MyFishCount Completion Report: A pilot project on electronic reporting for private recreational fishermen in the South Atlantic region

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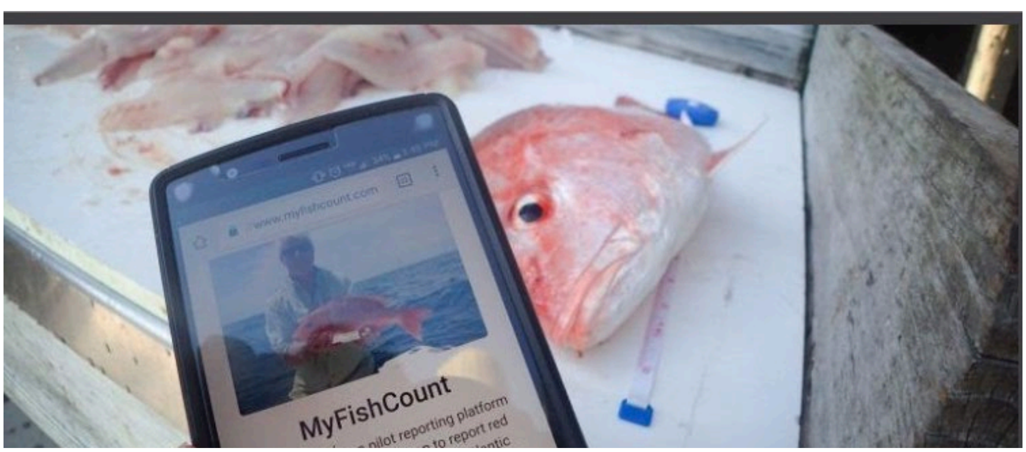

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EXECUTIVE SUMMARY

Private recreational fishing is an important component of the recreational sector that fishes for snapper grouper species in the South Atlantic region. Despite its importance, data on private recreational fishing trips targeting snapper grouper species are limited (**Figure 1**). This has resulted in fishermen's dissatisfaction with the estimates of recreational catch and release and associated management. Recreational anglers reporting their catch through an electronic app can help improve data on recreational fisheries as well as improve anglers' trust in fisheries management.

MyFishCount is a pilot program that enables anglers to report their catch electronically developed by South Atlantic Fishery Management Council, Angler Action Foundation, and Elemental Methods in partnership with Atlantic Coastal Cooperative Statistics Program and National Marine Fisheries Service. The goal of the pilot program was to develop an electronic reporting app designed for use in the snapper grouper fishery and enable data reported through MyFishCount to be entered into a standardized regional database (Standard Atlantic Fisheries Information System run by the Atlantic Coastal Cooperative Statistics Program). Many facets of MyFishCount have been developed through the pilot, including a website (MyFishCount.com), webpages on the South Atlantic Fishery Management Council's website (safmc.net), a web portal for recreational fishermen to report and review their catch, a mobile application for recreational fishermen to report and review their catch, an application program interface to transmit data to the Atlantic Coastal Cooperative Statistics Program, and a data portal to view aggregated data reported through MyFishCount.

The process to develop MyFishCount is described in the section of this report titled Development of the MyFishCount App. MyFishCount grew from a web portal created to test electronic recreational reporting during the November 2017 red snapper mini season. The mobile phone app was tested during early 2018 and released in June 2018 in time for the 2018 red snapper mini season. Since then, the app and web portal have been updated based on user comments.

The process to create an account, create a trip report, data structure, and data fields are described in App Structure. During the early phase of the project, the system had a technical issue that prevented some users from creating an account. These issues have been resolved (for more details see Account Creation). After creating an account, users can submit a variety of data related to their fishing trip through MyFishCount. Data are entered in three sections: trip start, catch information, and end trip. Most of the required data fields are drop-down lists (typically five or more options) or clickable boxes (generally less than five options) to reduce data entry error and increase consistency among users (for more details see Data Structure).

One of the most important aspects of the MyFishCount pilot program was outreach, which is described in Promotion of MyFishCount. Angler Action Foundation and South Atlantic Fishery Management Council staffs spent significant time contacting fishermen and other fishery stakeholders to promote the app. The app was promoted through in-person workshops (10 workshops), webinar training sessions (9 sessions), social media (66 posts), and word of mouth. We found that it generally takes three engagements with a person before they will become an active participant in a voluntary electronic reporting program and a broad outreach program is needed to engage private recreational anglers (for more details see Appendix B).

MyFishCount was also demonstrated at scientific (3 meetings), fishing industry (4 meetings), and fishery management meetings (11 meetings). This was an important aspect to help improve the app and ensure data would be usable in management. Based on recommendations from attendees at these presentations, the app was improved.

The cost to continue to maintain MyFishCount, along with periodic updates and improvements, will be less now that the web portal and app have been created (for more details see Costs). If MyFishCount continues as a voluntary program with the current number of users, the estimated yearly costs to run MyFishCount is approximately $50,000 with substantial costs for outreach, outreach staff, and maintenance. However, if the goal is to validate the program or increase the number of users, the cost will increase. Additionally, if the program requires a mandatory permit or becomes a requirement for private recreational anglers, then the cost structure would change. In any scenario, to keep anglers engaged, outreach to communicate with users on why they should report, how the data are being used, and how they may benefit should continue to be a substantial portion of the budget.

Data collected through MyFishCount are expected to be very valuable to fishery scientists and managers. Over 900 accounts, that supplied information on over 700 trips, have been created since MyFishCount was created. Information includes data on: on departure location, target species, port type, number of anglers, days of week fished, length of time to report, length of fish, catch rates, and fishing location (see MyFishCount Reporting Results for more results). Some of the interesting results include:

- Vessels leaving from private ports (docks, marinas, and boat ramps) tended to have more anglers than vessels leaving from public ports,
- Fishing on Friday was more commonly reported than fishing on Sunday,
- Most abandoned trips were reported in less than 1 minute and completed trips in less than 10 to 19 minutes,
- Length of fish was provided for 30% of the reported fish,
- Lengths reported through MyFishCount tended to be larger than lengths reported through Marine Recreational Information Program, and
- Catch rates were similar between MyFishCount reports and Florida's Fish and Wildlife Conservation Commission Red Snapper Mini-Season estimate in 2018.

Electronic reporting programs, like MyFishCount, can provide timely and non-biased information on recreational fisheries (see Discussion and Conclusions). Electronic reporting programs have been developed in the Gulf of Mexico and others are being considered for managing data-limited species such as blueline tilefish in the Mid-Atlantic region. Besides reporting landings, MyFishCount users can voluntarily report on a variety of aspects of their fishing trip including: number of fish released, size (weight or length) of fish kept or released, location of catch, depth fished, where the fish was hooked, hook type, release treatment, and reason for releasing fish. Information from these reported trips will be useful in management of the snapper grouper fishery as the number of users and trip reports continues to grow and new techniques are developed to combine these data with more traditional survey methods.

Appendices to this report include a published magazine article on MyFishCount describing the author's experience with MyFishCount, methods and results of a University of North Carolina Chapel Hill survey of fishermen's perceptions of electronic reporting, MyFishCount links for outreach material created through the grant, R code used to develop tables and figures in this report, and code used to develop the MyFishCount Shiny App that displays aggregated MyFishCount data.

ACKNOWLEDGEMENTS

We would like to start off by thanking the most important group for this project: the recreational snapper grouper fishing community. This project could not have been completed without the support of recreational fishermen and the fishing industry. Without their willingness to supply data and outreach, MyFishCount would not exist. MyFishCount was developed with fishermen in mind so that they could better inform management about their fishing trips and hopefully aid in positive fishing experiences in the future.

We would also like to acknowledge the efforts of staffs at the SAFMC, Angler Action Foundation, and Elemental Methods. This was a true partnership to develop an app that collected information important to managers but also considered the needs of fishermen too. Kelsey Dick and Abhishek Mishra went above and beyond to create MyFishCount, a program that has and will continue improve our knowledge on recreational fisheries.

ACCSP has been crucial in developing a regional database where data on private recreational fishing trips can be stored. This is a huge step forward for getting data from electronic recreational apps into a standardized format.

Finally, we wanted to thank our funding source, National Marine Fisheries Service. They saw the utility of a recreational reporting app to improve data on private recreational fishing trips in the South Atlantic region.

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INTRODUCTION

The fishing public and other stakeholders have become increasingly dissatisfied with the estimates of recreational landings and discards for South Atlantic Fishery Management Council (SAFMC)-managed species generated by the Marine Recreational Information Program (MRIP) for the private recreational sector. These catch estimates come from information collected during intercepts, where fishermen returning from a trip are surveyed by a dockside sampler. Since intercepts with offshore fishermen are relatively rare event encounters, fishermen who target SAFMC managed species often feel their input is rarely, if ever, used in the development of catch estimates. Fishermen's satisfaction with catch data and management could be improved by enabling private recreational fishermen to report their catch. Anglers are willing to provide self-reported data to improve fisheries data, contribute to original research, and benefit science (Crandell et al. 2018). This in-turn can improve trust in management because more fishermen will feel involved in the management process (Gray et al. 2012).

The extremely low number of intercepts for many species, including snappers and groupers, is of primary concern for the SAFMC (**Figure 1**). Fishermen are concerned about the very high proportional standard error (PSE) values and are asking, "Shouldn't there be a threshold PSE above which the estimates are not useful?" The Atlantic Coastal Cooperative Statistics Program (ACCSP) recommends that estimates with PSEs less than 40% are adequate for use in management, 40% to 60% should be used with caution, and greater than 60% should be used with extreme caution (ACCSP 2016). The landings PSEs for species such as black sea bass (landings are A + B1, where A = caught and kept fish, and B1 = other caught, but released dead, bait, etc.) averaged 20% for private recreational/rental mode in ocean waters from 2011 to 2015 indicating high precision for that species. PSEs for gag, red grouper, and hogfish over the same time period averaged 34% to 40%, close to the recommended threshold for acceptable data, and were above 40% in some years indicating the data should be used with caution and methods should be used to reduce potential biases in the estimates. For red snapper, snowy grouper, blueline tilefish, and golden tilefish, the PSEs from 2011 to 2015 averaged above 60%, indicating landings estimates for the private recreational mode should be used with extreme caution. High uncertainty, in this case associated with imprecise landings estimates, can lead stakeholders to dismiss resulting recommendations by scientists and managers (Budescu et al. 2009).

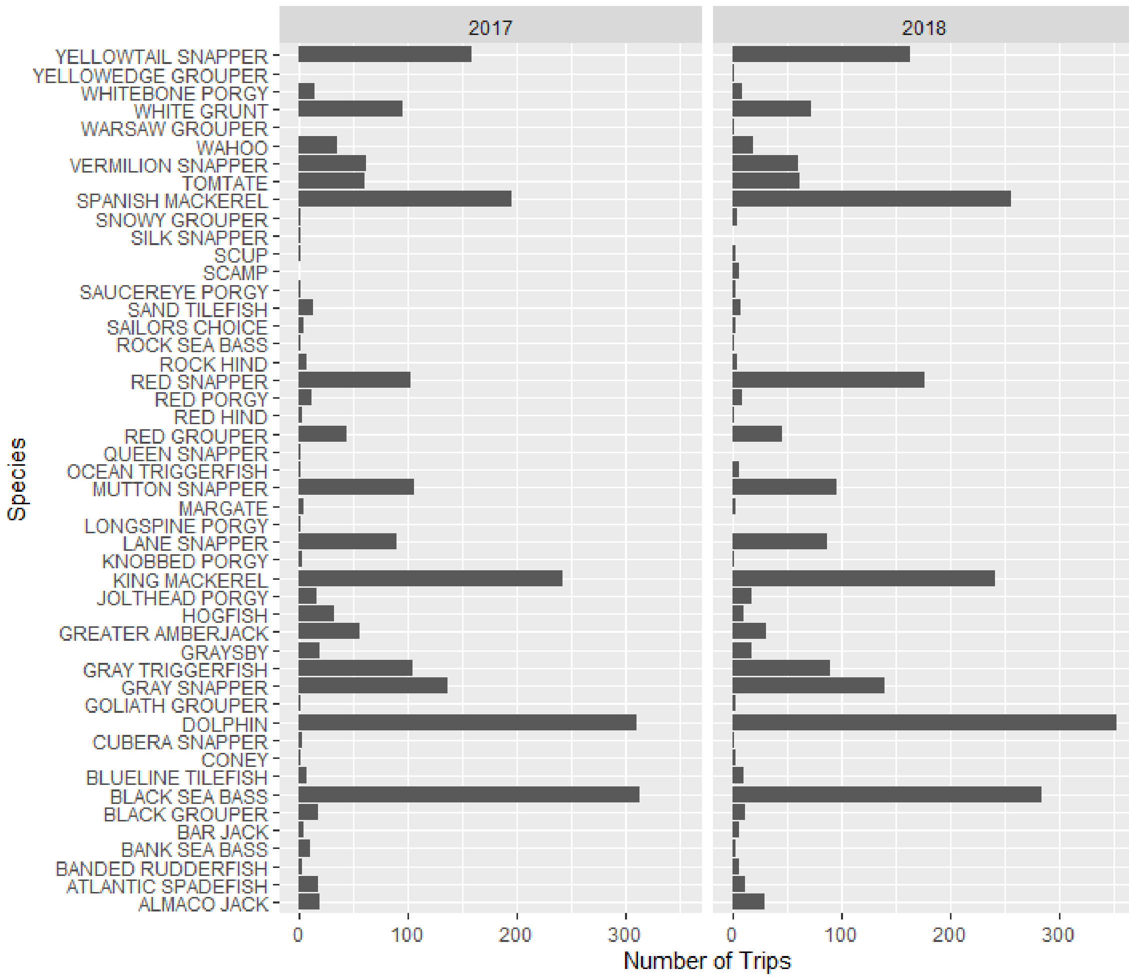

Figure 1. Number of trips intercepted through MRIP reporting (kept and released) SAFMC managed species on private/rental vessels in the ocean. Note: Trips were identified by the MRIP Party Code.

Adding to stakeholder's frustration are the low recreational annual catch limits (ACLs) for some species in the snapper grouper fishery management unit (FMU). For example, the red snapper recreational ACL was 29,656 fish in 2017 and 2018, and only 15,689 hogfish could be harvested recreationally in Florida in 2017 (Amendment 37 SAFMC 2017b). The 2019 recreational ACL for snowy grouper was approximately 5,000 fish, for wreckfish it was approximately 20,000 pounds, and for golden tilefish it was 2,316 fish. Given that the MRIP expansion factor for a single private recreational intercept from a port in Florida can exceed 2,000, the estimate for total number of fish harvested (total number of fish = expansion factor x number of fish observed (A) or reported dead (B1) by port samplers) from just two intercepts can result in estimated landings that exceed the ACL for some stocks. Given the low sample sizes, the adequacy of the data to estimate average size (needed for assessments) or average weight (needed for monitoring when converting from number of fish to weight of fish) could be questioned. Fishermen feel the landings are being over-estimated because just a few intercepts (low participation) are resulting in fishery closures.

Low intercepts can also lead to an under-estimate of catch. It is not uncommon for species with low intercepts to be sampled in only a single wave. Sometimes, those species are not even intercepted in a year or a state. This occurred with snowy grouper off Virginia, where the world record was set in 2007 and 2008, but no recreational catch of that species was reported during those years[1]. Blueline tilefish recreational landings north of North Carolina are another example of underestimation of catch due to low intercepts. The most recent stock assessment (SEDAR 50 2017) used recreational landings of blueline tilefish developed through a Delphi approach as opposed to MRIP estimates due to a lack of intercepts in the MRIP survey over many years. This discrepancy between landings estimates and fishermen's observations increases the mistrust of data and fisheries management.

Self-reported data are already being used in fisheries management to address issues with low intercepts and mistrust in management in some areas of the Southeast region. Efforts like this were used to increase the number of length and weight samples for stock assessments of popular recreational species in Florida (Murphey et al. 2011, Chagaris et al. 2015, Muller et al. 2015, Jiorle et al. 2017). In addition, self-reported data are also being used to manage red snapper in the Gulf of Mexico. Data collection programs have been designed to collect additional biological samples (ex. iAngler), estimate catch (ex. Mississippi's Tails-n-Scales and Alabama's Snapper Check), and supplement existing surveys (ex. Texas's iSnapper). As self-reported data programs are becoming more common, techniques are expanding to include self-reported data in management and science (Dukes et al. 2015, Lui et al. 2017, Williams 2018).

