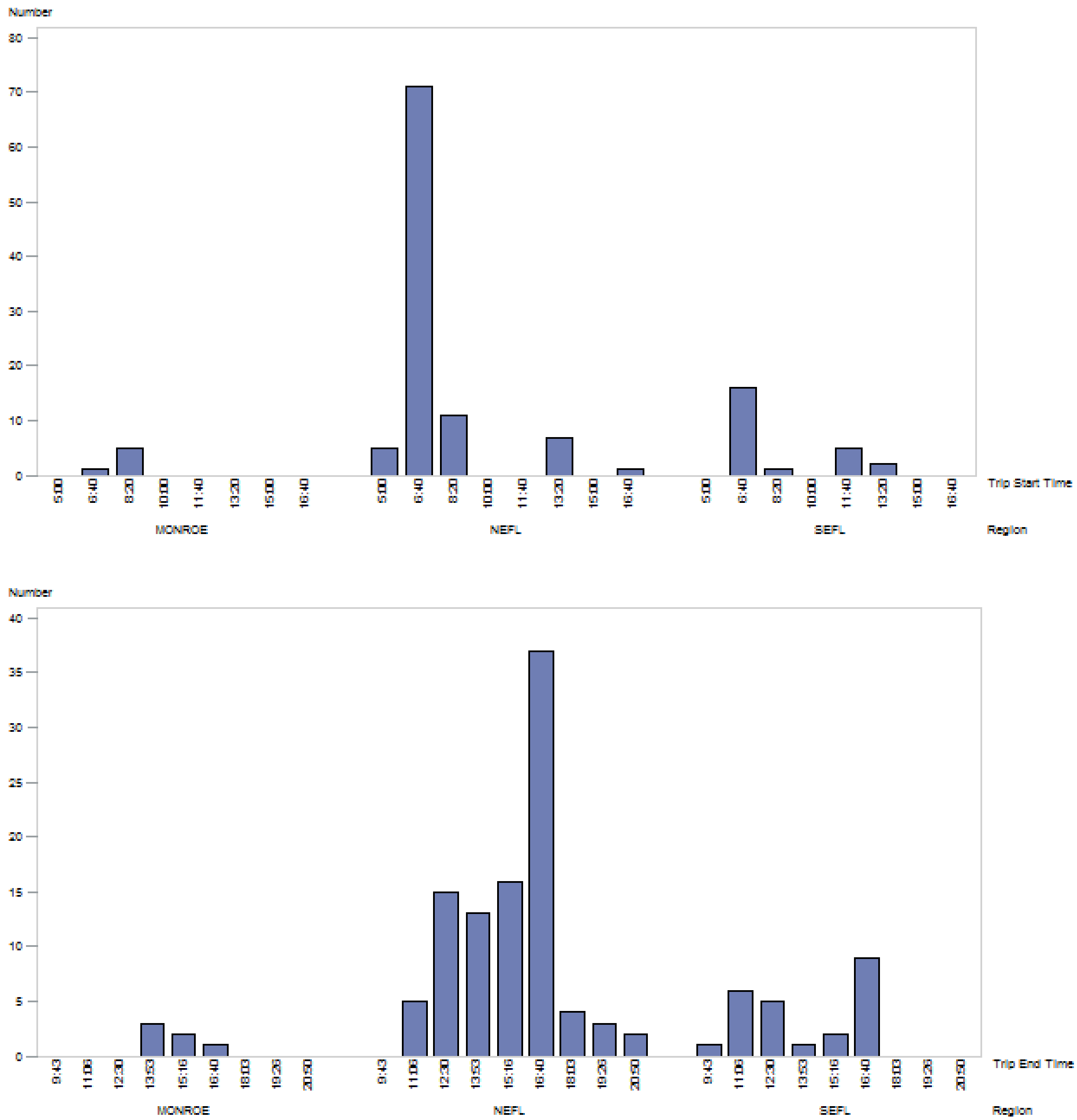

Figure 6. Reported trip start (top) and end (bottom) times for red snapper trips compared for the three regions.

Harvest Estimates

Harvest was estimated regionally by summing catch per trip for trips that either targeted red snapper or reported catch (Table 6). Charter fishery harvest of red snapper was estimated as 971 fish with lower and upper bounds at the 95% CL of between 713 and 1,312 fish harvested. In terms of numbers of released fish, between 945 and 2,180 fish were released with a mean total of 945. We were pleased with response rates which reduced adjustment for non-response relative to 2012 (1.73x-1.79x raw effort). In terms of the proportion of the fleet that responded to the survey in the various regions, adjustments of between 1.35 (NEFL) and 1.57 (Monroe County) were made. The improvement in response rates is probably attributable to improved awareness of data needs by the fleet, improved logistics associated with a single round of calls rather than two consecutive weeks of calls that may have affected response rates (many vessel operators had a preference for a single round of call attempts which would have allowed them to report once for both weeks in 2012). Another factor not alluded to earlier is the availability of manpower to make the calls. In 2012, a number of FWC staff involved in the field portion of data collection were also responsible for conducting the phone calls. Because of the intensive nature of the sampling efforts, those staff had calls to make on field days which may have affected their efficiency. Other adjustments made to levels of overall effort included an expansion for vessels selected but not called and vessels not selected that reported. The latter refers to vessels picked up during calls that were not on the frame. Although the sample draw was based on known vessels, vessel operators were asked to report for any of their vessels (some have several vessels for which they routinely report in the FHTS). In the FHTS, callers occasionally are occasionally informed of new vessels during those calls although the effort is not recorded unless the vessel selected was replaced by the new vessel, in which case it is assigned the previous vessels sample draw ID. There was a slight adjustment for vessels not selected but not called in NEFL (n=3) but no adjustments were necessary for unlisted vessels. The mean total charter fishing effort was estimated as 241 trips, with lower and upper 95% confidence limits of 195 and 288 trips, respectively. Based on field observations of vessels departing or returning through inlets and FHTS validations, no adjustments were necessary for possible misreporting of fishing activity either in terms of days fished or not fished. In the FHTS, this adjustment can have a significant impact on the estimation process depending on response rates. Since the trip information was limited to red snapper trips that occurred during a three day period, these trips may be less likely to be subject to misreporting.

A comparison of NOAA MRIP estimates for Wave 4 (July/August) of 2013, shows an estimate of 901 fish harvested with a PSE of 85.7% (NOAA Fisheries, pers. Comm.). MRIP released catch estimates are for 377 fish with a PSE of 19%. However, in released catch estimates were available for waves 3, 5 and 6 and together with wave 4 estimates totaled 6,585 fish with wave level PSEs varying from a low of 19% in wave 4 to 68% in wave 6. We were pleased to see that three “red snapper sites” were selected during the three day season for MRIP APAIS charter sampling.

Biosampling efforts

Results from biosampling activities are limited to a tally of the numbers of fish obtained for age analysis and size distribution of those fish by recreational fishing sector. As in 2012, biosamples were obtained from a number of sources but efforts concentrating on obtaining fish directly from anglers and charter vessels that at public launch sites and marinas throughout the various inlets sampled in the study. Fish were identified as tournament, charter, headboat, private boat and unknown (Table 7). The majority of fish came from private boat and charter modes. Briefly, charter, private boat and tournament fish were comparable in terms of age and size distributions. Ranges were the same for all three modes (range = 20) but tournament and charter fish contained more older individuals than private boat fish. The youngest fish ageed was 1 yr and oldest was 22 yrs. As in 2012, a number of fish could not be reliably assigned to a mode. The most common reason for this was because these fish largely represented "drop-offs" at the various sites sampled. In 2012, it was felt that carcass program was marginally effective in obtaining basic information on mode fished, waters fished and date fished. A lack of basic information resulted in a large number of aged fish not being usable for stock assessment purposes. In 2013, however, there was an expectation among anglers that there would be carcass drop-off points and the program would continue. As a result of that expectation, a very limited program was undertaken. It may be that the reduction in the carcass program was a premature decision and that angler education may solve the issues with not providing essential information with the fish. Carcass drops had water-proof cards and pencils available to anglers and a sign requesting basic information. The mode for these fish was 7 yrs., with mean age of 6.5 yrs. As in 2012, red snapper provide by headboat trips were comprised of younger smaller fish. Presumably, the shortened trips made by headboats to less distant offshore areas contributed to observed size and age differences (mode = 3 yrs, mean 4.6 yrs).

Table 6. Red snapper harvest estimates for the for-hire sector in FHTS regions 3 (Monroe County – Florida Keys), 4 (SEFL) and 5 (NEFL) of Florida. Variables are described in the text. LCL = 95% lower confidence limit, UCL = 95% upper confidence limit.