The SAFMC is considering requiring self-reported data through Snapper Grouper Amendment 46, currently under development. The amendment includes measures that would establish a private recreational permit and require self-reporting to possess species in the Snapper Grouper Fishery Management Unit (FMU). The SAFMC has discussed requiring a recreational stamp many times (now being called a permit), but the complexity and resources required, combined with a lack of funding available from NMFS, have prevented any progress. During the visioning process for the snapper grouper fishery, stakeholders suggested a recreational stamp program to identify snapper grouper fishermen and improve catch and effort estimates (SAFMC 2016). Such a permit could be used to determine the effort in the private recreational fishery and help refine the MRIP effort estimates, as seen in ingoing efforts in Florida and Louisiana.

The SAFMC recommended a requirement for private recreational reporting as outlined in the regulations shown below from Snapper Grouper Amendment 15A (2008):

> "Section 622.176 Recordkeeping and reporting.
>
> (d) *Private recreational vessels in the South Atlantic snapper-grouper fishery*. The owner or operator of a vessel that fishes for or lands South Atlantic snapper-grouper in or from the South Atlantic EEZ who is selected to report by the Science and Research Director (SRD) must--
>
> (1) Maintain a fishing record for each trip, or a portion of such trips as specified by the SRD, on forms provided by the SRD. Completed fishing records must be submitted to the SRD monthly and must either be made available to an authorized statistical reporting agent or be postmarked not later than 7 days after the end of each month. Information to be reported is indicated on the form and its accompanying instructions.
>
> (2) Participate in the NMFS-sponsored electronic logbook and/or video monitoring reporting

[1] Personal communication from National Marine Fisheries Service, Fisheries Statistics Division, 8/5/2019.

program as directed by the SRD."

The Office of Management and Budget did not approve the above regulation, and recordkeeping and reporting requirements have not been implemented for private recreational anglers. One potential reason for not implementing reporting requirements is the lack of information on the time to apply for a permit or complete a report. With the creation of angler apps, the time required to complete a permit application from a third party or report data can be measured. A pilot project such as this one can provide valuable information on potential impacts of reporting requirements on private recreational fishermen.

The SAFMC is reconsidering an action in Amendment 46 to require electronic reporting of landings and discards of species in the Snapper Grouper FMU to describe catch in the private recreational fishery. Fishermen would be required to provide certain data elements of their landings and discards for select species in the snapper grouper complex. In addition, anglers could report other data such as the size of fish discarded, depths fished, and location of fishing effort, all of which are lacking for the private recreational fishery. Fishing depth could be used to revise estimates of release mortality, which is a depth-dependent function for many snapper grouper species. Although self-reported data can be subject to biases and a complete census of the fishery may not be reported (MRIP Operations Team 2013), if spatial coverage is sufficient, angler avidity is accounted for, and reliable estimates of catch rates (important for bag limit analysis) are accurate and validated, reliable descriptions of catch and fishery characteristics can be developed from this information (Kaiser 2012, Jiorle 2015).

This project, MyFishCount, a pilot electronic reporting platform for recreational anglers, was created to test the feasibility and develop cost estimates of recreational permitting and reporting to inform the development of Snapper Grouper Amendment 46. MyFishCount requires users to sign up for the app and complete a subset of data. Through the initial pilot of MyFishCount, users were able to test and improve a potential tool to address actions in Amendment 46. Information supplied by users through MyFishCount, a novel program for the South Atlantic region, has helped to improve the South Atlantic Council's understanding of the private recreational component of the recreational sector.

DEVELOPMENT OF THE MYFISHCOUNT APP

Web Portal Development

The web portal was initially developed to enable fishermen to report their red snapper catch during the 2017 red snapper mini-season. The 2017 red snapper mini-season was opened through emergency action and was an unexpected event. The MyFishCount team (SAFMC staff, Elemental Methods, and Angler Action Foundation) saw the mini-season as an opportunity to collect data using electronic methods, but the extremely short notice of the season made it impossible to have a tested app ready for deployment prior to the mini-season. Rather than risking deploying a mobile application that might have glitches in time for the mini-season, the team decided to create a web portal that allowed recreational reporting for just red snapper. The team developed a website and a responsive web portal (with auto-adjustable formatting for all mobile visitors) for anglers to electronically report recreational, charter, and headboat trips and web pages to provide outreach accessible across platforms (mobile phone, computer, and tablet). MyFishCount.com was launched in September 2017. The website and web pages provided needed outreach on red snapper management, the importance of reporting, and regulations during the red snapper mini-season. Based on comments received from the SAFMC in December 2017, the website and web page were altered to broaden its scope beyond just red snapper and the web portal was modified to allow fishermen to report a variety of species. The web portal reporting options have since been updated so the format is consistent between the web portal and the app (deployed in 2018). The consistency in data reported across the two platforms enabled syncing with the API for data submission to ACCSP (see API Development). The web portal continues to be available for fishermen to report their catch.

App Development

Since fishermen could report using the web portal as a preliminary electronic reporting method, development of the app was delayed, ensuring the app was designed to collect the most appropriate information on private recreational fishing trips through an electronic reporting program. Staff discussed the app with advisory panels, management agencies, and fishermen prior to deployment. MyFishCount was presented to the SAFMC Information and Education Advisory Panel in October 2017. This group focused on the content of the web pages for reporting and best fishing practices. They also reviewed and recommended changes to a developing survey on stakeholder perception of electronic reporting to be conducted by Erin Spencer, a University of North Carolina Chapel Hill Master's student. The advisory panel recommended that the app be streamlined and encouraged staff to provide regular notifications to users in an effort incentivize reporting. Following the meeting with the Information and Education Advisory Panel, MyFishCount was then presented to the Snapper Grouper Advisory Panel in November 2017. The Snapper Grouper Advisory Panel was encouraged by the web portal and the ability to report for the 2017 red snapper season. They provided comments and suggestions on confidentiality and gear types to include in the app.

To better understand the intention of the SAFMC regarding recreational reporting, the MyFishCount team organized a special session on recreational reporting during the December 2017 SAFMC meeting. Presentations were given on large game-based tagging methods, voluntary reporting (including MyFishCount), mandatory reporting, and enhanced recreational surveys.

Following those presentations, the SAFMC indicated that they wanted to consider permitting for other snapper grouper species (not just red snapper) and that they would like for users to be able to report for a vessel, rather than just an individual. Considering this possible expansion to other species, as well as the app's future functionality as a personal fishing log or journal, the MyFishCount species list the list was adopted from the ACCSP to include over 200 species of fish. This species list is extensive. To aid in searching, the list is dynamically searchable (populates as you type). Fishermen can also type in colloquial names and the appropriate ACCSP common names will populate.

Since MyFishCount is a voluntary program, flexibility is paramount. As a result, the team designed the MyFishCount so that fishermen could report for a vessel or an individual. If a vessel-based permit is eventually adopted in the South Atlantic region (under consideration in Amendment 46), fishermen would still be able to collect information for their own MyFishCount fishing journal. In addition, having anglers accustomed to reporting and making it part of their normal trip increases consistency and accuracy of the reports, whether those reports be for a single angler of an entire vessel (Venturelli et al. 2017). Therefore, fishermen must select if they are reporting on behalf of a vessel or for an individual. Although there is some concern with duplicate reports from a single trip, the MyFishCount team has consistently encouraged that a single user report for a vessel. If others want to report their data for their own trip log, these data points can be sorted during analysis by selecting either trips reported for an individual or trips reported for the vessel. Duplicate trips reported for the same vessel could also be sorted based on the vessel ID. There are ways to manage duplicate reports while also providing fishermen the ability to report in the way that best suits their needs.

Following direction from the SAFMC during their December 2017, the team met with ACCSP and other data partners to select data elements to include in the app. Based on conversations with these partners and with the app developers, it was recommended to include the following:

Trip Information

- **Departure location,**
- **Port type,**
- **Target species,**
- Secondary species
- **Date,** and
- **Trip type**

Catch Information

- **Species,**
- Length,
- Length measurement type,
- **Disposition (kept or released),**
- Release reason (if applicable),
- Release treatment (if applicable,
- Depth, and

- Location

Ending Trip Information on

- **Length of time on the water,**
- **Length of time fishing,**
- **Number of fishermen, and**
- **Completed or abandoned trip**

Bolded items in the list above are required to be reported. Staff also wanted to include information on port type in trip information, hook type in catch information, and trip intercept.

Port type has been identified as a potential source of bias in catch estimation and in management. If fishermen from different port types use different boats (smaller boats may travel different distances offshore or choose to fish in different weather when compared to larger boats) or fish longer, this could have an impact on bag limit or vessel-based limit analyses (Ashford et al. 2010). Hook type is important in the estimation of release mortality due to differences in occurrence of hook injury or foul hooking (Bacheler and Buckel 2004, Sauls et al. 2015a, Sauls et al. 2015b). Finally, we wanted to know if a trip was intercepted back at the dock. This is to better understand overlap between MyFishCount and other sampling programs. Information on overlap between MyFishCount and other sampling programs could be used in designing future iterations of recreational sampling of snapper grouper fisheries, validation of self-reported data, and prevent double counting of fish. Voluntary programs like MyFishCount could potentially be incorporated into a survey design framework like the Marine Recreational Information Program (MRIP) to increase the precision of the estimates (Lui et al. 2017, Williams 2018). To prevent double counting of fish when combining multiple sources or surveys, trips that are marked as sampled at the dock in MyFishCount can be removed from any analysis.

MyFishCount and the draft survey to assess perceptions of electronic recreational reporting were presented to the SocioEconomic Panel of the SSC in February 2018. The Panel recommended adding zip code or permanent address as a requirement in the app, allowing for additional economic analysis. The group liked that there was a report provided to the anglers after the red snapper season, especially noting its use in the decision to extend the season due to bad weather in 2017. In addition, the SocioEconomic Panel provided several recommendations to improve the survey that Erin Spencer administered later that year.

The app was released in June 2018 prior to the August 2018 red snapper mini-season. The SAFMC was informed the app was available at their June 2018 meeting.

Since the start of the program, approximately 68% of reports have come through the mobile app; the rest comes through the website. This includes initial reports and angler self-edits and corrections. Having both a web-portal and app enables users to use the format with which they are most comfortable.

API Development

The application program interface (API), which is used to transmit data to the ACCSP database, was completed in January 2019. This was slightly delayed so that input from the ACCSP Rec Tech Committee and SAFMC could be gathered. Unfortunately, neither group discussed needed fields for private recreational data. The ACCSP Rec Tech Committee was not able to add

MyFishCount or data standards for private recreational fishery to their 2018 agenda. The SAFMC is scheduled to discuss Amendment 46 in December 2019. If changes are recommended to the required data fields, then changes may be required to the current API.

App Updates

Updates have been created for MyFishCount based on recommendations from fishermen and needed software updates for Android and iOS platforms. Other modifications, such as an improved weather feed, administrator ability to add cities and gears based on user input, improved data sync logic for closing trips, and improved user interface dashboard, have been suggested by MyFishCount users and will be incorporated into the app in the future (updates are expected to begin in August 2019).

APP STRUCTURE

Account Creation

The time to register and make accounts for new users in the MyFishCount system is approximately five minutes. A new user must submit a name, username, email, birthdate, and password to create a new account (zip code will be a required field in the future). After these are submitted, the system sends a confirmation email to the user's email address in order to finalize and activate the new account. Once the link within the confirmation email is opened by the user, the new account is active.

There have been instances when MyFishCount administrators needed to assist a user creating an account. An example of this is when the user does not receive the confirmation email to activate the account. This usually occurs because the confirmation email has been flagged as spam by the user's email account. In this situation, MyFishCount administrators must access the user's account in order to make the account active. This requires MyFishCount administrators to open the user account and switch the account status from "blocked" to "active." This process can be avoided by turning off the confirmation email feature and activating the account after the user has submitted the username, password, and email. The MyFishCount team currently uses this method. Another way to avoid the confirmation email being filtered by the user's spam blocker is to send the confirmation via text message or by sending a push notification through the app. Both options let the user know the account has been created and make the account active. By choosing the current method, the burden on fishermen was reduced, but the MyFishCount team took on additional responsibility.

Regardless of the confirmation method, MyFishCount administrators need to monitor accounts to ensure that all accounts are active. If the accounts are created but are not active, the MyFishCount administrators should contact the user directly to assist with activation of the account.

One issue that has come up when allowing all user accounts to be active is the number of phishing emails that come through to technical support. Given that blocking emails from MyFishCount could result in missed legitimate requests for technical support, the emails should not be blocked by MyFishCount administrators.

Incoming data are monitored by MyFishCount administrators for purposes of quality assurance and control. There are two reasons why staff might need to interact with an angler after reviewing a catch log - required information was left off a trip or information clarification and/or supplementation. In the former case, an angler might enter caught fish in the wrong field (fish caught entered in comment section instead of in the catch log) or leave a trip active or open. In these situations, the data cannot be used until issues are resolved. These types of errors mostly occur during the angler's first attempt at logging a trip. To ensure the data represents the anglers' intent, staff must communicate to with the user to verify any edits. In the latter case, where trips are left active, staff might simply request additional data. For example, an angler has the option of adding lengths, depth fished, released disposition and other fields. In the cases of certain rarely encountered species, that data has increased value to researchers. Staff might choose to contact that angler to explain the benefit of adding information and/or assist with the process.

Development of a Trip Report

When fishermen start trips in MyFishCount, the information for the trip is submitted to the MyFishCount data portal and is labelled an active trip. This is essentially a hail-out function, but fishermen are not required to hail-out since this is a voluntary project. MyFishCount administrators can see all active trips via a dashboard on an administrator web page. Administrators can see the type of trip, date/time, closest city of departure, state, vessel number, logging mode (individual or vessel), target species, gear, and departure port type (public or private and dock/marina or boat ramp). The trip is viewable on the dashboard until it's been closed. If a trip is open for more than one day, administrators should email the user to let them know they have an active trip. This ensures the user includes all the required information for the trip, while also allowing an opportunity for communication between administrators and users, further demonstrating that the information is of value to the MyFishCount team and managers. If the trip remains open after follow-up emails, the administrator can close the trip. Once a trip is closed by the user, the trip status is labelled in the database as either abandoned or completed. Administrators can then review the data and submit the information to ACCSP via the data portal.

Data Structure

Each user account, trip, and reported fish has a unique identifier. This enables catch to be easily linked to a trip or fishermen. Information for users, trips, and catch is stored as separate files on the MyFishCount data portal. Users can search their own catches, while administrators can search through all data on the portal. Administrators can download information on all users or a single user, depending on the data need. Trips and catches can be downloaded based on a subset of information or the entire database can be downloaded. Both catch (32 data fields) and trip (33 data fields) databases have many more fields that what shows up in the app. Fishermen are required to enter 18 data fields with five fields that auto-populate based on their last trip and one that auto-populates based on current time. Many of the data fields in the trip (15 fields) and catch (11 fields) databases are auto-generated by the app itself.