	Number of Vessels reporting	**Number of RS Trips/vessel**			**Number of RS Trips**			**Proportion of fleet contacted that reported**	**Expansion for Non-Response**
Region	E_r	*Mean*	*LCL*	*UCL*	*Total*	*LCL*	*UCL*	*n/N*	*C*
NEFL	57	2.35	2.0461	2.6539	133.95	116.6277	151.2723	0.73972603	1.3518519
SEFL	15	1.933	1.2893	2.5773	28.995	19.3395	38.6595	0.65986395	1.5154639
Monroe	6	1.333	0.4765	2.1902	7.998	2.859	13.1412	0.63768116	1.5681818
Total	78				170.943				

	Effort corrected for Non Response			**Expansion for vessels selected but not called**	**Effort expanded for vessels selected but not called**			**Adjustment for vessels not selected**	**Total Effort**		
Region	E_c	*LCL*	*UCL*	V_c	E_cV_c	*LCL*	*UCL*	*Ans*	E_t	*LCL*	*UCL*
NEFL	181.08056	157.66337	204.49774	1.0201342	184.72647	160.8378	208.61514	1	184.72647	160.8378	208.61514
SEFL	43.940876	29.308314	58.587077	1	43.940876	29.308314	58.587077	1	43.940876	29.308314	58.587077
Monroe	12.542318	4.4834318	20.607791	1	12.542318	4.4834318	20.607791	1	12.542318	4.4834318	20.607791
Total	237.56375				241.20967				241.20967	194.62955	287.81001

Harvest	**CPUE**			**Harvest**		
Region	C_t	*LCL*	*UCL*	H_t	*LCL*	*UCL*
NEFL	4.8456	4.3869	5.3043	895.1106	705.57936	1106.5573
SEFL	1	0.2103	1.7897	43.940876	6.1635385	104.85329
Monroe	2.5714	0.2527	4.8901	32.251317	1.1329632	100.77416
Total				**971**	**713**	**1,312**

Released	**CPUE**			**Relased catch**		
Region	C_t	*LCL*	*UCL*	H_t	*LCL*	*UCL*
NEFL	7.7803	5.8946	9.576	1437.2274	948.07451	1997.6986
SEFL	1.2963	-0.001	2.5936	56.960558	-0.0293083	151.95144
Monroe	0.4286	-0.6201	1.4772	5.3756376	-2.7801761	30.441829
Total				**1,500**	**945**	**2,180**

Table 7. Distribution of biolostatistical information (Fork length = FL/ML). Age and size information is assigned to five categories or modes (headboats, charters, private boats, tournament and unknown). NObs = Number of observations (lengths measured), N refers to the numbers of those fish that were aged.

Mode Fished	N Obs	Variable	Mean	Std Dev	Min	Max	Mode	Range	N	N Miss
Headboats	84	FL/ML	541.85	135.15	307	801	372	494	84	0
		Age	4.62	2.04	2	11	3	9	84	0
Charter	457	FL/ML	642.97	118.60	265	891	730	626	457	0
		Age	6.10	2.69	1	21	6	20	447	10
Private Boat	977	FL/ML	631.03	132.11	7.63	884	700	876.37	977	0
		Age	5.88	2.69	1	21	6	20	953	24
Tournament	81	FL/ML	678.90	114.94	313	899	668	586	81	0
		Age	7.00	3.86	2	22	6	20	66	15
Unknown	102	FL/ML	637.28	142.54	334	855	550	521	102	0
		Age	6.47	3.35	2	18	7	16	100	2

DISCUSSION

For hire harvest estimates for 2013 were comparable to those obtained in 2012. However, 2013 was the second year of the survey and logistically less difficult because the season was limited to a single three day weekend that ended on a Sunday. Calls to vessel operators began on the following Monday and were in general completed by Sunday of the same week (unless a vessel operator requested that we call outside the calling period. In 2012, back to back three day weekends forced an overlap between the calling period for the first weekend's activity and the second weekends fishing activity which may have had an impact on response rates and certainly required some unanticipated adjustments to the estimation process for overall charter effort in 2012. A single weekend season in 2013, also allowed for the inclusion of additional vessels to the overall sample draw. Vessels from Monroe County and Broward and Dade Counties were added to the draw to informally test the assumption from 2012 that those areas were beyond historical red snapper fishing areas and did not contribute significantly to overall effort or harvest. We also received some notice from charter captains in both areas that they intended to fish for red snapper. In terms of overall effort, red snapper trips in SEFL and Monroe County accounted for more than 20% of the charter effort but in terms of catch rates and overall harvest, those trips only accounted for about 8% of the overall harvested catch and only about 4% of the releases. For future recreational fishery openings, and in particular consecutive weekend openings, where resources to sample the fishery are limited it may be reasonable to exclude these areas for consideration and concentrate on more productive areas. However, both the Keys and SEFL contributed to red snapper fishery effort and that effort was detectable using a more than 10X effective sample size through modified FHTS methodology.

Private Boat mode estimates

Introduction

The offshore recreational boat fishery off the Atlantic coast of Florida first emerged in the early 20th century, but did not fully develop until after World War II (Gregg 1902, Moe 1963, Rivken 2009). There was a notable increase in offshore recreational fishing participation after 1950 that has been attributed to tourism and resident population growth in Florida, improvements to coastal inlets, and technological advances that made offshore fishing accessible and appealing to amateur fishers (Moe 1963, Rivken 2009). Fishing innovations that gained widespread commercial availability during decades following the war include the outboard motor, durable fiberglass boats, improved electronics for radio navigation, and monofilament line and fiberglass rods with spinning reels for ease in retrieval of hook-and-line gear (Spurr 1999, Shultz 2000, Hunn 2002). At the time that the first formal survey of Florida's offshore fisheries was conducted in the early 1960's, commercial, for-hire and private recreational boat fisheries were well established on the Atlantic coast and intense fishing pressure was already cited as a particular concern for reef fishes (Moe 1963).

Since 1981, private boat-based recreational landings for all saltwater finfish in the South Atlantic region (North Carolina through the Atlantic coast of the Florida Keys) have been monitored continuously through a suite of complementary surveys statistically designed to estimate recreational effort and catch-per-unit effort over two month time intervals (previously the Marine Recreational Fisheries Statistics Program, now the Marine Recreational Information Program or MRIP, see www.st.nmfs.noaa.gov/recreational-fisheries). However, offshore anglers are a small subset of the overall saltwater recreational fishing population that is sampled in the coast wide survey, due to the type of boat and other expenditures necessary to access fishing areas miles from shore. Boat-based offshore effort is becoming increasingly recognized as a unique sub-set within marine recreational fisheries that requires specialized sampling designs (Dunlop and Mann, 2013; Zischke et al. 2012; Sumner et al., 2008). Among all saltwater recreational angler trips estimated to take place from private boats in the South Atlantic, less than 20% fish more than 3 miles from shore in the Exclusive Economic Zone (EEZ; personal communication, National Marine Fisheries Service, Fisheries Statistics Division, 2/14/14). Offshore effort in the South Atlantic is concentrated along the east coast of Florida, with more than 70% of private boat angler trips in the EEZ originating from the state. Within Florida, offshore effort must originate from one of a series of geographically separated inlets along the Atlantic coast that serve as egress points to the open ocean. Navigating the inlets and travelling offshore in small recreational boats is highly dependent on marine conditions that vary across months, weeks, and days. Thus, offshore fishing effort is not homogeneously distributed spatially or temporally and surveys designed to sample all saltwater fishing may sample the offshore segment inconsistently, resulting in imprecise estimates. Further exacerbating these issues in recent years are reduced fishing seasons for some highly regulated species, such as red snapper (*Lutjanus campechanus*), which has compressed targeted fishing effort over time intervals that are substantially shorter than the two month periods (called waves) sampled by MRIP.

Red snapper is a popular reef fish species targeted by recreational boat anglers in the South Atlantic region. The species' center of abundance lies between Cumberland Sound and Sebastian Inlet on the east coast of Florida (Figure 1), where recreational fishing effort is also concentrated. In 2010, red snapper was closed to all commercial and recreational harvest throughout the South Atlantic region to allow the stock to recover from overfishing. Prior to the closure, fishery-independent monitoring programs for reef fishes were still being developed and virtually all of the information available for assessing the stock was provided by fishery-dependent data collection programs. Complete closure of the fisheries represented a major interruption in the historic time series of data used to assess the red snapper stock. Furthermore, when the stock was last assessed in 2009, fishery-dependent monitoring programs provided little to no information on the areas fished, capture depths, size and age distribution, and selectivity for harvested and released fish, particularly for the private recreational boat sector (SEDAR, 2010a). In 2012, it was determined that the red snapper stock could sustain a small harvest quota and recreational anglers were permitted to keep one fish per person of any size during two weekend season openings (six days total) during September. The following year, the season was opened again for one weekend (three days) in August. However, for reasons already discussed, the general recreational fishing survey was not expected to estimate harvest levels with reasonable precision given the small quotas and short duration of the two seasons.

Managers of large-scale fisheries-dependent monitoring programs have realized the need in recent years for flexible approaches to handle the unique circumstances of scale and context within recreational fisheries (Hartill et al., 2012). Our approach was to design complementary catch and effort surveys to directly sample the offshore recreational fishery during short season openings for red snapper. The sampling methods were designed to take advantage of the compressed nature of the harvest seasons and geographic bottlenecks that together serve to concentrate offshore fishing effort both temporally and spatially. Briefly re-opening harvest also provided an opportunity to collect new information on characteristics of the private recreational boat fishery targeting red snapper that were previously unknown, including distance from shore and depths fished, age distributions for harvested fish, and size classes for released fish.

Methods

The study area was the east coast of Florida from the state's border with Georgia south to Saint Lucie Inlet. A total of nine inlets in the study area serve as navigable egress points to offshore fishing grounds in the Atlantic Ocean (Figure 1) and any red snapper fishing trip that originates from within the study area must pass through one of these inlets. St. Lucie Inlet is the southern limit for recreational access to fishing areas where red snapper are sufficiently abundant to target. Cumberland Sound defines the border between Florida and Georgia and fishing effort from this egress point may originate from either state.

Boat Trip Survey

To estimate the total number of directed red snapper trips from private recreational boats, two of the nine inlets in the study area were selected as reference inlets and monitored from land continuously during daylight hours from 7:00 am to 7:00 pm each day the fishery was open. Inlets 3 and 7 were assigned as reference inlets in 2012, and inlet 7 was replaced by inlet 8 in 2013 (Figure 1). Field observers were stationed at the outermost area of the inlet where vessels could be clearly viewed exiting into the Atlantic Ocean. Each power boat was identified either as a private recreational boat or other vessel type. If the viewer could not ascertain with the aid of binoculars whether a vessel was a private recreational power boat, then the vessel was classified as "undetermined". If individual vessels were observed making multiple passes through an inlet, then field observers made notes on the data sheets so that they were not included more than once in boat trip counts.

For the remaining non-reference inlets, boat traffic was monitored for up to six hours during three separate days each season. Monitoring took place from land, with the exception of the largest inlet (inlet 2), where an improvement was made during the second year of the study to monitor this inlet from a small boat stationed inside the pass. However, weather declined on the last day of the 2013 season and the low volume of recreational boat traffic on that day was effectively monitored from land. Monitoring of non-reference inlets was conducted during one six hour time period each day (7:00 a.m. to 2:00 p.m. or 2:00 p.m. to 7:00 p.m.) and assignments were randomly selected from a generated list of all possible inlet, day, and time period combinations. The one exception to random selection was during 2013 in inlet 2 where monitoring times were adjusted to accommodate the availability of the research vessel.

Access Point Trip Intercept Survey

A list of boating access sites located in the vicinity of an inlet from which private recreational boats embark on offshore trips was generated for the study area. The list included 54 public and privately operated boat ramps, marinas and dry dock facilities. Sites were assigned to one of two regions. The northern region included sites located in the vicinity of inlets 1 through 6, and the southern region included sites near inlets 7 through 9. Each site was also assigned a pressure of high, medium, or low based on the number of offshore vessels expected to use the site on an average weekend. A list of all possible site and day combinations was generated and the survey select procedure in SAS software was used to randomly select assignments. The number of high, medium and low pressure sites located near each inlet varied, and no assignments were selected for the smallest inlet in 2012; therefore, in 2013, the survey select procedure was stratified to ensure equal selection probabilities across all inlets. The first eight high and eight medium–low pressure site and day combinations that were randomly selected were assigned to field staff in the northern region, and in the southern region the first six high and six medium–low pressure combinations were assigned. The remaining selected combinations were listed in order by inlet, day, and random selection, and this list was used to issue supplementary assignments wherever additional manpower was available. This method was chosen to insure that a minimum number of completely randomized combinations were assigned first and then supplemented to maximize productivity for the amount of staff available over the short sampling periods. Assignments were moved only for circumstances that would otherwise result in cancellation or lower than expected productivity. For example, one assignment was moved to an adjacent site due to construction at the assigned boat ramp and a small number of assignments had to be moved to different days when staff was available.

During a scheduled assignment, field staff arrived at their assigned site at 10:00 a.m. and remained on site until sunset or the site closed (whichever occurred first). As vessels returned from recreational boating trips, the operator of the vessel was approached to confirm the nature of the trip. For all private recreational boat trips, the operator was interviewed to first determine whether the vessel exited through the inlet into the Atlantic Ocean at any time during the trip. If not, the interview was complete. If the vessel did enter the Atlantic Ocean, a positive response (yes) was also recorded if the party intentionally targeted red snapper or caught red snapper (regardless of the intended target species). In 2012, the time the vessel exited the inlet was recorded for positive red snapper trips and in 2013, the inlet exit time was recorded for all ocean trips. The following additional information was collected only for positive red snapper trips: 1) number of people in the party, 2) number of people that fished, 3) numbers of red snapper harvested and released for the party, 4) number of hours spent fishing, 5) the average depth fished (in feet, added in 2013), and 6) the minimum and maximum distance from shore (in miles) where fishing took place. If red snapper were harvested, the interviewer asked for permission to inspect the fish and recorded the length (mm at the midline) and weight (in kg) for each fish and extracted otoliths. For parties that released one or more red snapper, they were asked to recall how many of those fish were less than 16 inches, between 16 and 20 inches, and greater than 20 inches in length.

Since older age classes of fish are relatively uncommon in samples from an overfished stock, samples from red snapper harvested from private (not for-hire) recreational boats were also collected at tournament weigh-in stations, voluntary carcass drop-off locations, and other non-randomly selected sites. The purpose of this non-random sampling effort was to supplement catch-at-age information obtained from the intercept survey. Otoliths from both the intercept survey and the non-random sampling effort were sectioned, aged, and blind validated by separate readers at the Fish and Wildlife Research Institute in Saint Petersburg, Florida following established procedures (cite FIN).

Effort Estimation

For each day that red snapper was open to recreational harvest (j), the numbers of boats that exited through each inlet (i) were summed for each hour of observation (h). Only private recreational power boats and undetermined vessels were included in the summations. If the same vessel was observed making multiple passes through the inlet, then the vessel was only included once in the summation. For randomly sampled (non-reference) inlets, the number of boats that exited through each inlet during each hour observed was expressed as a proportion (p) of the number of boats observed in a corresponding reference inlet during the same time, calculated as:

$$p_{j,j,h} = (B_{obs,\ rand\ inlet\ i,j,h}) / (B_{obs,\ ref\ inlet\ i,j,h})$$

For example, if 10 boats exited Cumberland Sound from 7:00 am to 7:59 am on August 23, 2013, this number was expressed as a proportion of the number of boats that exited through Saint Augustine during the same hour on the same day. In 2013, random inlets were sampled each day of the three-day season and the mean daily proportion and variance (σ^2) for each randomly sampled inlet was calculated as:

$$\text{mean } p_{i,j} = (\textstyle\sum_{h=1 \text{ to } k} p_{i,j,h}) / k$$

$$\sigma^2\ p_{i,j} = (\textstyle\sum_{h=1 \text{ to } k} (p_{i,j,h} - \text{mean } p_{i,j})^2) / k-1$$

Where k is the number of hours the inlet was observed on a given day. The total estimated number of boat trips that entered the Atlantic Ocean through each random inlet between 7:00 a.m. and sunset during the red snapper harvest season each year was calculated as:

$$B_{est,\ rand\ inlet\ i} = \textstyle\sum_{j=1 \text{ to } x} (B_{obs,\ ref\ inlet\ i,j} * \text{mean } p_{i,j}),$$

The 95% confidence interval was calculated as:

$$CI_{0.95}\, B_{est,\ rand\ inlet\ i} = \textstyle\sum_{j=1 \text{ to } x} [B_{obs,\ ref\ inlet\ i,j} * (\text{mean } p_{i,j} \pm 1.96\ (\sigma\ p_{i,j} / \text{sqrt } k))]$$

Since random inlets were only sampled three days out of the six day season in 2012, a slightly different method was used for estimating boat trips. Rather than estimating boat trips separately for each day of the harvest season, the mean number of boats that exited an inlet was expressed as a proportion over all hours observed for each day an inlet was sampled. Variance was then calculated around the mean p_i over the three sample days, and total effort over the 2012 season was estimated as:

$$B_{est,\ rand\ inlet\ i} = (\textstyle\sum_{j=1 \text{ to } x} B_{obs,\ ref\ inlet\ i,j}) * \text{mean } p_i,$$

The 95% confidence interval was calculated as:

$$CI_{0.95}\, B_{est,\ rand\ inlet\ i} = [(\textstyle\sum_{j=1 \text{ to } x} B_{obs,\ ref\ inlet\ i,j}) * (\text{mean } p_i \pm 1.96\ (\sigma\ p_i / \text{sqrt } k))]$$

The total observed number of boat trips exiting through each reference inlet from 7:00 am to 7:00 pm was simply:

$$B_{obs,\ ref\ inlet\ i} = \sum_{j=1\ to\ x} \sum_{h=1\ to\ k} B_{obs,\ ref\ inlet\ i,j,h}$$

Trip interviews obtained during the access point trip intercept survey were used to calculate the proportion of boats entering the Atlantic Ocean that targeted red snapper. To account for variable sample sizes across inlets (due to variable numbers of scheduled assignments), a weight (W) for each inlet was calculated as:

$$W_i = (N_i/\sum_{i=1\ to\ x} N_i) / (n_i /\sum_{i=1\ to\ x} n_i)$$

Where the numerator is the proportion of total boat trips in region r that are from inlet i ($N_i = B_{obs,\ ref\ inlet\ i}$ or $B_{est,\ rand\ inlet\ i}$), and the denominator is the proportion of ocean boat interviews in the access point trip intercept survey that were obtained from inlet i (n_i). Inlets with $W_i < 1$ are down weighted to account for oversampling and inlets with $W_i > 1$ are inflated to account for undersampling. The weighted proportion of ocean boat trips targeting red snapper was calculated separately for each region as:

$$P_r = \sum_{i=1\ to\ x}(t_i * W_i) / \sum_{i=1\ to\ x} (n_i * W_i)$$

Where t_i is the number of ocean boat trip interviews that reported targeting red snapper. For this calculation during 2013 only, n and t excluded trip interviews that reported exiting the inlet before 7:00 a.m. so that P_r matched the time period that ocean boat trips were estimated for. In 2012, inlet exit time was not collected for all trips (only positive red snapper trips).