Trip Information

- Trip ID (auto-generated)
- Username (auto-generated based on user)
- Email (auto-generated based on user)
- Trip Name (auto-generated by app can be edited by user)

- Authorization Number (auto-generated)
- Status (auto-generated)
- Trip Type (clickable box, selected by user)
- Target 1 (drop-down, selected by user)
- Target 2 (drop-down, selected by user)
- Departure Date (auto-generated by app can be edited by user)
- Arrival Date (auto-generated by app can be edited by user)
- Nearest City (drop-down, auto-populated based on last trip can be edited by user)
- State (drop-down, auto-populated based on last trip can be edited by user)
- Port Type (drop-down, selected by user)
- Hours Fished (drop-down, selected by user)
- Minutes Fished (drop-down, selected by user)
- Vessel Name (auto-populated based on last trip can be edited by user)
- Vessel Number (auto-populated based on last trip can be edited by user)
- Latitude (auto-generated based on nearest city)
- Longitude (auto-generated based on nearest city)
- Percent of Time with Hooks in the Water (drop-down, selected by user from list)
- Abandon Reason (drop-down, selected by user from list)
- Abandon Date (auto-generated by app can be edited by user)
- Comments (user created)
- Date Created (auto-generated by app)
- Last Updated (auto-generated by app)
- Verified (auto-generated based on Administrator)
- Reporting Method (selected by user)
- No Anglers (selected by user from list)
- Verified By (auto-generated based on Administrator)

Catch Information

- Catch ID (auto-generated)
- Trip ID (auto-generated)
- Username (auto-generated based on user)
- Email (auto-generated based on user)
- Trip Name (auto-generated by app can be edited by user)
- Authorization Number (auto-generated)
- Status (auto-generated)
- Trip Type (clickable box, selected by user, Private, Charter, Headboat, or Test)
- Target 1 (drop-down, selected by user from list)
- Arrival Date (auto-generated by app can be edited by user)
- Nearest City (drop-down, auto-populated based on last trip can be edited by user)
- State (drop-down, auto-populated based on last trip can be edited by user)
- Port Type (drop-down, selected by user from list)
- Hours Fished (drop-down, selected by user from list)
- Minutes Fished (drop-down, selected by user from list)
- Vessel Name (auto-populated based on last trip can be edited by user)

- Vessel Number (auto-populated based on last trip can be edited by user)
- Catch Latitude (pin dropped by user)
- Catch Longitude (pin dropped by user)
- Angler (auto-populated can be edited by user)
- Species (drop-down, selected from list by user)
- Catch Status (clickable box, selected by user)
- Caught Time (auto-generated can be edited by user)
- Length (entered by user)
- Length Type (clickable box, selected by user)
- Weight (entered by user)
- Depth (drop-down, selected by user)
- Hook Type (drop-down, selected by user)
- Hook Location (clickable box, selected by user)
- Release Treatment (drop-down, selected by user)
- Release Reason (drop-down, selected by user)
- Comments (entered by user)
- Date Created (auto-generated)
- Last Updated (auto-generated)

Data Fields and Cost Estimates

The MyFishCount data fields use dropdowns, limited clickable boxes, required fields, and notifications to help prevent user errors. Users are only allowed to type information into the comment boxes located throughout the app and a few other fields (vessel name, length (must be a number), weight (must be a number)). Dropdowns and limited clickable boxes give all users the same options to choose from and allow for consistency within the data fields (**Figure 2**).

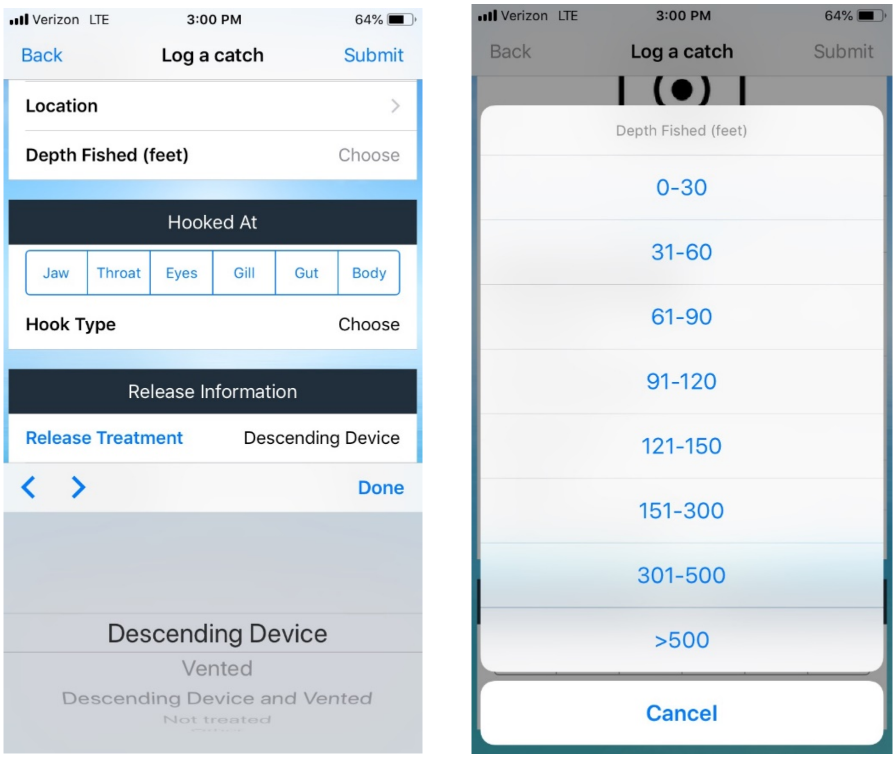

Figure 2. Dropdown options for release treatment (left) and depth (right) designed to prevent user error in entering data into the MyFishCount database.

The amount of data reported by the user through the app and web-portal is flexible and the user can enter as much as they prefer. There are a limited number of required fields located throughout the app. Required fields are indicated with asterisks on the trip start page and all fields are required on the end trip page. The user cannot move onto the next page of the app unless the required fields are completed. In addition to required fields, there are notifications located throughout the app that remind the angler to fill out a section (**Figure 3**). The catch log page is completely optional, but species and number caught (if using quick log) are required if any information is reported on the catch log page.

This aspect of self-reporting is continuously evolving as we try to create an experience for the user that is as efficient as possible, yet still captures information that is useful. This means future budget projections should always include technology improvement options, which could range from $5000 to $30,000 or more, annually. This is in addition to hosting fees.

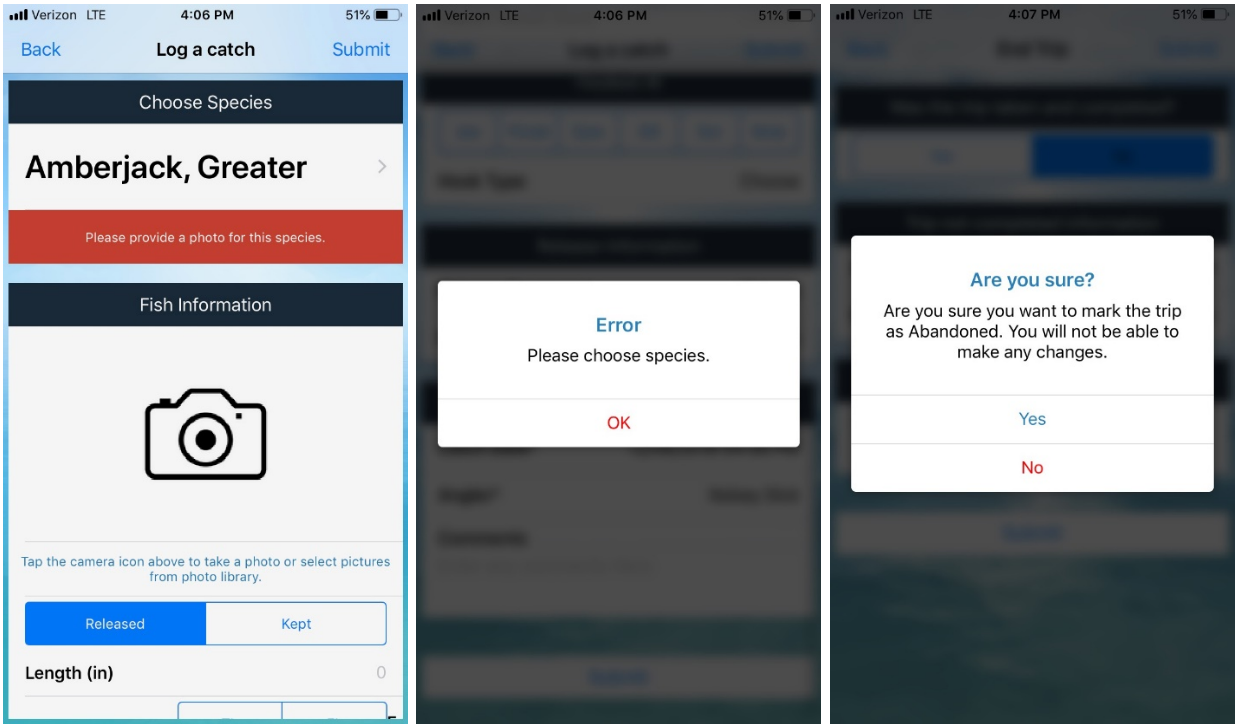

Figure 3. Example of reminders or alerts that users receive while logging data in MyFishCount. Left is an example of a reminder to take a picture of a fish that can be difficult to identify, middle image is a reminder to enter species, and right shows an alert asking users how they'd like to proceed when entering an abandoned trip notification.

The Angler Action Program, previously known as the Snook and Gamefish Foundation, has been engaged in electronic reporting for several years in the State of Florida and has grown to 20,000 users. The average cost for standard electronic maintenance for the app, website, and average annual costs for upgrades to existing programs is $9,000 (**Table 3**). To clean the data, extract data for the Florida Fish & Wildlife Conservation Commission, develop queries, and Memorandum of Understanding, it takes an average of 200 hours per year and costs $5,000 per year. Providing tech support by responding to individual users, assisting with app issues, and changing passwords results in an average of 250 hours per year and an average cost of $6,250 per year. The cost of outreach, which involves two meetings per month, travel, car rentals, meeting rooms, hotels, and materials, is an average of $10,000 per year. An average of 15 hours per week (600 hours annually) costs $15,000 per year. Please see the table below for a breakdown of the costs. Around $2,000 per year is spent on hosting fees. This comes to an average cost of $40,000 annually to maintain the program. It is important to note that as the program grows to over 100,000 plus users, the cost to maintain, host, and store information will increase.

Table 3. Items and numbers are based on a previous five-year average and based on a fee of $25 per hour.

Item	Hours	Average Cost ($)
Standard maintenance		9,000
Data cleaning	200	5,000
Tech support	250	6.250
Outreach meeting costs		10,000
Hosting fees		2,000
Outreach staff costs	600	15,000
TOTAL	760	47,250

System Expansion

Data storage is a common concern for systems that may potentially deal with an increased number of users. If the reporting program is expanded to include additional regions or events, resulting in an influx of new users and data, an additional server for data storage and node balancers (used to balance data coming in from multiple sources) can be used to direct information to various servers. Once the high-volume reporting period has ended, the additional server and node balancer can be removed.

An example of this is the Angler Action mobile app program used for the Coastal Conservation Association (CCA) Star Tournament which takes place from Memorial Day to Labor Day. During the tournament, there are over 6,000 anglers logging transactions and 24,000-25,000 fish logged through the system. An additional server and node balancer are used during the tournament but are eventually taken away when the data traffic returns to normal after the event.

PROMOTION OF MYFISHCOUNT

Promotion of the MyFishCount was done through a variety mechanisms. First a website and webpage pages were created as outreach for MyFishCount (available at MyFishCount.com and SAFMC MyFishCount web pages). These websites host information about reasons to report, what to report, tips for reporting, best fishing practices, uses of the data, confidentiality, and contacts. Several MyFishCount training and “how-to” videos were developed and are now hosted on the SAFMC’s YouTube channel. PowerPoint presentations were developed for in-person and webinar meetings.

Promotional items were developed to be given away at training seminars, meetings, and other outreach events. MyFishCount waterproof cell phone bags were created so that fishermen using the app could protect their phone. Waterproof rulers with information on MyFishCount and best fishing practices were created so that fishermen could measure their fish. Measuring tapes were created as a cheaper alternative to the waterproof rulers to be given away at events not specifically designed for fishermen.

Outreach

Outreach meetings were held in conjunction with SAFMC Meetings, at tackle shops (Charleston Angler, Haddrell’s Point Tackle, and various West Marine locations throughout the SAFMC geographic region) and fishing clubs (Sun City Sportfishing Club, Beaufort Fishing and Diving Club, Florence Saltwater Anglers, and Seacoast Anglers Association). When presenting at tackle shops, we attempted to have a prominent local fisherman (usually a charter boat captain) present to draw in more anglers. The meetings at West Marine drew about 10 people each, Charleston Angler had about 20 attendees, and Haddrell's Point Tackle had about 10 anglers. During each of the meetings, the local captain described fishing techniques to the crowd and then the MyFishCount Team would give a short presentation about why data collection is important. Given the small number of anglers at these presentations, we were not able to detect if having in-person meetings recruited anglers into MyFishCount. The presentations at fishing clubs, which typically hosted audiences of about 30 fishermen, were done in conjunction with a tutorial on best fishing practices and management changes. Fishermen seemed very interested in the best fishing practices and received the concept of recreational reporting positively. However, MyFishCount was not received positively when presented with management measures that would restrict effort or catch. On the other hand, having a hot button issue like red snapper management generally drew a crowd to the presentation. One issue that was identified was not all the captains that presented in conjunction with MyFishCount had federal permits (only fished in state waters). Future events with invited fishermen speakers should make sure presenters have required federal fishing permits.

Social Media Posts

The team posted sixty-six MyFishCount related posts to SAFMC's social media accounts (Facebook and Twitter) (**Table 1**). Some of the posts specifically discussed MyFishCount, while others addressed other issues and mentioned MyFishCount. These social media posts were generally published before, during, and after the red snapper season or other snapper grouper seasons. Some of these posts reached over 5,000 people, a high reach for the SAFMC's social media platforms relative to other SAFMC posts.

Table 1. Dates of SAFMC Facebook and Twitter posts that included mentions of MyFishCount.

SAFMC Facebook and Twitter Post Dates		
2017	**2018**	**2019**
25-Sep	6-Feb	17-Jan
25-Oct	19-Mar	5-Feb
27-Oct	28-Mar	6-Feb
31-Oct	5-Apr	21-Feb
31-Oct	22-May	26-Feb
1-Nov	12-Jun	4-Mar
1-Nov	25-Jun	6-Mar
2-Nov	3-Aug	8-Mar
2-Nov	7-Aug	14-Mar
3-Nov	8-Aug	28-Mar
5-Nov	9-Aug	29-Mar
8-Nov	15-Aug	22-Apr
10-Nov	16-Aug	25-Apr
10-Nov	17-Aug	29-Apr
11-Nov	20-Aug	2-May
12-Nov	27-Aug	20-May
16-Nov	29-Aug	22-May
22-Nov	31-Aug	23-May
24-Nov	25-Oct	
27-Nov	6-Nov	
5-Dec	9-Nov	
6-Dec	13-Nov	
11-Dec	20-Nov	
	4-Dec	

Webinar Training Sessions

Nine MyFishCount webinar training sessions occurred over the course of this project (**Table 2**). During each of the sessions, MyFishCount staff gave a short presentation on why reporting is important. Afterward, using software which facilitates phone mirroring, staff walked through the mobile app and submitted a test report. After the presentation, attendees asked questions and offered feedback on the app. Generally, attendees had very positive comments about the app and the need for better data. However, fishermen generally did not attend the training sessions. Attendees were typically representatives of management agencies rather than fishermen.

Table 2. Number of webinar registrants and attendees by date for MyFishCount Training Webinars.

Webinar Date	Registered	Attended
2-May-19	3	0
29-Apr-19	9	7
6-Mar-19	5	2
26-Feb-19	1	1
21-Feb-19	7	4
6-Feb-19	12	7
4-Dec-19	8	4
20-Nov-18	6	5
7-Nov-18	11	5

Survey Results

As a follow-up to the outreach SAFMC had conducted on MyFishCount, the survey conducted by Erin Spencer provided some valuable insight on the people that responded to the survey. Most people (72%) had indicated that they heard about MyFishCount through emails, social media, or web-based material from the SAFMC (220 responses). Over 15% of the respondents had heard about MyFishCount from another angler or fishing organization. This is a positive sign that fishermen are beginning to talk about electronic recreational reporting. Twelve percent of the respondents indicated they had not heard of MyFishCount.

MyFishCount Presentations

- SAFMC (three times and quarterly updates are provided),
- SAFMC Information and Education Advisory Panel (two times),
- SAFMC Snapper Grouper Advisory Panel (two times),
- SAFMC Scientific and Statistical Committee,
- SAFMC SocioEconomic Subpanel for the SCC (two times),
- American Fisheries Society Annual Meeting,
- Theodore Roosevelt Conservation Partnership Board Meeting,
- Grays Reef Marine Sanctuary Advisory Council,
- 2018 Canadian Conference for Fisheries Research,
- Recreational Reporting Workshop (SAFMC Session),
- NMFS Recreational Summit,
- American Sportfishing Association's Sportfishing Summit,
- Brews and Bottom Fish,
- STEM (Science, Technology, Engineering, and Mathematics) Night at Charleston Charter School for Math & Science.