Since boats exiting inlets prior to 7:00 a.m. could not be observed, information collected during access point trip interviews was used to adjust effort estimates. The portion of targeted trip interviews that reported exiting through inlets before 7:00 a.m. was applied to all inlets within a region. Sample weights were again calculated for each inlet using the equation for W_i above, except for this calculation n and n_i included only trip interviews that reported targeting red snapper. The weighted proportional increase in targeted trips was calculated for each region as:

$$I_r = \sum_{i=1\ to\ x}(e_i * W_i) / (\sum_{i=1\ to\ x}(n_i * W_i) - \sum_{i=1\ to\ x}(e_i * W_i))$$

Where e_i is the raw number of trip interviews that reported exiting through an inlet before 7:00 a.m, and n_i is the raw total number of trip interviews. The total adjusted number of targeted trips for a reference inlet was calculated as:

$$T_{ref} = \sum_{i=1\ to\ x} [(B_{obs,\ ref\ inlet\ i} * P_r) + I_r*(B_{obs,\ ref\ inlet\ i} * P_r))]$$

And for each random sampled inlet as:

$$T_{rand} = \sum_{i=1\ to\ x} [(B_{est,\ rand\ inlet\ i} * P_r) + I_r*(B_{est,\ rand\ inlet\ i} * P_r))]$$

The upper and lower 95% confidence limits were calculated for random sampled inlets as:

$$LCL_{0.95} = \sum_{i=1\ to\ x} [(LCL\ B_{est,\ rand\ inlet\ i} * P_r) + I_r*(LCL\ B_{est,\ rand\ inlet\ i} * P_r))]$$

$$UCL_{0.95} = \sum_{i=1\ to\ x} [(UCL\ B_{est,\ rand\ inlet\ i} * P_r) + I_r*(UCL\ B_{est,\ rand\ inlet\ i} * P_r))]$$

Catch Estimation

Weighted catch per unit effort was calculated for each region. To obtain the sample weight for a given inlet, proportional effort was divided by the proportion of trip interviews obtained during access point intercept assignments:

$$W_i = (T_i/\sum_{i=1 \text{ to } x} T_i) / (n_i/\sum_{i=1 \text{ to } x} n_i)$$

Where the numerator is the estimated number of targeted trips from inlet i divided by total estimated targeted trips in region r, and the denominator is the number of positive red snapper trip interviews from inlet i divided by the total number of positive trip interviews in the sample population for region r. To calculate a weighted harvest rate per targeted trip, the number of harvested fish recorded during positive trip interviews was summed for each inlet and multiplied times the respective weighting factor as follows:

$$hpue_r = [\sum_{i=1 \text{ to } x} (h_i{*}W_i)] / \sum_{i=1 \text{ to } x} n_i$$

Where h_i equals the number of harvested red snapper recorded during trip interviews in inlet i and n is the total number of trip interviews for all inlets in the region. The 95% confidence interval for $hpue_r$ was calculated as follows:

$$95\%CI = hpue_r \text{ +- sqrt } [\sum_{i=1 \text{ to } x}((h_i{*}W_i/n_i) - hpue_r)^2 / x\text{-}1]$$

Where x is the number of inlets.

Red snapper landings (in numbers of fish) during each season, were estimated as:

$$H = hpue_r * \sum_{i=1 \text{ to } x} T_{ir}$$

The same methods were used to calculate weighted catch rates and estimates for discarded fish.

Results

The number of private recreational power boats exiting through reference inlets into the Atlantic Ocean was highest during initial hours of observation in the a.m., declined throughout the remainder of each day and remained at very low levels during the last p.m. hours observed (Figure 2). During each weekend that red snapper was open in 2012 and 2013, the volume of boat traffic observed in reference inlets was highly variable across days (Figure 2). Low daily numbers of boats coincided with poor marine conditions offshore. For example, during the first day of the season in 2012, seas were 3-4 feet offshore and only two boats were observed exiting through the southern reference inlet between 7:00 a.m. and 7:00 p.m. If zero boats were observed in a reference inlet during the same period of time that a non-reference inlet was sampled, it was not possible to calculate a proportion for estimation. Therefore, the reference inlet with the most consistent presence of boat traffic observed throughout each day of a season was selected for comparisons with random sampled inlets. The northern reference inlet was selected in 2012 due to the low boat count in the southern inlet described previously. In 2013, the southern reference inlet was selected for comparisons with random sampled inlets due to poor offshore conditions in the northernmost region of the study area during the last day (Figure 2).

For a majority (5 out of 8) of inlets sampled during the 2012 season, less than half of vessel operators on average that were interviewed during access point intercept surveys reported making a trip into the Atlantic

Ocean (Figure 3). During the 2013 season, weather conditions were more favorable for offshore fishing and higher proportions of vessel operators reported entering the Atlantic Ocean (Figure 3). For vessels that reported making a trip into the ocean, the percentage that also reported targeting or catching red snapper varied between the two regions, but was consistent among years within each region (Table 1). During 2012 and 2013 in the northern region, 81% and 85%, respectively, of vessel operators that reported entering the Atlantic Ocean also reported fishing for red snapper. In the southern region, where red snapper are less abundant, only 38% and 41% of vessels that made a trip into the Atlantic Ocean reported fishing for the species during 2012 and 2013, respectively.

Among vessel operators that reported fishing for red snapper, the percentage that reportedly exited through an inlet before boat traffic observations began at 7:00 a.m. was higher in the northern region (Table 1). Adjusting for vessels that exited through northern inlets before 7:00 a.m. resulted in a 38% increase in the estimated number of red snapper fishing trips in 2012, and a 37% increase in 2013 (Table 1). In the southern region, adjustments for early a.m. departures resulted in a 25% increase in estimated red snapper trips in 2012, and a 16% increase in 2013 (Table 1). During the 2012 season, an estimated 4,569 (95% CI 1,888−7,250) private recreational boat trips targeted or caught red snapper; compared to an estimated 1,954 (95% CI 1,098−3,202) trips during the shorter season in 2013 (Table 1). During both years, fishing effort was centered around Ponce Inlet and Port Canaveral (inlets 5 and 6). Because non-reference inlets were only sampled three days each year, total effort was estimated across the six day season in 2012 and variance around effort estimates was high (Figure 4). In 2013, effort could be estimated separately for each of the three days the season was open and variance was reduced compared to the previous year (Figure 4).

Catch rates for harvested and discarded fish were highest in the northern region (Figure 5). The mean weighted number of red snapper harvested per boat trip (harvest per unit effort, or HPUE) in the northern region were comparable among years (within 0.1 fish per trip), as were discards (DPUE among years within 0.3 fish per trip). Catch rates were more variable in the southern region, though precision was improved in the second year due to an increased intercept sampling effort (Figure 5). Estimated total landings from this study were highest during the six day season in 2012 (Figure 6). An estimated 7,479 (95% CI 2,882−12,076) red snapper were harvested in 2012, compared to 3,993 (95% CI 2,129−6,726) in 2013. Estimates from the MRIP survey for private boat mode in east Florida during the two sampling periods that coincided with red snapper season openings each year (September−October in 2012 and July−August in 2013) show an opposite trend, with much higher preliminary estimates for 2013 compared to 2012 (Figure 6). However, it should also be noted that the percent standard error (PSE) around MRIP harvest estimates during each sampling period was 97.4% in 2012 and 80.1% in 2013 (personal communication, National Marine Fisheries Service, Fisheries Statistics Division, 2/14/14). The number of red snapper discards estimated from this study during the two harvest seasons also decreased from 8,065 (95% CI 3,175−12,456) during the 2012 season, to 3,144 (1,660−5,246) in 2013 (Figure 6). Since anglers are likely to catch and release red snapper year-round when the season is closed, MRIP discard estimates are not directly comparable to estimates from this study.

Biological samples were collected from a total of 440 harvested red snapper intercepted from 167 recreational boat trips in 2012, and 631 red snapper were sampled from 244 intercepted trips in 2013. There was a bi-modal peak in the size distribution of harvested red snapper in the first year, which shifted to larger size classes in the second year (Figure 7). For red snapper that were reported as discarded during intercepted trips (n=583 fish in 2012 and n=464 in 2013), approximately equal percentages were reported to be less than 16 inches total length, between 16 and 20 inches total length, and greater than 20” total length (Figure 8).

Vessel operators from the northern region, where the continental shelf is wider, reported traveling farther distances to fish for red snapper (Figure 9). Average depth fished was reported by vessel operators starting in 2013, and fishing effort was distributed somewhat proportionally across the avaible bottom depth habitats (Figure 10). Harvested red snapper that were sampled during intercept surveys in 2013 ranged from 1 to 16 years of age (n=452), and fish aged 7 years and younger were sampled across a wider range of depths (Figure 10). An additional 376 red snapper harvested from private boats were sampled at tournament weigh-in and voluntary carcass drop-off locations during 2013. While fish sampled from these sources are often biased towards larger size classes (the oldest fish in this sample was 21 years), this supplemental sample confirms that at least some older year classes were harvested from recreational boats fishing in deeper depths (Figure 10). Therefore, the narrow distribution of capture depths for fish older than 7 years of age in the random sample is likely due to the the low frequency of intercepted trips that reported fishing in deeper depths.

Discussion

Small quotas and short seasonal fisheries are particularly challenging to monitor using traditional fishery dependent methods. This study highlights the necessity of customized data collection methods as an important tool for balancing the goals of managing resources responsibly and maximizing fishing opportunities. Results presented here demonstrate the unique opportunity that a compressed harvest season offers for acquiring samples from a large number of harvested fish and a high percentage of targeted trips, which may not be feasible during protracted fishing seasons when effort is more diffuse. Out of an estimated total of 4,569 targeted red snapper trips during the first season opening in 2012, 398 trip interviews were collected during random access point intercept surveys over six days (8.7% sample coverage); and out of an estimated total of 1,954 targeted trips in the second year, 554 trip interviews were collected over three days (28.4% sample coverage). Information collected during these two short seasons provides granularity to previous knowledge of the offshore fishery and important insights into where red snapper are captured and the size and age distribution of fish that are vulnerable to the recreational fishery. These data are expected to contribute to re-assessment of the stock, which is scheduled for the current year (2014).