Partnerships Developed

The MyFishCount team worked with State and Federal agencies to coordinate data collection and outreach during red snapper mini-seasons in 2017 and 2018. We also worked with ACCSP so that recreational data can be stored in a regional fisheries database. Meetings were held with the Mid-Atlantic Fishery Management Council, the ACCSP, the NMFS Greater Atlantic Regional Office, and the Virginia Marine Resources Commission to ensure appropriate fields were available for reporting. We worked with State partners to compare red snapper carcass collection data with trips reported in MyFishCount in 2017 and 2018 and developed a connection with the American Sportfishing Association to promote the app prior to and during the red snapper mini-season. This led to over 30 published articles that included information about MyFishCount (one article included as Appendix A). In addition, the University of North Carolina Chapel Hill conducted a survey of MyFishCount participants and SAFMC's Constant Contact list server to document perceptions and hinderances for electronic reporting in the snapper grouper fishery (attached as Appendix B). MyFishCount was included mechanism for anglers to report release treatment in projects created by FishSmart (https://www.takemefishing.org/how-to-fish/how-to-catch-fish/fishsmart-conservation-project/) and the South Carolina Wildlife Federation (https://safmc.net/bestpracticestutorial/story_html5.html). Finally, we had discussions with the NMFS Western Pacific and the North Pacific Regional Offices about recreational reporting.

Public Access to App and Data

The App is available for anyone to download at Google Play (Android phones) and the App Store (Apple phones). Information on MyFishCount is available at http://myfishcount.com and http://safmc.net/electronic-reporting-projects/myfishcount/. Users can access their personal data while logged in to myfishcount.com. The public can view aggregated data at https://data.safmc.net/MyFishCount.

Query Development

MyFishCount provides users and managers multiple methods to query data in the app. Users can view their own data through the app and web-portal, consolidated information through a shiny app developed for MyFishCount, and data available through ACCSP's database. Managers will be able to access the data by contacting MyFishCount administrators or pulling data from ACCSP.

Fishermen Selection Pilot

The 2017 red snapper mini-season was used as the fishermen selection pilot. Fishermen from a variety of areas used the web-portal to submit data and comments. They were also contacted via group email about the program. MyFishCount user accounts email addresses were sent a survey on-behalf of Erin Spencer about their perceptions of MyFishCount.

COSTS

Currently, reporting through the MyFishCount platform is voluntary. The cost structure of a project is largely dependent on whether it is mandatory or voluntary. Mandatory programs such as Tails n' Scales, a mandatory electronic reporting program in Mississippi, will have a much higher reporting rate than voluntary systems. Tails n' Scales started with a compliance rate of 50% in 2015. However, the compliance rate increased to 86% in 2017 (Somerset 2017). In 2018, the Tails n' Scales program was certified as an alternative to MRIP for monitoring landings of red snapper. Since the reporting rate is high, the cost per angler for the program is reduced but there are costs associated with certifying any program.

Outreach is necessary for any reporting system to recruit and retain users. To recruit users, the MyFishCount team employed a variety of outreach methods and approaches to promote the app. Due to the voluntary nature of the program, it is critical to inform users why it is important to report, what the information will be used for, what to report, and the terms of confidentiality. Creating and distributing outreach materials takes considerable time, something which should be considered when promoting a voluntary reporting program. MyFishCount team produced web pages, informative videos and photographs, infographics, angler reports, and power point presentations. A variety of platforms were used to distribute these materials both in-person and online. Outreach events were held at tackle shops, industry expos, fishing clubs, while online platforms like Facebook and the MyFishCount website were used to distribute materials and information to online users. In addition, the MyFishCount team worked with Council staff and media personnel to ensure that articles were published in newsletters, magazines, and newspapers.

After users have signed up for the program, it is important to ensure that they continue to report. To keep users engaged, reports containing information collected during the red snapper mini seasons were distributed to users after each weekend. Promotional videos reminding anglers to report were posted and shared on social media, encouraging users to continue to use the app. Emails were distributed to MyFishCount users to serve as a reminder of why and how to report. Ensuring anglers have a positive experience with the system is important for user retention. This includes listening and responding to angler questions or concerns through email or phone and applying feedback from users to the system. The MyFishCount team took the time to communicate with users, developing a rapport with anglers while also working together to create a better product.

Moving forward, the cost of recruitment and retention will depend upon whether electronic reporting remains voluntary or becomes mandatory. MyFishCount is currently voluntary. As noted in this report, considerable efforts to reach and educate the public are essential for both recruitment and retention. Approximately $15,000 (600 hours) dedicated to outreach would likely support the current number of users, accounting for modest growth. However, if the program is to expand recruitment in a voluntary system, recruitment costs will rise significantly. Based on outreach efforts conducted by the Angler Action Foundation with the iAngler self-reporting system, a recreational angler's likelihood of participating for the first time (recruitment) improves greatly after three recruitment/education encounters. These encounters include one-on-one conversations at fishing trade shows, group presentations at fishing clubs, etc. Retention of anglers in a voluntary system also requires extensive education. Again, based on the experience with iAngler, the most important aspects of retention include technology maintenance and improvements, and feedback to users regarding gross-level data analysis and application of data in fisheries management or other uses such as local habitat projects.

On the other hand, should the program evolve to include some form of mandatory participation, the outreach focus changes, as do the projected costs. The recruitment budget would be reduced and replaced with costs associated with educational goals. Feedback would continue to be important, as angler buy-in will always be critical to ensure fishing data are accurate and complete.

Because the MyFishCount program represents a potential improvement in data available to support fishery management, which increases as the number of participants increases, it is reasonable to expect at least moderate success in seeking funding sources to assist with recruitment and retention. A well-managed fishery benefits anglers as well as the fishing industry, and the Angler Action Foundation has benefitted from financial support from both industry and private citizens.

MYFISHCOUNT REPORTING RESULTS

MyFishCount became publicly available in September 2017 as a web-portal and June 2018 as a smartphone application. Significant increases in user accounts occurred in association with red snapper mini-seasons in 2017 and 2018 (**Figure 4**). The number of accounts increased over 900% in November and December 2017 (2017 red snapper mini-season months) compared to October 2017. The following year, the number of accounts increased another 32% in August (2018 red snapper mini-season) compared to July. The only other month with greater than 15% increase in user accounts occurred in June 2018 when the smartphone app was launched.

As of May 30, 2019, 993 users had created accounts in MyFishCount. There were initially some issues with creating an account, where some users were not able to create an active account (see Account Creation). To resolve the issue, all accounts were defaulted to an active account. This, unfortunately, lead to spam. While spammers send junk emails to MyFishCount administrators, other users remain unaffected. Instead, it is up to the administrators to weed through the spam emails.

To eliminate the spammer accounts, cell phone numbers were matched to valid areas. Based on the cell phone number area codes, there were 723 valid users. These users were from 39 states and 1 Canadian province. The highest percent of users (46%) had a Florida area code. Area codes from Georgia, North Carolina, and South Carolina each accounted for approximately 10% and area codes from Virginia accounted for two percent of the total users. Area codes from other states did not account for greater than two percent of the total.

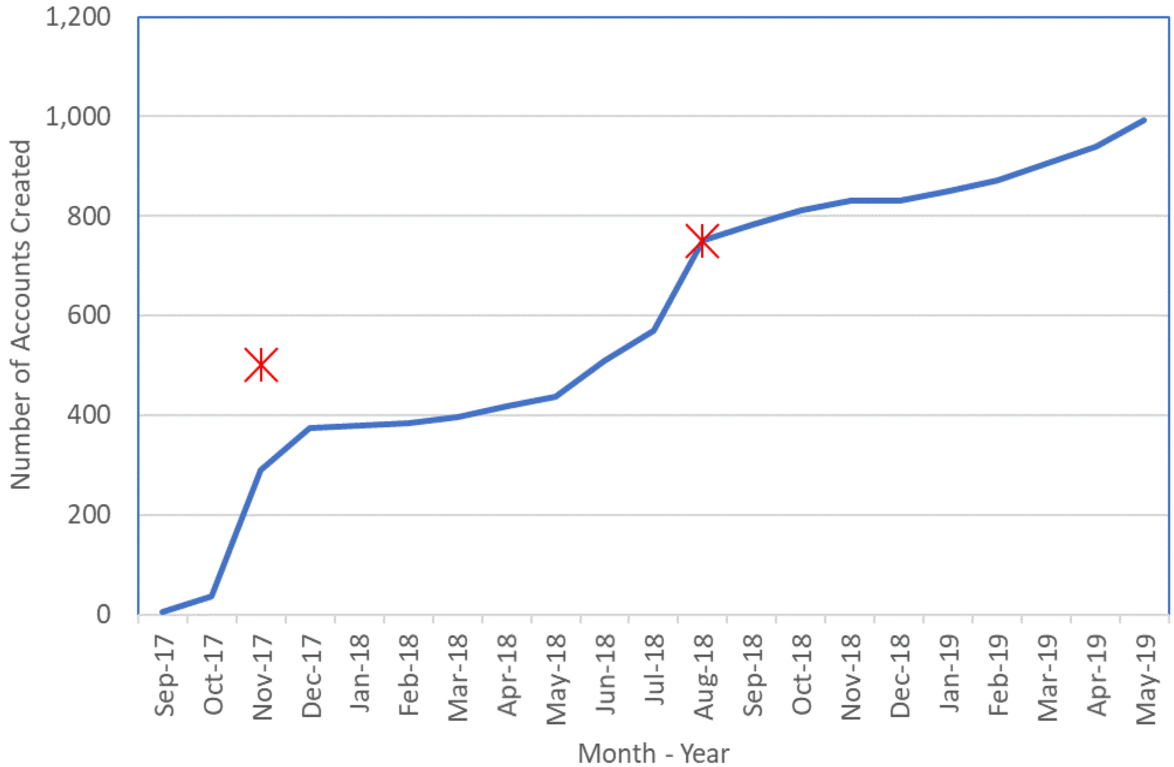

Figure 4. Number of user accounts created in MyFishCount by date. Red asterisks represent dates when the red snapper mini-season occurred.

Of the valid users, 191 anglers submitted a trip report in 2017 and 120 anglers submitted a trip in 2018 (**Table 4**). In 2017, anglers seemed to encourage others to report with MyFishCount since they had an opportunity to report abandoned trips due to poor weather, with the hopes of potentially getting additional fishing days. This communication among anglers increased the reports for abandoned trips in 2017 when 81% of the trips reported as abandoned (**Figure 5**). These reports were used by NOAA when the Southeast Regional Administrator considered opening an additional weekend due to the strong winds that blew on the second weekend of the mini-season. Since the app allows for real time reporting, MyFishCount data on abandoned trips were provided five days after the second weekend of the mini-season.

A total of 704 trips were submitted in MyFishCount from November 2017 through December 2018 (**Figure 5**), plus another 173 test trips (trips used to test for programming bugs by staff, train new anglers, or practice completing a trip log). Of these trips, 675 reports were submitted to the data portal as wither abandoned or completed. Most trips were reported for private recreational fishing trips (617 trips). Some users reported trips on charter boats (44 trips) and headboats (14 trips).

The number of users and reported trips decreased in 2018 compared to 2017, primarily due better weather during the 2018 season and the new ability to report on behalf of a vessel, rather than just an individual (**Table 4**). Although the number of anglers and reported trips decreased, the number of completed trips increased in 2018 (only 18% were reported as abandoned). Completed trips in MyFishCount are reports that have been closed by a user or administrator and were not listed as abandoned. Completed trips are the most useful because they provide detailed information on private recreational effort and catch. The number of completed trips increased in each state, doubling in Florida (**Table 4**). These are encouraging signs that fishermen are increasing the use of MyFishCount to report their catch.

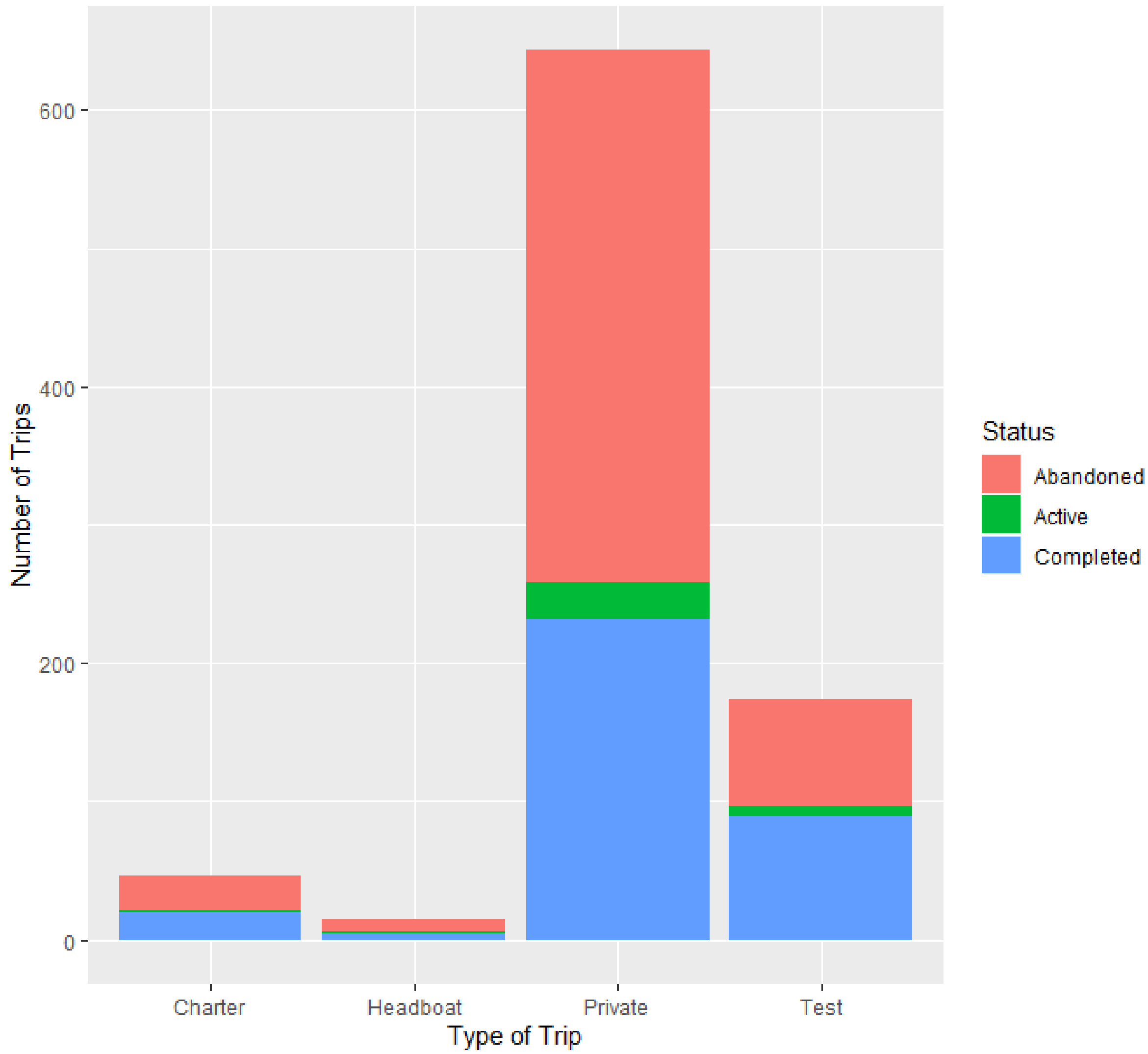

Figure 5. Number of trips reported in MyFishCount from 2017 and 2018 by type of trip (charter, headboat, private, and test) and trip status (abandoned (did not go), active (not closed), or completed).

Table 4. Number of anglers (identified by email address) that submitted trips, number of trips reported, and number of completed trips by state and year as reported in MyFishCount. Trips include trips reported for Private, Charter, and Headboat trips and trip status was abandoned or completed.

	Anglers Submitting Trips	
State	**2017**	**2018**
Florida	122	71
Georgia	14	9
North Carolina	22	19
South Carolina	33	21
	Trips Reported	
Florida	299	113
Georgia	27	13
North Carolina	62	35
South Carolina	81	45
	Trips Completed	
Florida	46	107
Georgia	9	12
North Carolina	11	18
South Carolina	22	31

Most users only reported in MyFishCount once (**Figure 6**). Some users did not complete their first fishing log and didn't report again. One reason for this is that fishermen that do not submit a completed report cannot start another trip until the previous one has been submitted. Also, there was a bug in the system where the app would not allow another trip to be started if an administrator closed a prior trip. This bug has been fixed. Efforts have been made to contact these users to see why they did not complete their trip. Often the users do not respond and will simply end their trip.

Users that reported an abandoned trip were more likely to report again. Commonly, fishermen would submit three 'abandoned due to weather' fishing reports for a three-day block (note: the mini-season was Friday, Saturday, and Sunday) that had bad weather. Few fishermen submitted more than 5 trips combined for 2017 and 2018. Retention of anglers will be key to gaining adequate and reliable data that will provide an improved understanding of the private recreational fishery, leading to more informed management.

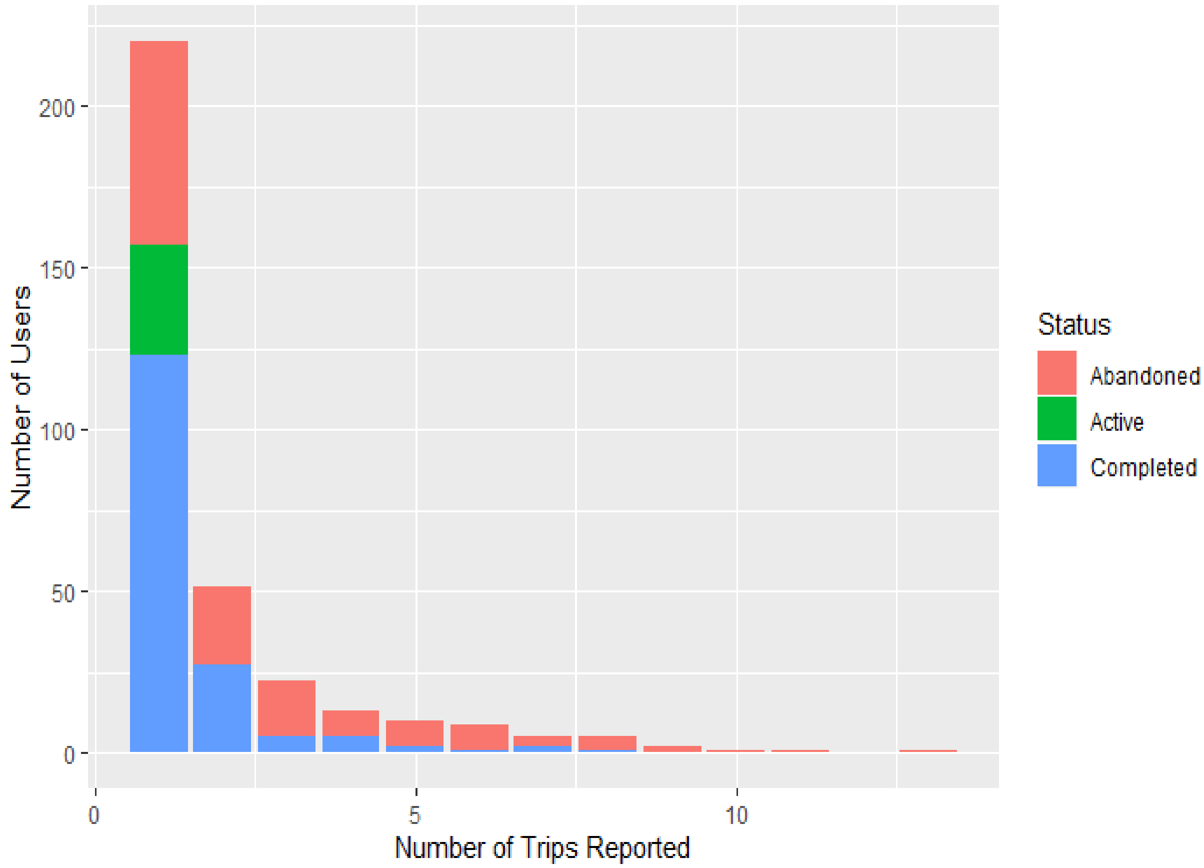

Figure 6. Sum of users (identified by email address) by the number of trips they reported in MyFishCount database for 2017 and 2018 by status (abandoned= trip report completed but trip was shortened or not taken, active = trip report not completed, completed = trip report completed, and trip taken).

Private Recreational Fishing Reports in MyFishCount

The following results will describe submitted trips (status = abandoned and completed) in MyFishCount reported as private vessels. From these reports, interesting information can be extracted to describe recreational fishing trips in the South Atlantic region. Since MyFishCount is not part of a statistically designed survey, the results describe the universe of MyFishCount users and not the general fishing public. Additional information will be needed to verify the data and ensure there are not biases in the reported information.

Departure City

Users reported trips departing from 63 cities in the South Atlantic region. Seven of the ten most common departure locations were in Florida (**Table 5**, **Figure 7**). Atlantic Beach, Florida was the most commonly listed departure city with 111 trips. Charleston, South Carolina was the second most common departure city (61 trips). The most common departure city in North Carolina was Wrightsville Beach (ranked 7th overall), and Savannah (ranked 13th overall) was the most common departure city in Georgia.

It is difficult to determine if localized outreach efforts caused certain areas to become common departure cities. Also, Atlantic Beach, Florida may have been chosen because it was the first city on the list of cities for Florida, is near a highly populated area, or is near the hot spot for red snapper fishing. However, Atlantic Beach, North Carolina was not the most common departure city in North Carolina. This would seem to argue against users selecting the first city in the list. Charleston, Savannah, and Wilmington (Wrightsville Beach) are the largest coastal cities in their respective states. Combined, this seems to indicate that MyFishCount reports came from larger cities, where there was a better chance an offshore fishermen interested in harvesting red snapper lived.

Table 5. Top ten departure cities for MyFishCount reported trips (abandoned and completed).

Nearest City	State	Number of Trips Reported	Rank
Atlantic Beach	Florida	111	1
Charleston	South Carolina	61	2
Cape Canaveral	Florida	53	3
New Smyrna Beach	Florida	42	4
Saint Augustine	Florida	36	5
Jacksonville Beach	Florida	30	6
Wrightsville Beach	North Carolina	30	7
Fernandina Beach	Florida	25	8
Daytona Beach	Florida	18	9
Atlantic Beach	North Carolina	17	10

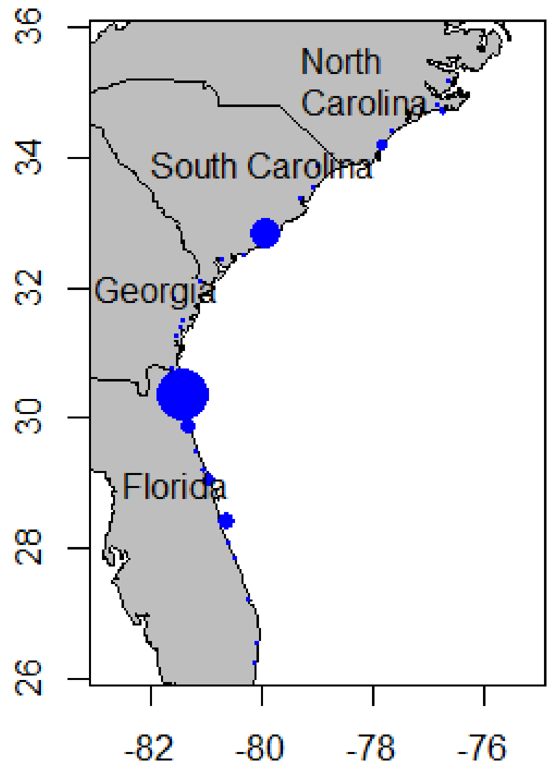

Figure 7. Departure location for trips (blue circles) reported in MyFishCount. A larger circle indicates a higher number of reported trips.

Target Species

Target species or group of species (primary target species) is a required field and users were given the chance to add a second target species or group of species (secondary target species) **(Table 6**). Most trips reported only one target species (319 out of 615 trips - two trips did not have a target species listed), with red snapper being the most commonly reported target species (521 out of 615 trips). On some trips (23 trips), red snapper were so important the user listed them as the primary and secondary target species. Other commonly reported primary target species included: other (29 trips), red drum/spotted seatrout (14 trips), dolphin/wahoo (13 trips), and bottomfish (11 trips). The most common secondary target species was other (154 trips), red snapper (29 trips), bottomfish (26 trips), grouper (26 trips), black sea bass (20 trips), and mackerel (11 trips).

Table 6. Primary and secondary target species reported by MyFishCount users.

	Secondary Target Species														
Primary Target Species	**Billfish**	**Black Sea Bass**	**Bottomfish**	**Cobia**	**Deepwater Grouper**	**Dolphin/Wahoo**	**Flounder**	**Grouper**	**Mackerel**	**Other**	**Red Drum/Spotted Sea**	**Red Snapper**	**Snapper**	**Not Listed**	**Total**
Billfish				1		4									5
Black Sea Bass	1		1						1					1	4
Bottomfish	1	1		1					3				1	4	11
Cobia			1										1		2
Dolphin/Wahoo	1		2			1			2	4			1	2	13
Flounder										1					1
Grouper		1										1	1	1	4
Mackerel				1						1	1			4	7
Not Listed														2	2
Other				1		1	1		1	12		5		8	29
Panfish										1					1
Red Drum/Spotted Sea Trout			1				2			2				9	14
Red Snapper		17	21	2	1	3	1	26	3	133		23	4	287	521
Snapper		1							1					1	3
Total	3	20	26	6	1	9	4	26	11	154	1	29	8	319	617

Port Type

Most users (55%) reported departing from a public boat ramp (297 trips), dock (23 trips), or marina (18 trips) (**Table 7**). Over 40% reported departing from a private dock (66 trips) or marina (204 trips). Other port type accounted for 1% of the trips. Understanding trips from private docks and marina is important because these trips may not be in the MRIP sampling frame.

Table 7. Number of reported trips by port type.

Port Type	Number of Reported Trips
Private Dock	66
Private Marina	204
Public Boat Ramp	297
Public Dock	23
Public Marina	18
Other	9

Effort on trips from different port types varied in MyFishCount (**Table 8**). There were 99 private recreational trips that reported for vessels (vessel reporting was added as an option in 2018) and had number of anglers (added in 2018) (**Table 8**). Many of the trips reported departing from public boat ramps (48 trips). Sixty-three percent of these trips had three or fewer anglers. Seventy-one percent of the trips departing from private docks (19 trips) and private marinas (23 trips) had four or more anglers.

Table 8. Number of trips by port type and number of anglers per vessel. This comparison includes trips on private recreational vessels that were completed (not active nor abandoned) and reported for the vessel.

	Number of Anglers							
Port Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**10**
Other	1		1					
Private Dock	1	1	2	5	4	5	1	
Private Marina		3	5	7	5	2		1
Public Boat Ramp		17	15	7	5	3	1	
Public Dock		1	2	1				
Public Marina			1	2				

A chi-square test was used to test for significant differences between trips departing from public and private areas. Private ports were grouper together and public ports were grouper together (Other ports were removed for the purposes of this analysis). Trips with two or fewer anglers were grouped and trips with six anglers or greater were grouped. A significant difference ($p = 0.007$) was detected among the departure port type (public vs private) where private port types tended to have more anglers per vessels than public ports (**Figure 8**).

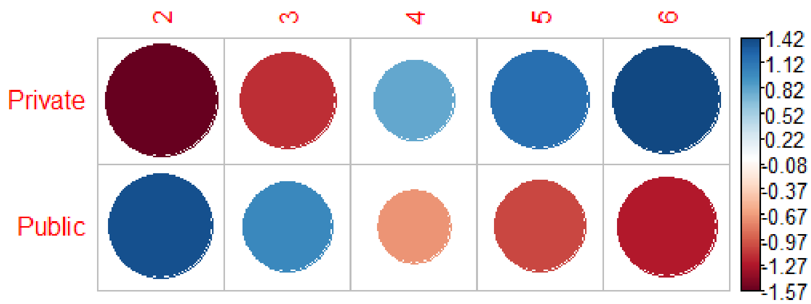

Figure 8. Residuals of a chi-square test comparing public vs private port types by number of anglers per vessel. The size of the circle indicates the absolute value of the residual and the color indicates the sign of the residual: positive (blue) or negative (red).

Digging deeper into effort, there was a total of 124 trips that reported greater than 1 hour fished for both vessel and individual combined (**Table 9**). Because some trips may be double counted when mixing the two reporting methods, an ANOVA was conducted to test for differences in hours away from the dock based on port type (private vs public) and reporting type (individual vs vessel vs other) with a test for interaction (**Table 10**). There was a statistical difference between reporting method, where time away from dock was greater for unknown and vessel reporting method compared to individual reporting. Port type was not significantly different (**Table 11**).

MyFishCount users also reported percent of time fishing. Ninety-four trips reported both port type and percent of time with hooks in the water. A significant difference in percent of time with hooks in the water was not detected among the port types ($p=0.278$) (**Figure 9**). Given these results, it appears that vessels leaving from private docks or boats ramps had more anglers on board but did not spend more time fishing or more time away from the dock.

Table 9. Number of completed private trips by port type and number of hours away from dock.

Hours Away from Dock	Private	Public
0	40	62
1	6	2
2	3	1
3	2	1
4	2	6
5	2	14
6	13	10
7	12	4
8	7	2
9	7	4
10	1	3
Greater than 10 hours	11	11

Table 10. Number of completed private trip reports by reporting method (individual, vessel, and unknown (2017)) and port type (private vs public) with number of hours reported.

Reporting Type	Port Type	Number of Reports
Individual	Private	12
Individual	Public	9
Unknown	Private	40
Unknown	Public	31
Vessel	Private	14
Vessel	Public	18

Table 11. Results from comparison of hours away from the dock by reporting method (individual, vessel, and unknown (2017)) and port type (private vs public) using an ANOVA and post-hoc Tukey. Asterisks indicate signficance (*= less than 0.05 and ** = less than 0.01).

Source	Df	Sum	Sq Mean	F Value	Pr(>F)	
Reporting	2	76.9	38.46	4.804	0.00986	**
Port	1	0.6	0.62	0.078	0.78093	
Reporting:Port	2	7.5	3.76	0.47	0.62629	
Residuals	118	944.6	8.01			

	Tukey HSD Multiple Comparison of Means				
Comparison	Difference	Lower	Upper	adjusted p	
Unknown-Individual	1.758551	0.090313	3.42679	0.036287	*
Vessel-Individual	2.419643	0.533579	4.305706	0.008015	**
Vessel-Unknown	0.661092	-0.76885	2.09103	0.517584	

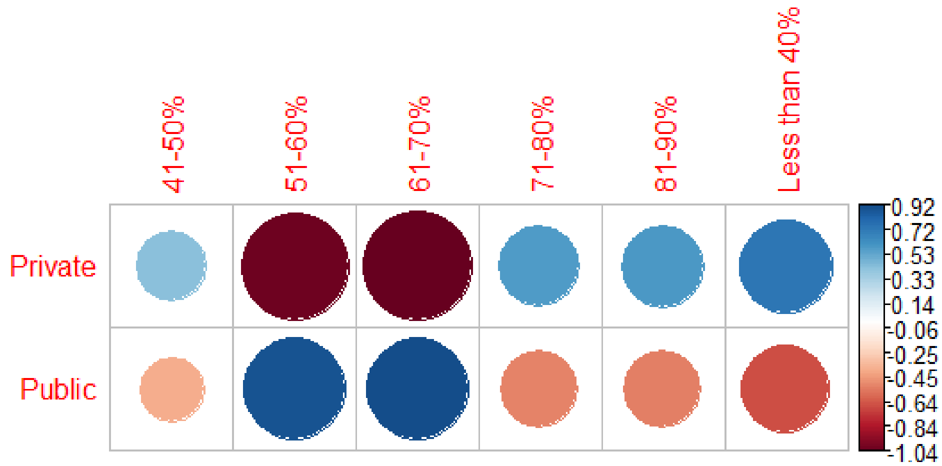

Figure 9. Residuals of a chi-square test comparing public vs private port types by percent of time with hooks in the water. The size of the circle indicates the absolute value of the residual and the color indicates the sign of the residual: positive (blue) or negative (brown).