Harvest estimates from this study design, which was focused on offshore fishing effort specifically during the periods when red snapper was open to harvest, were more stable across seasons compared to the general saltwater fishing survey and demonstrated a logical trend of decreased harvest during the shorter season in 2013. Harvest estimates from MRIP demonstrated a reverse trend of increased harvest with decreased season duration in the second year, which was unexpected. Field intercept procedures for MRIP were modified in 2013 to ensure that recreational fishing trips are intercepted throughout the day as opposed to peak time intervals during the middle of the day. Boat operators that fished offshore for red snapper reported they traveled maximum distances of atleast 20 miles on average from most inlets, and from some inlets the average maximum distance traveled was greater than 30 miles. It is likely that boats fishing this far from shore return later in the day compared to fishing trips that take place in inland and nearshore waters, and procedural changes to MRIP may have resulted in higher probabilities for intercepting offshore trips during 2013 compared to 2012. However, because the duration of the harvest seasons was substantially shorter than the two-month waves sampled in the MRIP survey, harvest estimates for red snapper were highly imprecise during both years and the apparent increase may not be significant. During this study, interceptsof boats that did not enter the ocean were not used in estimates of catch per unit effort, but the relatively high percentage of non-ocean intercepts was unexpected given that sites in this study were selected based on their close proximity to inlets and expected high offshore fishing pressure during the particular weekends sampled. This result demonstrates how diluted offshore effort is within the overall universe of saltwater fishing trips, even in a survey designed to specifically target this segment of the recreational fishery.

Based on responses by vessel operators intercepted in this study during 2013, 60% of red snapper trips fished an average depth of 99 feet or less, another 35% fished average depths of 100–149 feet, and only 5% fished average depths greater than 150 feet. Several studies for red snapper and other reef fishes in the Gulf of Mexico and South Atlantic suggest that discard mortality is low at retreival depths less than 100 feet, generally less than 25%, and increases with increasing depth (Burns et al. 2002, McGovern et al. 2005, Rummer and Bennett 2005, Rudershausen et al. 2014, Sauls 2014). The 2010 stock assessment assumed an overall point estimate of 39% discard mortality (range 27%-52%) for the private recreational boat fishery throughout the South Atlantic. The percentage was based on average fishing depths for private boat recreational trips reported by participants at the stock assessment data workshop who had personal knowledge of recreational fisheries, and a depth-dependent function for proportional discard mortality ($M=1/1+e^{-(-2.3915+0.0592*\text{meters})}$) derived from published studies for red snapper (SEDAR 2010b). Combining the distribution of effort across average depths fished reported in this study to the depth-dependent mortality function used in the assessment yeilds a value of 0.349, indicating that the distribution of capture depths for discards from private boats reported anecdotally during the data workshop were reasonably accurate. However, the depth-dependent mortality function may need to be revisited if more recent published studies are available in time for the 2014 assessment.

The results of this work have directly aided fishery managers in determining whether or not the red snapper fishery can be reopened each year by providing much more precise estimates of harvest than could be attained using traditional survey methods. Procedures for reopening the fishery require estimates of both commercial and recreational landings and dead discards. Landings and dead discards are obtained from a variety of sources (i.e., commercial dealers, headboat logbooks, MRIP (NC, SC, and GA), commercial discard logbooks, and FWC for-hire phone surveys) including this survey. If total mortalities exceed the prior year's acceptable biological catch (ABC), then no harvest is allowed in the following year. However, if total mortalites are less than the ABC, harvest is allowed as long as the recreational season is at least three days (SAFMC 2013). In 2013, NMFS determined red snapper landings or dead discards were less than the 86,000 fish ABC for 2012, allowing for a three-day fishing season in 2013. Similar estimates will be generated later this year to determine if total mortalites exceeded the 2013 ABC. Based on our study's findings, point estimates for private recreational landings in 2013 were much more precise and four times less than those estimated by traditional methods.

Table 1. Estimated numbers of private recreational boats that exited inlets from 7:00 a.m. to 7:00 p.m. during each red snapper season (N_i) with 95% confidence intervals (in parenthesis), and raw numbers of trip interviews obtained by region, inlet and year. Weighted proportions of interviews that targeted red snapper are indicated by P_r, and I_r is the weighted proportional increase used to adjust estimated targeted trips upwards for boats exiting inlets before 7:00 a.m.

Year	Inlet	Estimated ocean boat trips	Ocean interviews	Ocean interviews that exited inlet before 7:00 a.m.	Positive interviews (targeted or caught red snapper)	Positive interviews that exited inlet before 7:00 a.m.	Estimated target trips (T)
2012	1	172 (32, 312)	9		9	0	192 (36, 348)
	2	435 (156, 715)	143		134	20	486 (174, 798)
	3	252	43		35	14	281
	4	225 (133, 317)	-		-	-	251 (149, 353)
	5	1233 (342, 2124)	132		112	33	1376 (381, 2371)
	6	1036 (293, 1780)	127		86	30	1157 (327, 1987)
	North				$P_r = 0.810$	$I_r = 0.379$	3743 (1348, 6138)
2012	7	588	29		14	2	277
	8	394 (272, 516)	13		4	3	186 (128, 243)
	9	771 (286, 1257)	12		4	0	363 (135, 592)
	South				$P_r = 0.378$	$I_r = 0.248$	826 (540, 1112)
2013	1	139 (71, 240)	18	14	16	3	112 (60, 189)
	2	322 (126, 597)	70	57	68	13	273 (105, 509)
	3	180	59	27	57	30	224
	4	27 (7, 54)	2	2	2	0	23 (4, 49)
	5	500 (254, 860)	108	53	90	51	393 (187, 691)
	6	508 (255, 882)	262	150	208	94	407 (189, 732)
	North				$P_r = 0.849$	$I_r = 0.369$	1418 (762, 2370)
2013	7	458 (221, 882)	54	36	44	14	160 (76, 282)
	8	378	145	105	57	22	189
	9	605 (169, 1258)	85	61	12	4	188 (70, 361)
	South				$P_r = 0.405$	$I_r = 0.164$	536 (336, 832)

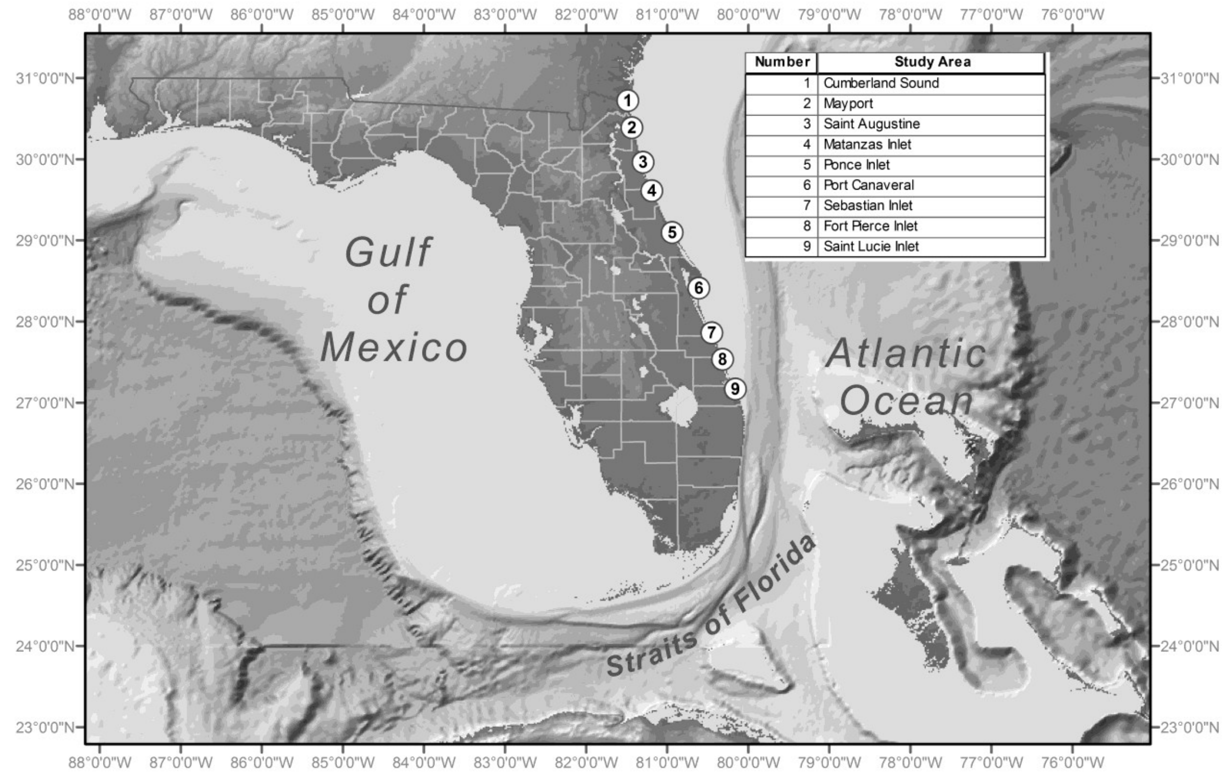

Figure 1. Navigable egress points to the Atlantic Ocean included in the study area.