Time away from dock was also investigated for different target species. Species were grouped at higher levels than choices listed in MyFishCount. The groupings included inshore species (flounder, drum, trout), offshore pelagics (billfish, dolphin, wahoo), other (cobia, mackerel, and other), and bottomfish (snappers, grouper, and basses). A significant difference was not detected in time away from dock among port type (p= 0.3217) and targets species (p=0.9586) using an ANOVA. There was a significant interaction between port type and target species (p=0.0363). A second test was conducted to examine if a difference between port type and target species could be detected. No difference was detected using a chi-square test on the distribution of trips among port type and target species (**Figure 10**, p=0.38).

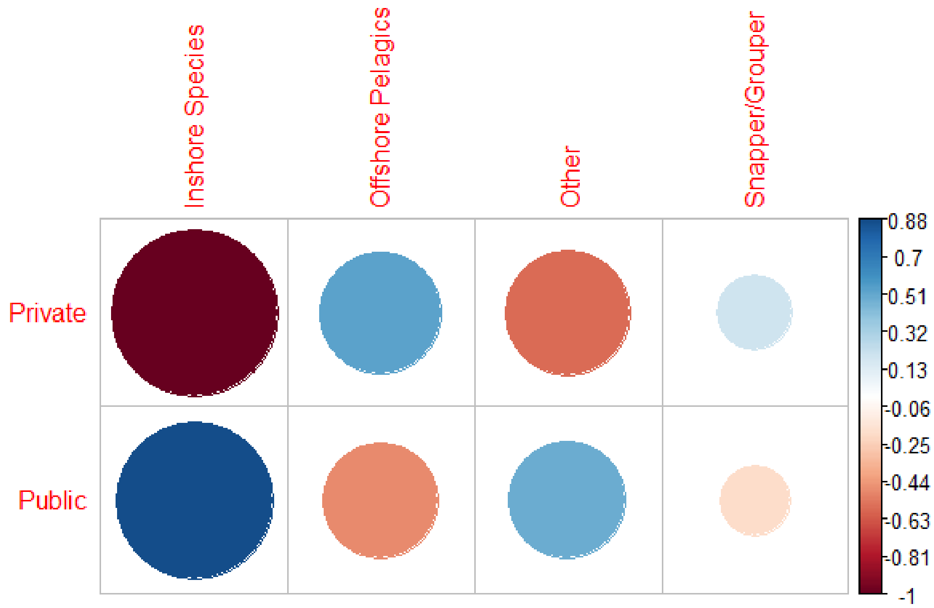

Figure 10. Residuals of a chi-square test comparing public vs private port types by target group. The size of the circle indicates the absolute value of the residual and the color indicates the sign of the residual: positive (blue) or negative (brown).

Day of Week

As expected most private fishing trips were reported on the weekend and Friday because most users reported during the red snapper mini-seasons (opened only on Friday – Sunday) (**Table 12**). Interestingly, users reported more fishing trips (both abandoned and completed) on Fridays in 2017 and 2018 than on Sundays. Also, there were more completed trips reported on Friday and Saturday in 2017 and 2018. Fridays are included in the opening for red snapper mini-seasons and likely caused the higher number of trips. This is an interesting finding given that it was suspected that most users would fish on weekends (Saturday and Sunday). Weather could have influenced which day people fished.

Table 12. Number of private recreational trips by day of week reported in MyFishCount.

Day of Week	Year = 2017 Abandoned	Year = 2017 Completed
Monday	1	3
Tuesday	0	1
Wednesday	3	8
Thursday	5	3
Friday	112	37
Saturday	134	15
Sunday	92	6

	Year = 2018 Abandoned	Year = 2018 Completed
Monday	2	7
Tuesday	3	4
Wednesday	0	7
Thursday	2	4
Friday	8	49
Saturday	15	45
Sunday	8	43

Length of Time to Report

MyFishCount is designed to be used while a user is fishing. However, some users report trips after they get back to the dock and most abandoned trips were completed at one sitting. Abandoned trips could be used as a proxy to estimate minimum time that reporting would take users. There were 383 trips for which reporting time was analyzed (**Table 13**). Reports taking less than 10 hours (310 trips) were subset to determine length of time to report an abandoned trip. Users reported 92% of the abandoned trips in four minutes or less with a modal time of one minute. Completed trips took longer and were dependent on the number of fish that were reported. Once again, trips that were reported over 10 hours were removed since these were likely reported while fishing or the trip reports were completed on another day. Users finished 35% of the completed trips in four minutes or less and 84% of the completed trips in 20 minutes or less. Modal time was 10 to 19 minutes.

Table 13. Time to submit abandoned and completed trip reports in MyFishCount based on the difference between departure time and last updated fields.

Reporting Time	Abandoned	Completed
0 minutes	92	1
1 minutes	137	17
2 minutes	33	9
3 minutes	14	10
4 minutes	10	13
5 minutes	5	10
6 minutes	3	10
7 minutes	2	11
8 minutes	1	6
9 minutes	2	5
10 to 19 minutes	3	27
20 to 29 minutes	2	11
30 minutes-1 hour		6
2 hours	1	2
3 hours		1
4 hours	1	1
5 hours	2	
6 hours	1	1
7 hours		
8 hours		
9 hours	1	
>10 hours	73	91

Catch (Kept and Released)

Users reported catching (kept and released) 1,871 fish on completed private recreational trips in 2017 and 2018 combined (**Table 14**). There were 48 species reported as being kept and 64 species reported as being released. The most commonly reported fish was red snapper (854 kept and released), followed by black sea bass (180 kept and released) and vermilion snapper (107 kept and released). Users reported keeping 39% of red snapper, 45% of black sea bass, and 63% of vermilion snapper. Fishermen reported keeping over 80% of dolphin, gray snapper, scamp grouper, and spiny lobster.

Table 14. Top ten reported kept and released species by year in MyFishCount on completed, private recreational trips. Note: Only red snapper and other could be reported in 2017.

	Kept		
Species	**2017**	**2018**	**Total**
Red Snapper	128	201	329
Black Sea Bass		81	81
Dolphin		70	70
Vermilion Snapper		67	67
Gray Triggerfish		39	39
Caribbean Spiny Lobster		36	36
Spanish Mackerel		34	34
King Mackerel		31	31
Other	20	1	21
Scamp Grouper		19	19
	Released		
Red Snapper	305	220	525
Black Sea Bass		99	99
Gray Triggerfish		54	54
Vermilion Snapper		40	40
Atlantic Sharpnose Shark		33	33
White Grunt		19	19
Other	16	2	18
Spotted Sea Trout		15	15
Sailfish		15	15
Spanish Mackerel		15	15

Measured Fish

MyFishCount users reported lengths for 555 fish, which was 30% of the total number of fish reported. There were lengths for 44 species. However only seven species had greater than 10 measurements combined for caught and released fish (**Table 15**). Red snapper were the most commonly measured fish in 2017 and 2018 (~30% of both kept and released were measured). Vermilion snapper ranked second in total number of fish measured (2nd for kept and 3rd for released). Black sea bass ranked third for total number of fish measured (3rd for kept and 2nd for released).

Overall, few species had greater than 10 fish measured (**Table 15**). Some general trends were observed with smaller fish being released, especially for species with size limits (black sea bass, gag grouper, and vermilion snapper) (**Figure 11**). Red snapper, which does not have a minimum size limit, were released at a variety of sizes likely due to the short season in 2017 and 2018.

The percent of fish with lengths reported may provide insight into which species fishermen view as most important, the fish were close to the minimum size limit, or easiest to measure. Lengths were provided for all red grouper reported (3 fish). Gag grouper had the next highest percentage with lengths reported for 87% of the kept and released fish. Only four percent of the scamp were measured (all scamp were kept). Users reported lengths for 82% of released vermilion snapper and 43% of released gray triggerfish. Less than 25% of the white grunt were measured. Lengths were rarely provided for amberjack, barracuda, and sharpnose sharks, which are all commonly released fish. Length data will become more useful and reliable as more lengths are reported.

Table 15. Number of fish lengths reported in MyFishCount by catch status (kept or released) in 2017 and 2018. Note: Only red snapper and "other" were options for reporting lengths in 2017.

	2017		2018	
Species	**Kept**	**Released**	**Kept**	**Released**
Red Snapper	50	87	81	80
Vermilion Snapper			32	23
Black Sea Bass			19	33
Gray Triggerfish			11	23
Gag Grouper			8	5
White Grunt			3	7
King Mackerel			6	4
Gray Snapper			7	
Other	7			
Mutton Snapper			5	

In comparing data on red snapper from MyFishCount and MRIP, both datasets had a broader red snapper length distribution in 2018 compared to 2017 (**Figure 12**). Red snapper lengths in MyFishCount were converted to fork length based on the conversion equation from SEDAR 41 (SEDAR 2017). The modal size reported in MyFishCount was similar among years (23- and 27-inches fork length in 2017 and 23-inches fork length in 2018). The modal sizes of red snapper collected through MRIP were 21-inches fork length in 2017 and 26-inches fork length in 2018 based on the expanded length distribution. Both datasets indicated a higher percentage of red snapper under 23-inches fork length was kept in 2017 compared to 2018 and a higher percentage of red snapper greater than 30-inches was kept in 2018 compared to 2017.

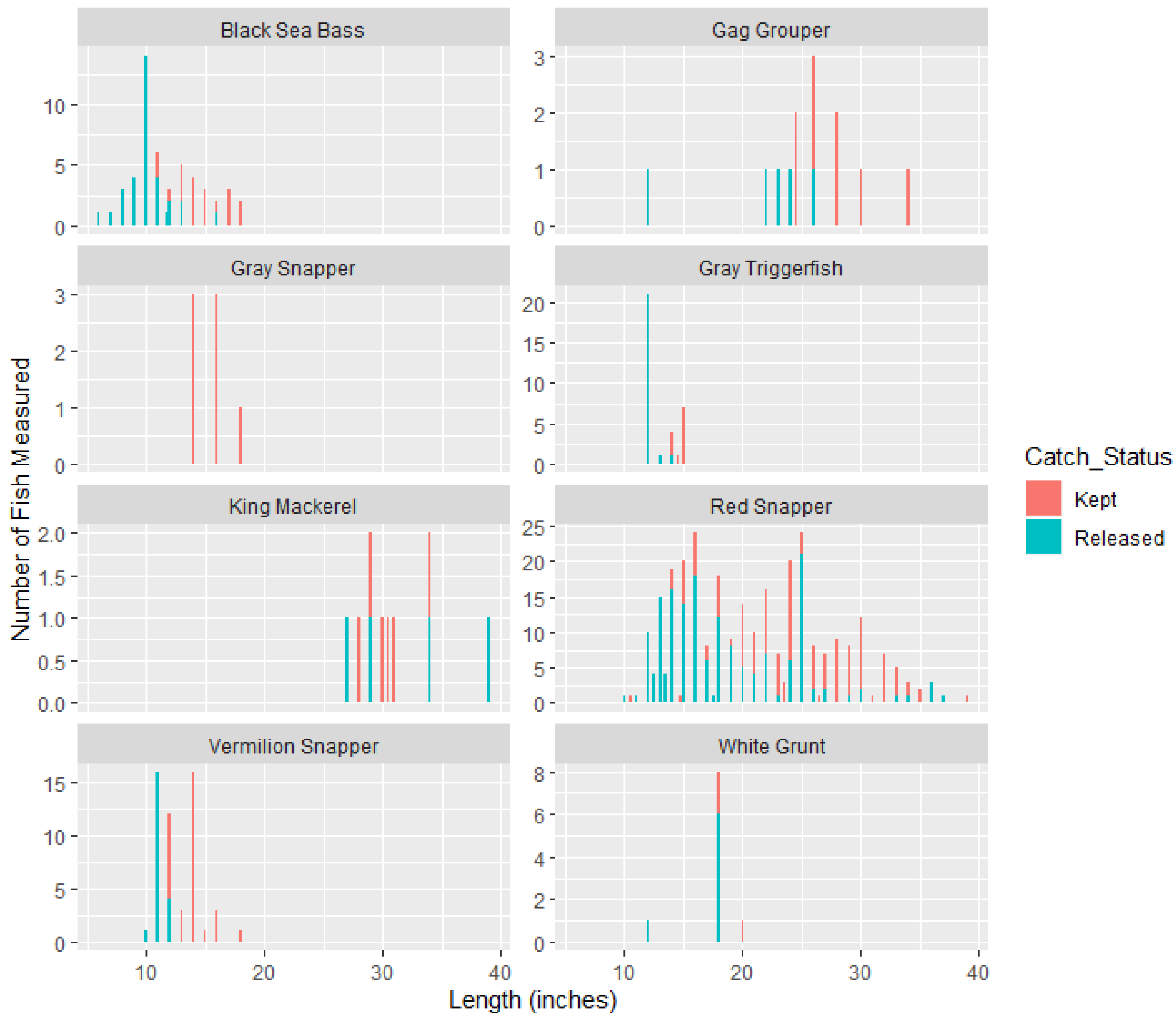

Figure 11. MyFishCount private recreational reported length distribution for the eight species with the most lengths reported by catch status (kept or released). Note the ordinate changes for each species.

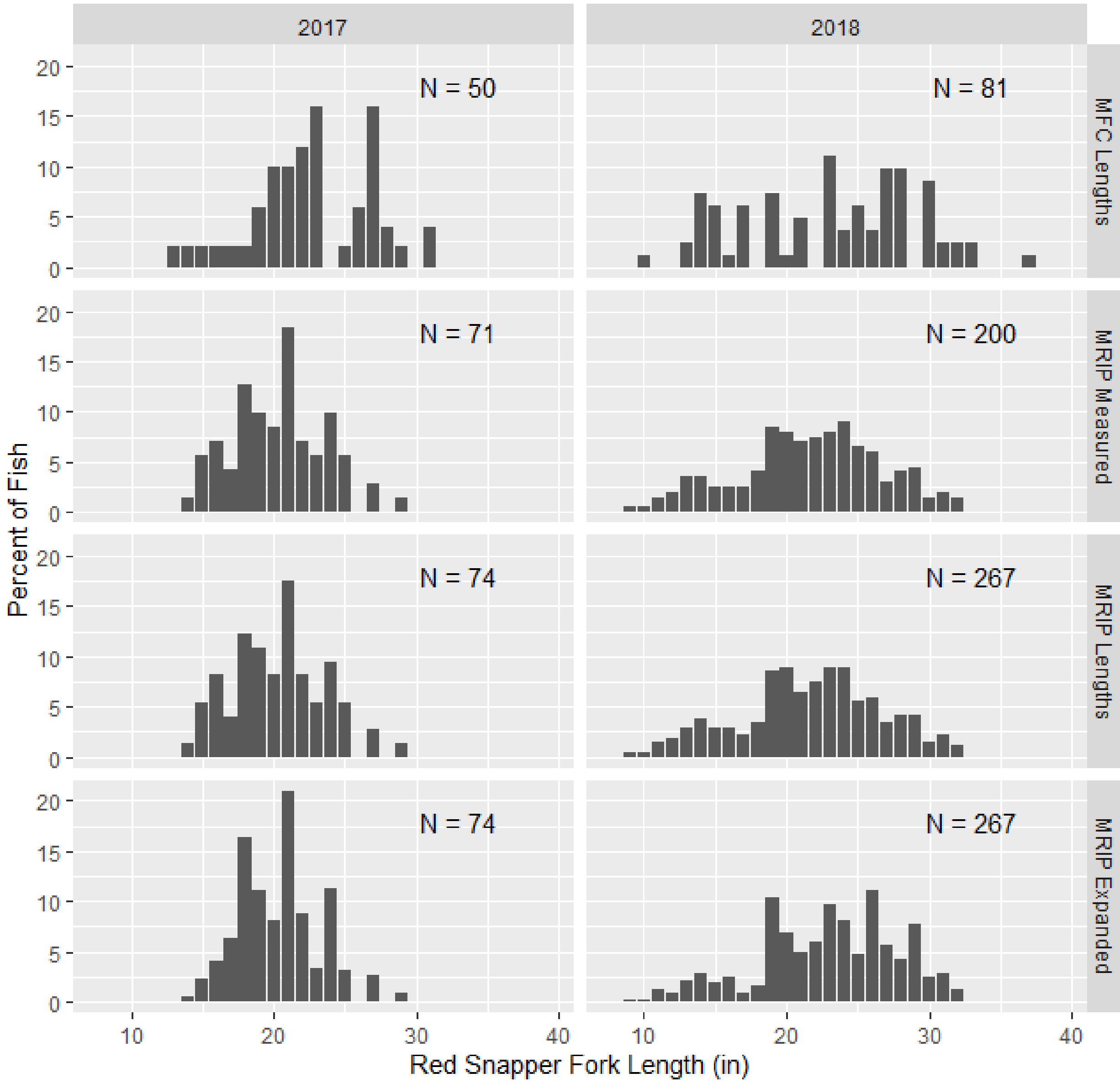

Figure 12. Red snapper length distributions (fork length (inches)) presented as percent of total number of measured fish (N) by year for MyFishCount (converted to fork length based on conversion in SEDAR 41 (2017)), MRIP measured fish (only fish observed), MRIP Lengths (observed and imputed measurements), and MRIP Expanded (expanded lengths based on survey design).