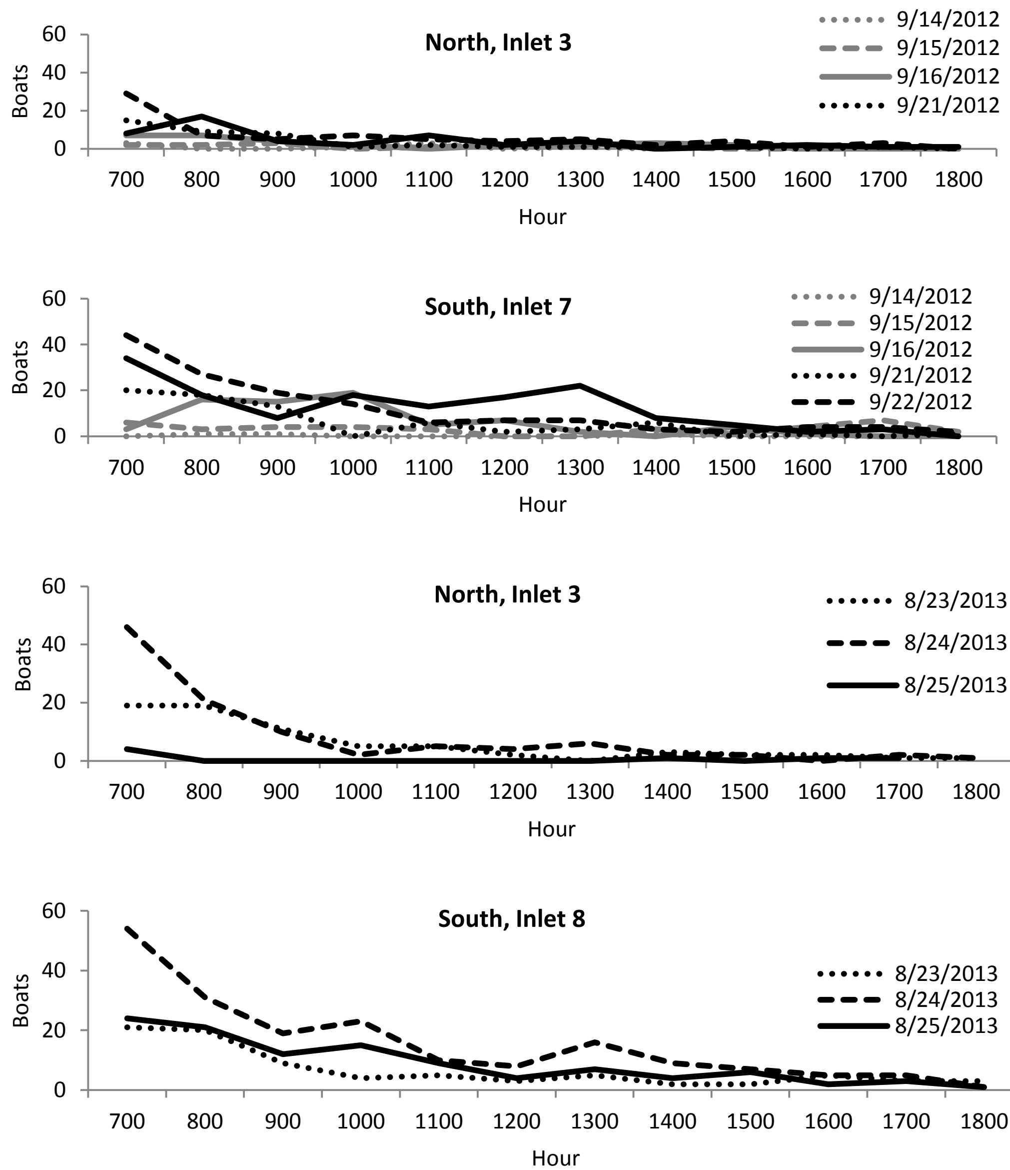

Figure 2. Numbers of private recreational boats (including <4% that were undetermined) observed exiting through northern and southern reference inlets between 7:00 a.m. and 7:00 p.m. during 2012 (top two panels) and 2013 (bottom two panels). For comparisons with random sampled inlets, northern inlet 3 was selected in 2012 and southern inlet 8 was selected in 2013.

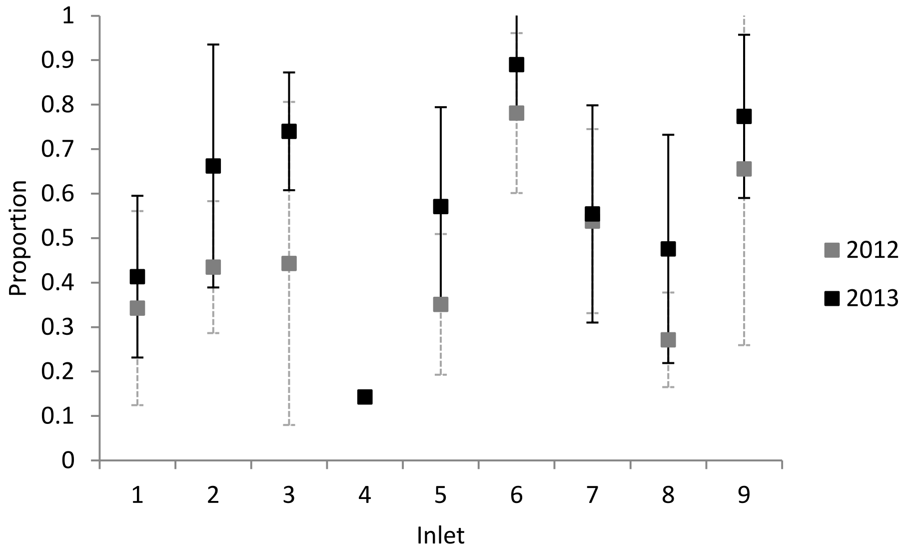

Figure 3. Mean proportion of access point intercept interviews per assignment that reported entering the Atlantic Ocean, with 95% confidence intervals.

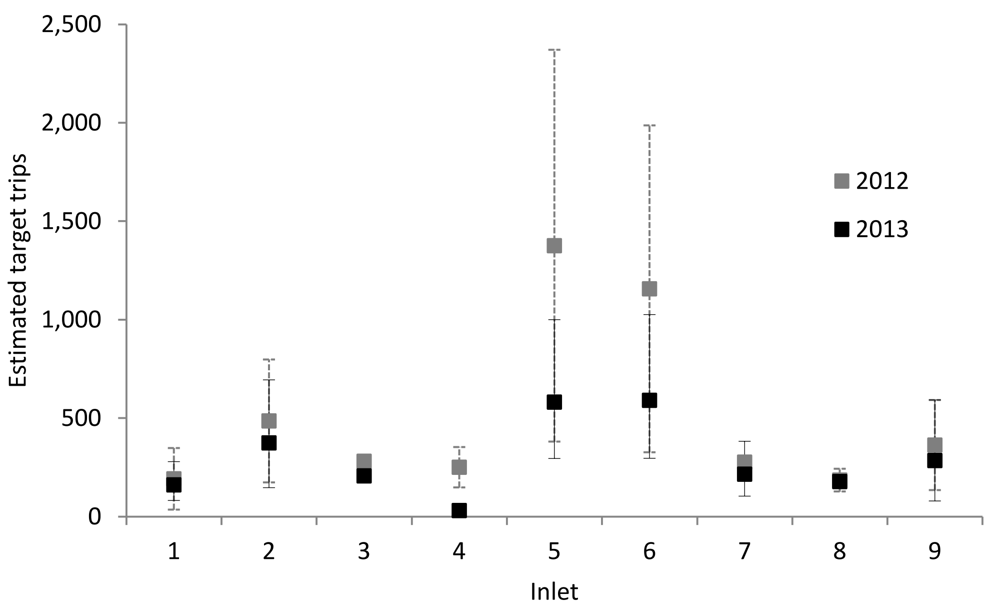

Figure 4. Total numbers of red snapper trips estimated for the 2012 and 2013 seasons. Values are provided in Table 1.

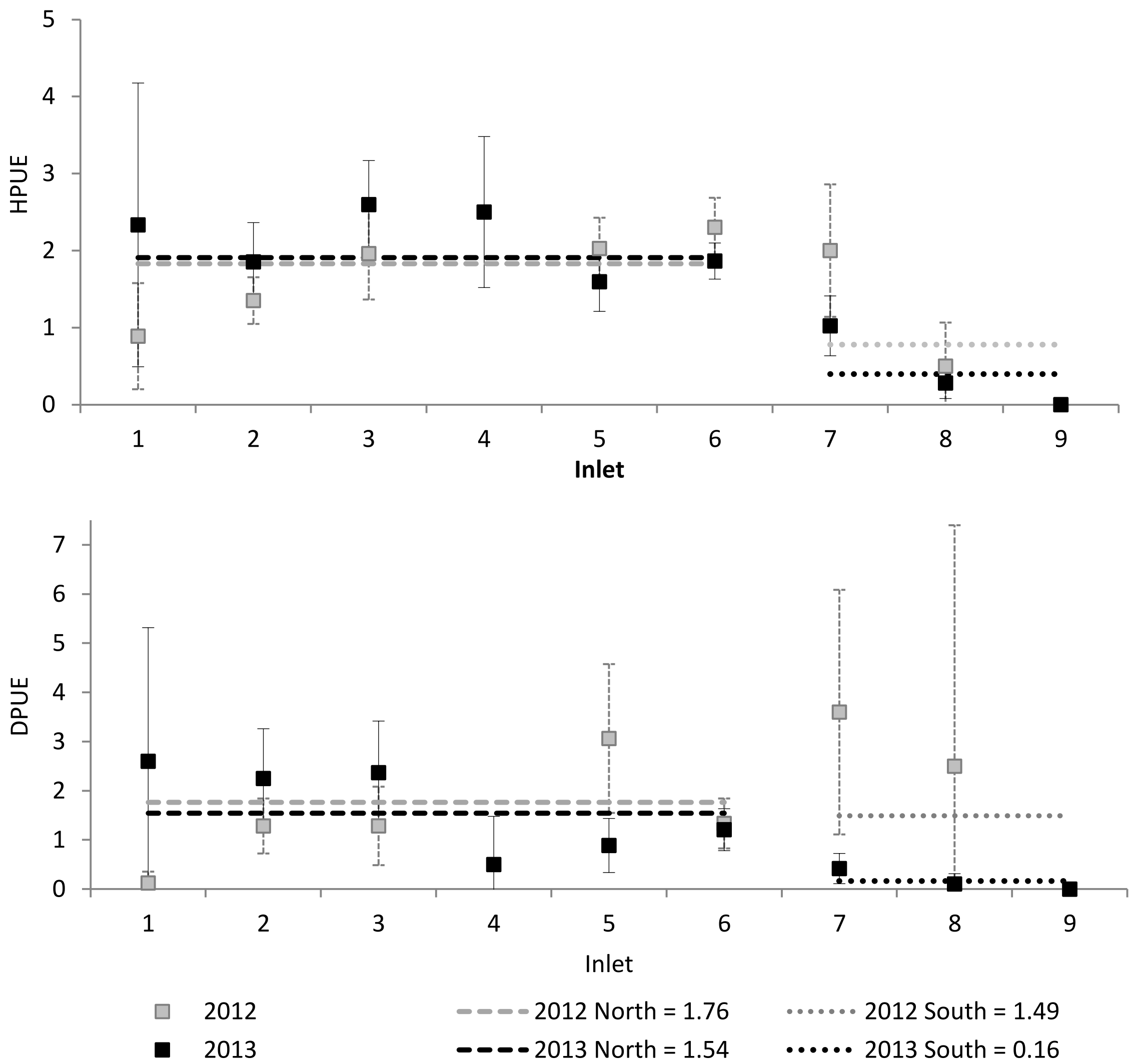

Figure 5. Numbers of red snapper harvested (HPUE, top) and discarded (DPUE, bottom) per unit of effort (boat trip) with 95% confidence intervals by inlet (individual points) and weighted by region (dashed lines). See Table 1 for sample sizes of numbers of trip interviews that targeted or caught red snapper.

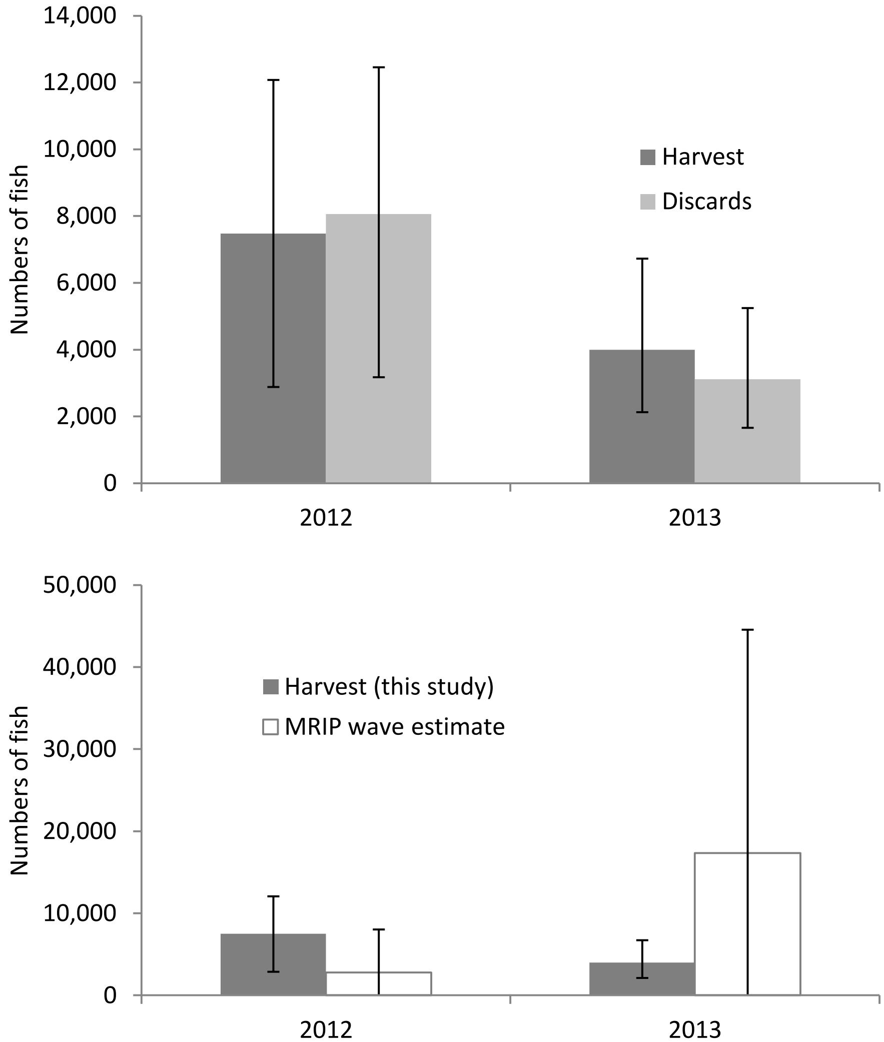

Figure 6. Total numbers of red snapper caught from private recreational boats during the 2012 and 2013 seasons estimated from this study (top graph, values provided in Table 2), and compared to bi-monthly estimates from the Marine Recreational Information Program, or MRIP (bottom graph). Note: 2013 MRIP estimates are preliminary as of 2/14/14.

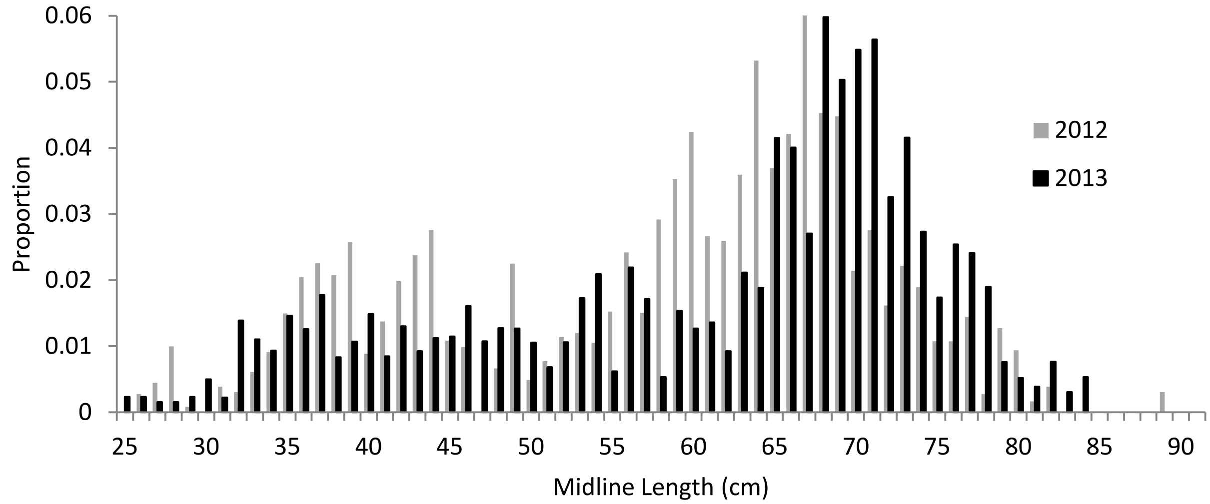

Figure 7. Size distribution of harvested red snapper.

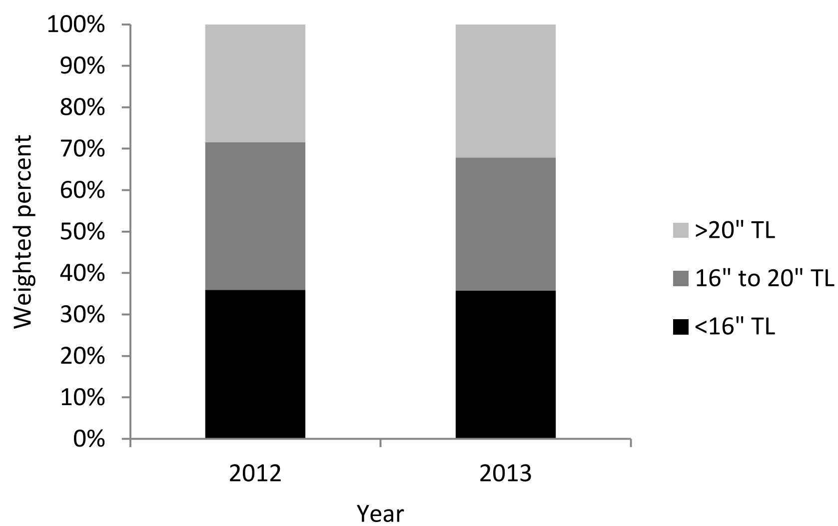

Figure 8. Percentage of red snapper discards by reported size class.