There were fewer black sea bass measured than red snapper in both MyFishCount and MRIP. Keep in mind that black sea bass lengths were only reported in 2018 in MyFishCount. The length distribution in MRIP (used ocean as location and mode was private vessel and south of Dare County, NC) was broader and had more small fish than what was reported in MyFishCount (**Figure 13**). Based on MRIP expanded data, 40% of the kept fished were under the federal minimum size limit of 13 inches south of Cape Hatteras. MyFishCount users reported only 16% of the kept fish as 12 inches or less. The modal size was 14 inches in MyFishCount and 13 inches in MRIP. Black sea bass larger than 16 inches were only reported in MyFishCount and accounted for 26% of the reported lengths.

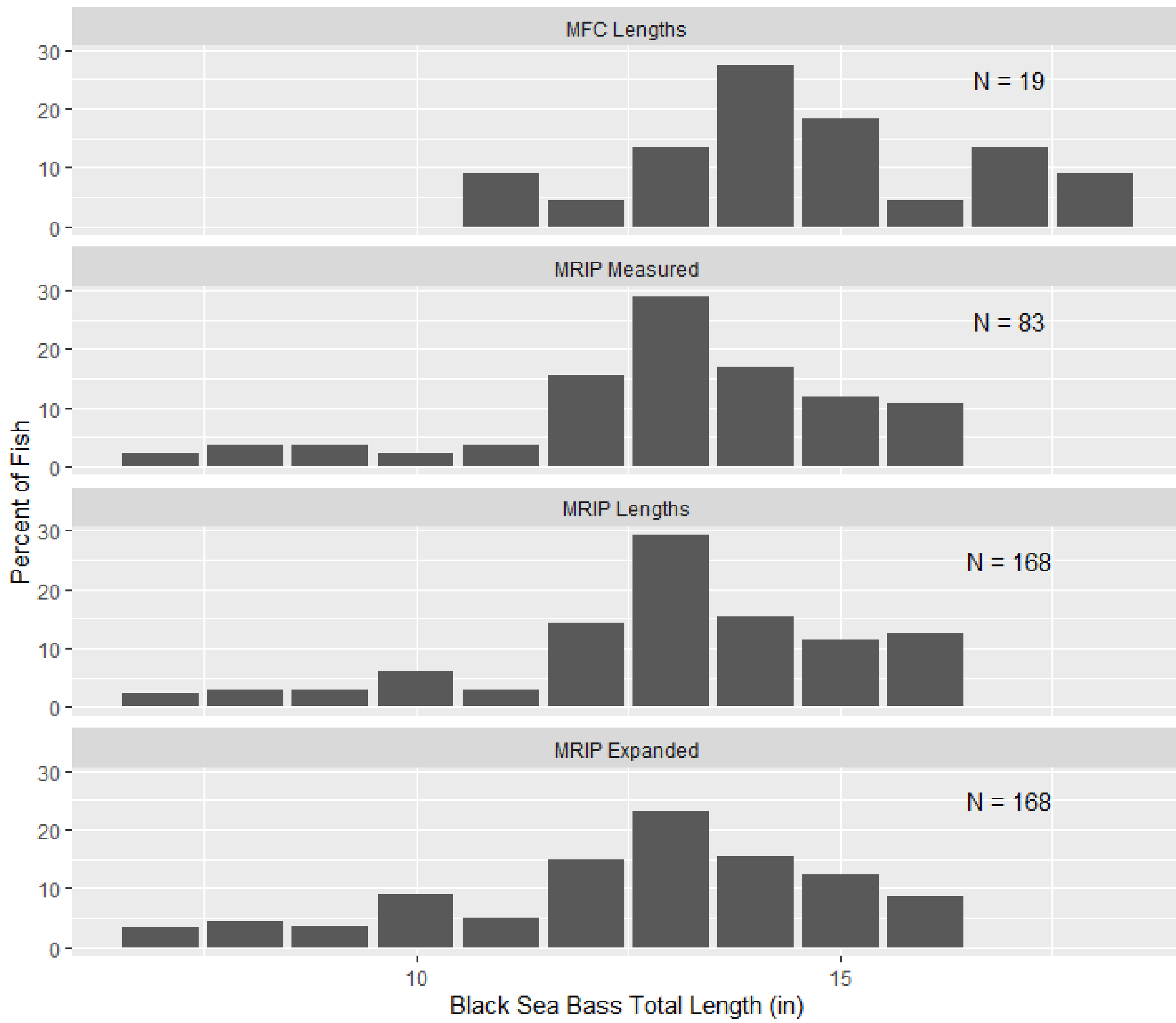

Figure 13. Black sea bass length distributions (total length (inches)) presented as percent of total number of measured fish in 2018 for MyFishCount, MRIP measured fish (only fish observed and assumed measurement was total length as did SEDAR 25), MRIP Lengths (observed and imputed measurements), and MRIP Expanded (expanded lengths based on survey design).

Like black sea bass, vermilion snapper lengths were only reported in MyFishCount in 2018. Vermilion snapper lengths in MyFishCount were converted to fork length based on the conversion equation from SEDAR 17 (2008). The length distribution in MRIP (using ocean as location and private vessel as mode -south of Dare County, NC) was broader and had more small fish than what was reported in MyFishCount (**Figure 14**). Forty-seven percent of the vermilion snapper reported in MRIP were at or below the federal size limit (12 inches total length, which is approximately 10.8 inches fork length). Lengths reported through MyFishCount (converted from total length) were larger than those measured in MRIP. The modal size was 10 inches fork length in MRIP in the expanded sample, 11 inches fork length for measured and lengths in MRIP, and 13 inches fork length in MyFishCount. The largest vermilion snapper was reported in MyFishCount. MyFishCount users did not report keeping any fish below the federal size limit.

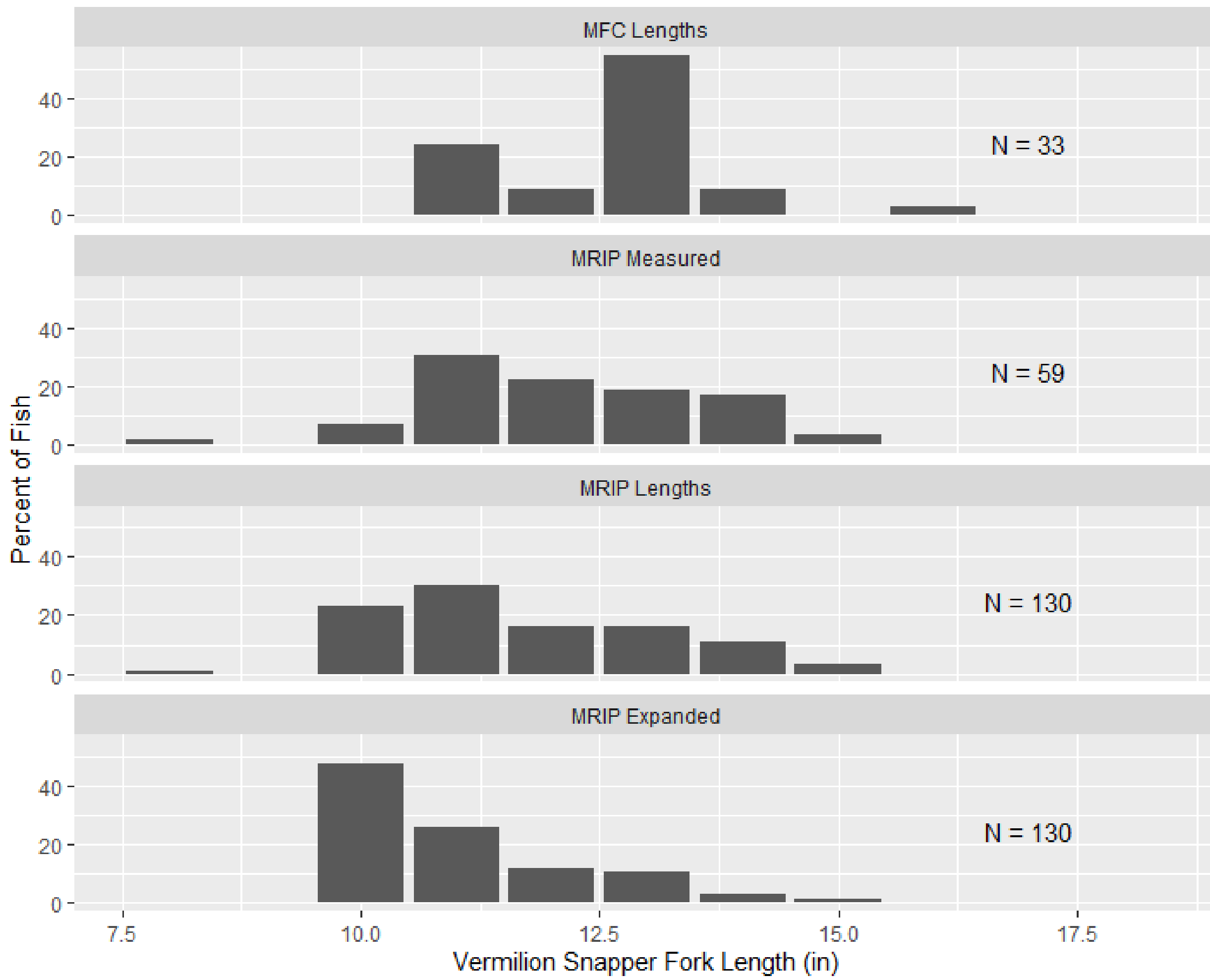

Figure 14. Vermilion snapper length distributions (fork length (inches)) presented as percent of total number of measured fish (N) in 2018 for MyFishCount (converted to fork length based on conversion in SEDAR 17 (2008)), MRIP measured fish (only fish observed), MRIP Lengths (observed and imputed measurements), and MRIP Expanded (expanded lengths based on survey design).

Length Weight

Another interesting comparison looked at the lengths and weights reported in MyFishCount compared to a length-weight relationship developed in stock assessments. MyFishCount data were filtered to only include fish with length and weight reported (Note: these fish are reported as total length which is different than the comparison with MRIP). The reports with lengths and weights appear to overestimate the weight of black sea bass when compared to data from the previous black sea bass assessment (SEDAR 25 2011), underestimate the weight of vermilion snapper (SEDAR 17 2008), and match the weight of red snapper (SEDAR 41 2017) (**Figure 15**). As more data are collected, comparisons can be made between MyFishCount derived curves and values used in stock assessments.

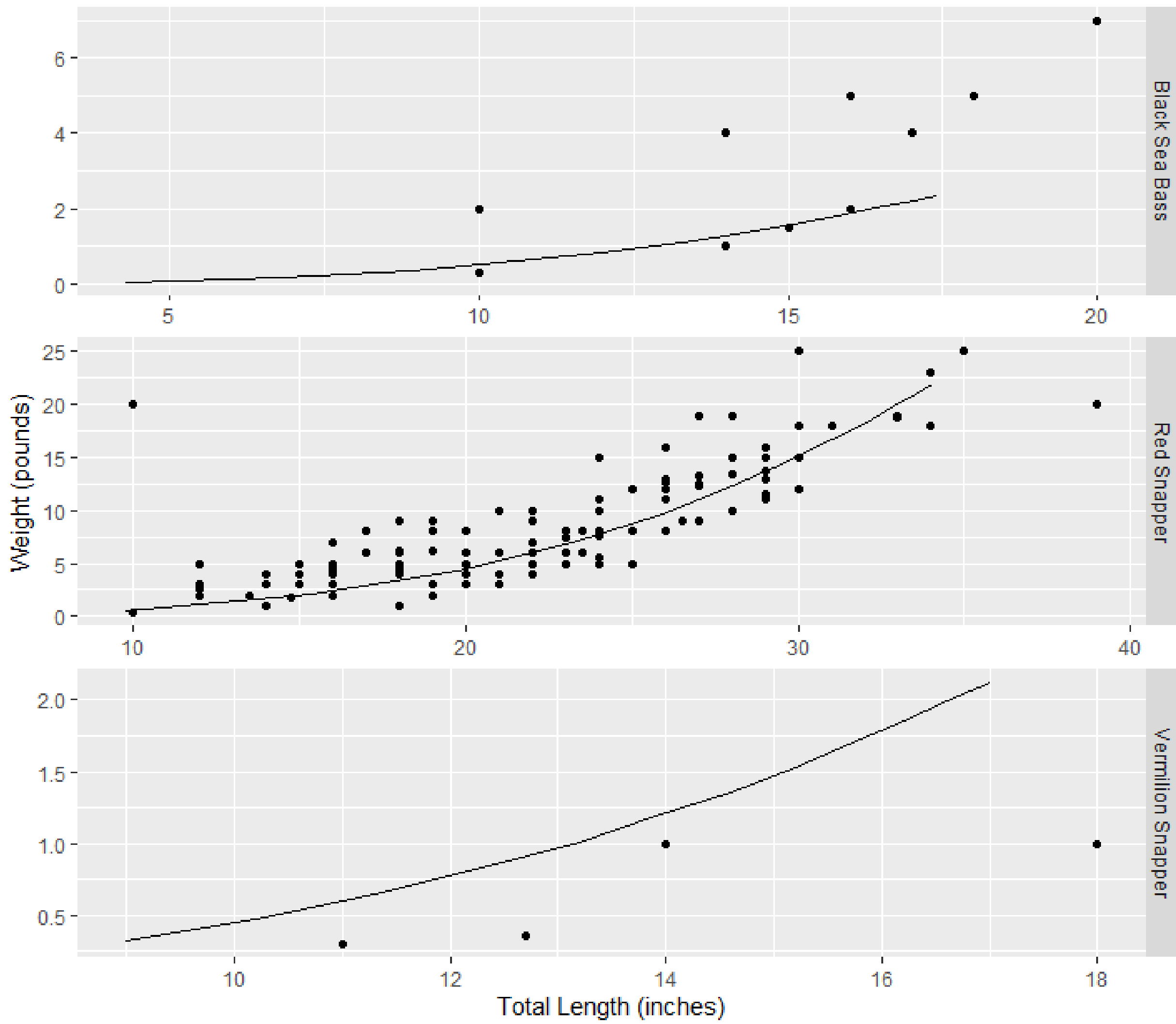

Figure 15. MyFishCount length and weight values for black sea bass, red snapper, and vermilion snapper (circles) compared to length-weight relationships (line) developed in SEDAR 24 for black sea bass (SEDAR 2011), SEDAR 41 for red snapper (SEDAR 2017), and SEDAR 17 for vermilion snapper (SEDAR 2008).