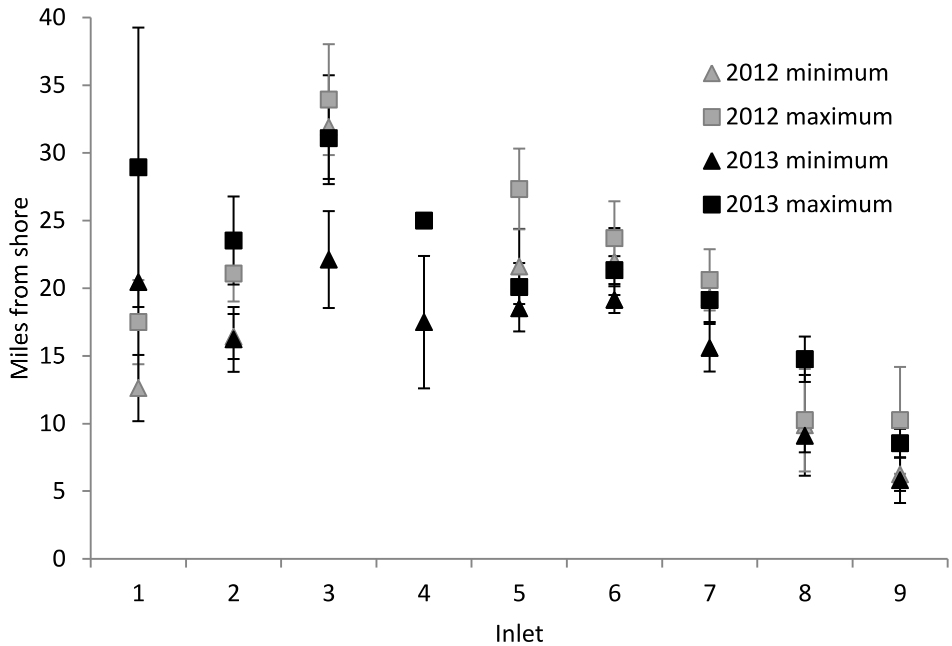

Figure 9. Sample means for minimum and maximum distance from shore reported by vessel operators that targeted or caught red snapper.

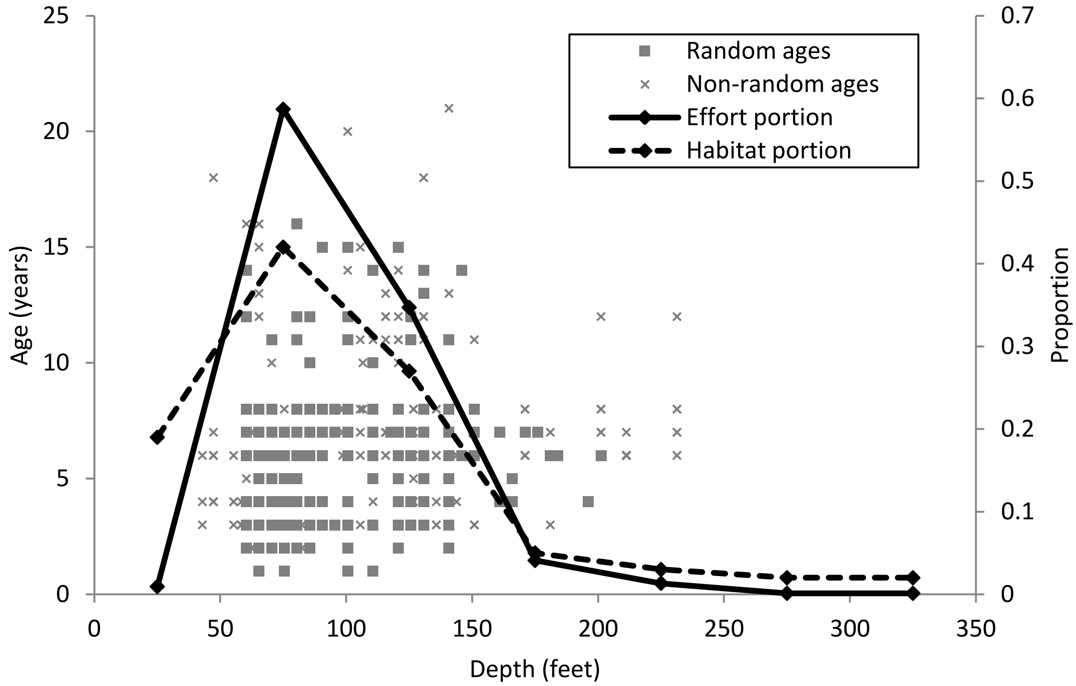

Figure 10. Ages of harvested red snapper (shown as squares) sampled during random access point intercept surveys across the range of reported fishing depths, and additional red snapper harvested from private recreational boats that were non-randomly collected from voluntary carcass drop-off and tournament weigh-in locations (ages shown as x's). Also shown are the proportion of randomly sampled recreational boat trips that targeted or caught red snapper during the 2013 season by reported average depth fished (grouped into 50 feet depth intervals and weighted across all inlets), and the proportions of available bottom habitat at each 50 feet depth interval (from SEDAR, 2010a).

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Florida – SA Red snapper Survey NEFL

*****Screener**: Do you take customers into the Atlantic Ocean for recreational fishing trips?*** ***Yes*** ***No***

Sample week: 34 **Sampler Name:** ___________________ FHTS SEL: Y **Eligibility:** A, Y
(A=Active, N=Noncooperative/Y=Cooperative)

Number of Representatives Contacted for ____ **Boat Type:** C
***Total Recreational Saltwater Fin fishing Trips with Paying Passengers** _______ (C=Charter, H=Head)
***Total Vessel Trips (trips with paying passengers + other dock-to-dock trips for period of** 8/23 – 8/25, 2013 ________

Date	Day of Week	* Trip No.	*Trip Type (Charter, Head, or Other)	* # of anglers	Origin of Trip		Access Site (see codes)	Target Species (see ITIS codes)	HMS Trip (Y or N)	*Fish Area (see codes)	*Distance from shore	Time Trip Started (24hr)	Time Trip Ended (24hr)	Time Spent Fishing (nearest half-hr)	Multi-day Trip?
					*State	Cnty									
8/23/2013	FRI	1													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/23/2013	FRI	2													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/23/2013	FRI	3													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/24/2013	SAT	1													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/24/2013	SAT	2													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/24/2013	SAT	3													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/25/2013	SUN	1													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/25/2013	SUN	2													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			
8/25/2013	SUN	3													
			Number harvested:			Number released:			Distance from shore:			Depth fished:			

Representative :
Vessel Registration:
Vessel Name:
Vessel ID:
Notification Received _____
Form Used _____
Verified___ Errors Found (Y or N)___
Initials___ Date__________

*KEY QUESTIONS

Fishing Areas
1=Gulf, Ocean, or Open Bay
2=Sound
3=River
4=Enclosed Bay
5=Other

Multi-Day
1=YES
2=NO

If Gulf, Ocean or Open Bay:
1= <= 3 miles from shore
2= > 3 miles from shore
3= <=10 miles from shore
4= > 10 miles from shore
8=Not applicable

Date:	Date:	Date:	Date:	Date:
Time:	Time:	Time:	Time:	Time:
Phone:	Phone:	Phone:	Phone:	Phone:
Call Back	Call Back	Call Back	Call Back	Call Back
1 ☐ Line Busy	1 ☐ Line Busy	1 ☐ Line Busy	1 ☐ Line Busy	1 ☐ Line Busy
2 ☐ No Answer	2 ☐ No Answer	2 ☐ No Answer	2 ☐ No Answer	2 ☐ No Answer
3 ☐ Answering Machine/Service	3 ☐ Answering Machine/Service	3 ☐ Answering Machine/Service	3 ☐ Answering Machine/Service	3 ☐ Answering Machine/Service
4 ☐ Wrong Number - new number avail.	4 ☐ Wrong Number - new number avail.	4 ☐ Wrong Number - new number avail.	4 ☐ Wrong Number - new number avail.	4 ☐ Wrong Number - new number avail.
5 ☐ Not available	5 ☐ Not available	5 ☐ Not available	5 ☐ Not available	5 ☐ Not available
11 ☐ Fax/Computer	11 ☐ Fax/Computer	11 ☐ Fax/Computer	11 ☐ Fax/Computer	11 ☐ Fax/Computer
No Call Back	No Call Back	No Call Back	No Call Back	No Call Back
6 ☐ Not in service/ Wrong number	6 ☐ Not in service/ Wrong number	6 ☐ Not in service/ Wrong number	6 ☐ Not in service/ Wrong number	6 ☐ Not in service/ Wrong number
7 ☐ Refusal	7 ☐ Refusal	7 ☐ Refusal	7 ☐ Refusal	7 ☐ Refusal
8 ☐ Communication Problem	8 ☐ Communication problem	8 ☐ Communication problem	8 ☐ Communication problem	8 ☐ Communication problem
9 ☐ Ineligible	9 ☐ Ineligible	9 ☐ Ineligible	9 ☐ Ineligible	9 ☐ Ineligible
10 ☐ Successful Contact	10 ☐ Successful Contact	10 ☐ Successful Contact	10 ☐ Successful Contact	10 ☐ Successful Contact

Week No: begin 8/19/2013
Vessel ID:
Vessel Reg.:
Vessel name:
Vessel length:
Year Vessel Built:
Vessel Capacity:
Vessel loc:
Loc. Site Code:
County:

Representative (REP_ID=1):

Best time to call: EVENINGS
Region: NEFL

Other Contact
Capt1 (Rep_id=2):
Capt2 (Rep_id=3):
Capt3 (Rep_id=4):
Ownr (Rep_id=5):
Other (Rep_id=6):

	Representative	Captain 1	Captain 2	Captain 3
Phone #1:				
Phone #2:				
Phone #3:				

Comments:

Interview Status (to be completed when telephone contact made):

1 ☐ Complete Interview (**Result=10**)

2 ☐ Incomplete, but all key (*) questions answered

3 ☐ Refusal (**Result=07**)

4 ☐ Language Barrier

5 ☐ Mid-interview Refusal

6 ☐ Ineligible (**Result=09**)

7 ☐ Unable to Contact

8 ☐ Inactive (**Result=10**)