Catch Rates

Catch rates were developed for 2017 and 2018. The analysis for 2018 considered individuals and vessels, since those selection options were added that year. In 2017, it's likely that some users reported as an individual while others reported for the vessel. It could not be determined how the users were reporting until the individual and vessel options were added as a required field in 2018. The number of anglers field was added as a requirement for users reporting for the vessel in 2018. The analysis was restricted to trips targeting red snapper as the primary species since this was the most common target species. Overall, users reported typically catching (kept and released) less than three fish per angler except for 2017 (note the number of anglers could not be determined and assumed to be 1) when greater than six fish per angler was most common (**Figure 16**). One fish was the most common number of fish kept per angler in the three groups (2017, Individual 2018, and Vessel 2018) (**Figure 17**). When comparing the number kept and the number caught, the number kept is lower as expected. Interestingly, no catch was common on trips targeting red snapper.

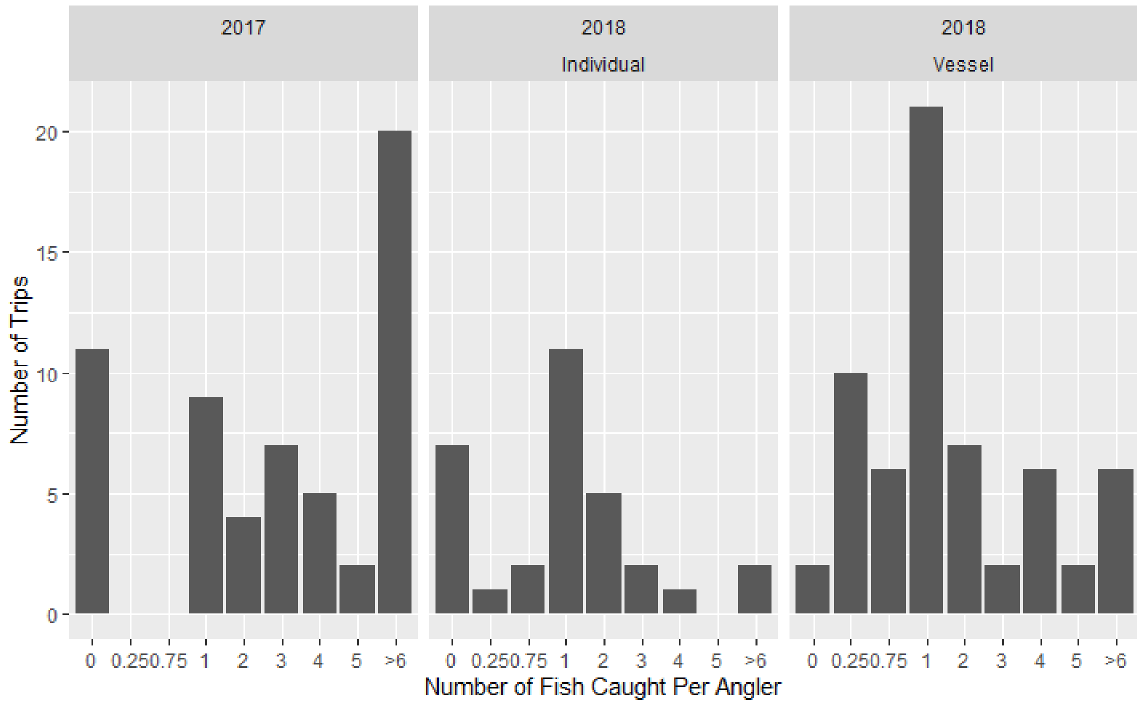

Figure 16. Number of fish caught per angler reported in MyFishCount in 2017 and 2018 by reporting mode.

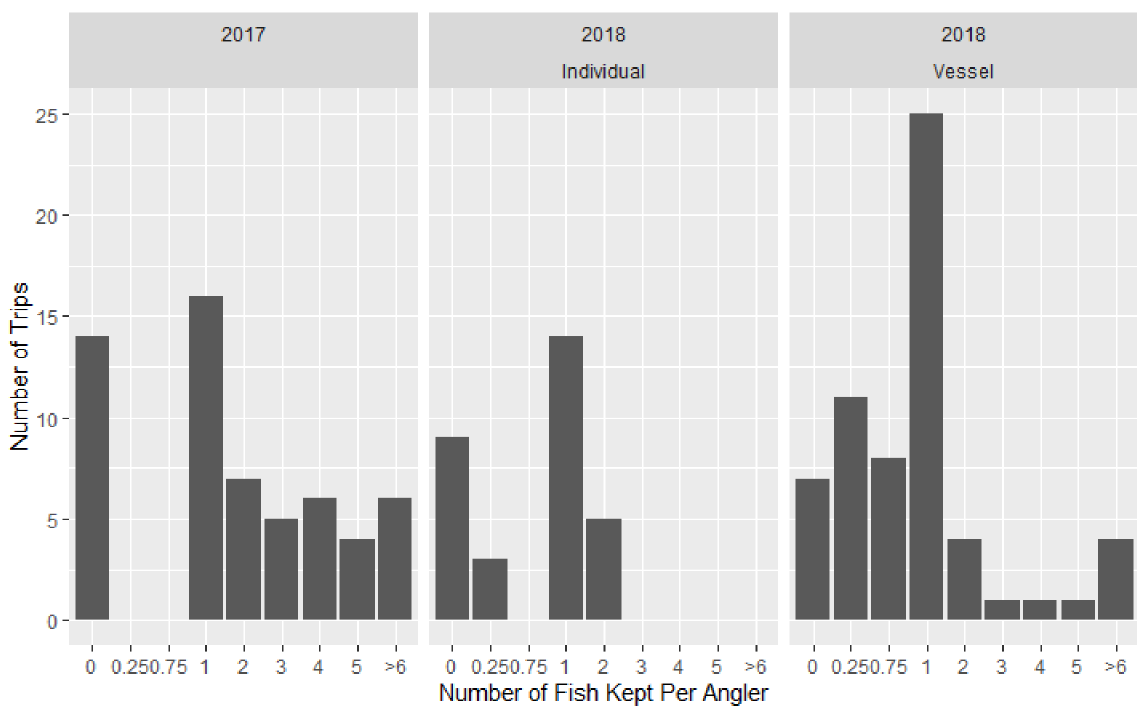

Figure 17. Number of fish kept per angler reported in MyFishCount in 2017 and 2018 by reporting mode.

The same methods were used to describe red snapper catch per angler since this was the most common species in MyFishCount. The number of red snapper caught was always greater than zero because the trips were subset to trips with at least one red snapper reported. Like the previous figure, 2017 had a higher number of red snapper caught per angler compared to the vessel and individual modes in 2018 (**Figure 18**). Five trips with the highest number of red snapper occurred in 2017. Catching one red snapper or fewer per person was more common in 2018 compared to 2017. Similarly, users usually reported keeping only one red snapper per angler, the federal bag limit in the South Atlantic region, in 2018 (**Figure 19**). There were a few users that reported keeping more than one red snapper per angler, which could have been user error, non-compliance in federal waters, or following Florida regulation for state waters.

Average red snapper catch per trip has been calculated off Florida using methods developed for the red snapper mini-seasons since 2014 (Sauls et al. 2017). In this estimate, average red snapper catch is developed for trips targeting red snapper. The same criteria were applied to calculate average red snapper catch per trip in MyFishCount. Average catch of red snapper reported in MyFishCount was 1.635 per angler in 2018 and average kept was 0.829. Average catches were not calculated for 2017 because number of anglers was unknown. Both values are higher than the respective estimates from Florida, which were 1.422 red snapper caught per angler and 0.594 red snapper kept per angler (Sauls et al. 2019). The MyFishCount values for average catch and kept red snapper were higher than the upper confidence interval reported for Florida. The reason MyFishCount values are higher is not known, but sources of bias and error could be angler avidity, over reporting, higher reporting levels in red snapper hot spots, or user error. Future estimates from MyFishCount and FWC could aid in identifying potential biases in self-reported data for red snapper.

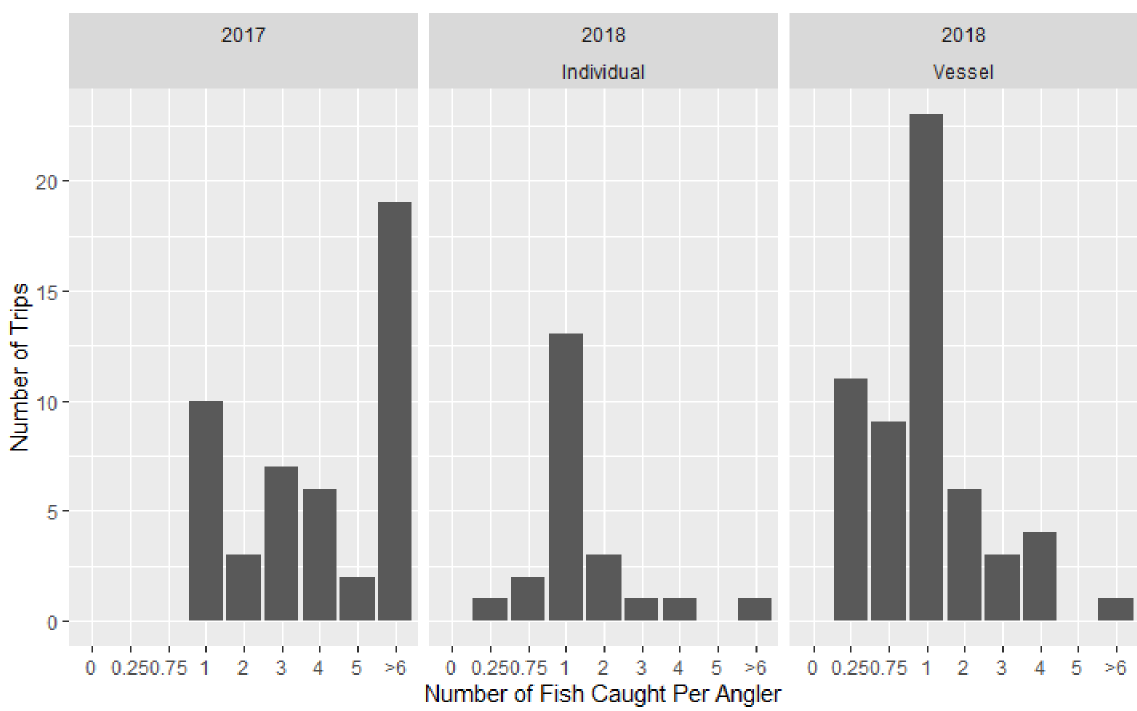

Figure 18. Number of red snapper caught per angler reported in MyFishCount in 2017 and 2018 by reporting mode.

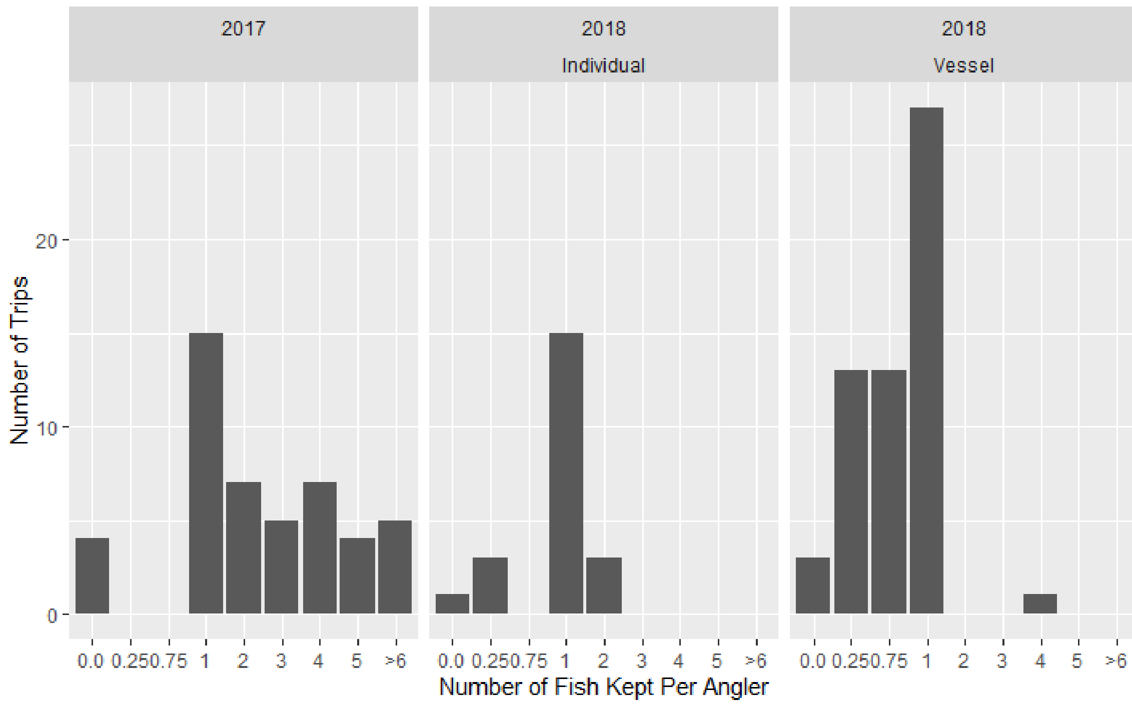

Figure 19. Number of red snapper kept per angler reported in MyFishCount in 2017 and 2018 by reporting mode.

Fishing Location

Location was reported for all fish kept and released from the Florida Keys through Cape Hatteras, North Carolina (**Figure 20**). Common reported locations were off Cape Canaveral, FL; Atlantic Beach, FL; Brunswick, GA; Hilton Head, SC; Charleston, SC; and Cape Lookout, NC. There is some mismatch between departure locations and catch locations. The highest number of departures was reported off Atlantic Beach, FL, whereas the highest number of catch locations was off Hilton Head, SC. As more data are collected, hot spots for recreational fishing can be identified. This can be useful in management so that important areas for recreational fishing are protected from offshore development and socio-economic impact of spatial management actions can be evaluated.

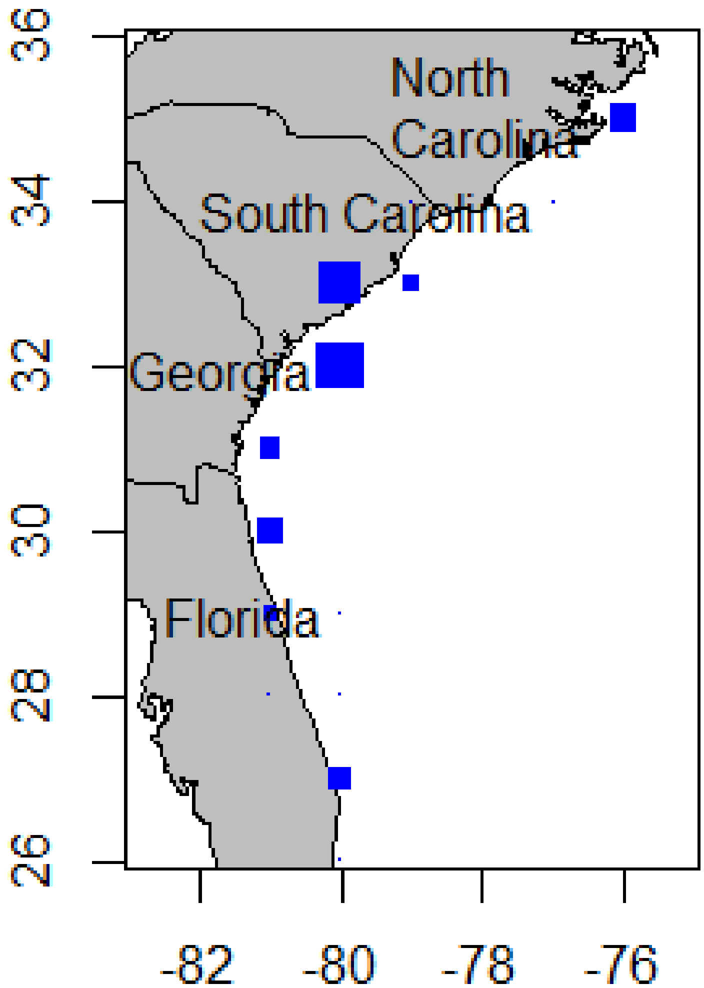

Figure 20. Fishing area for all kept and released fish reported in MyFishCount. The map includes only locations for areas with three or more anglers reporting in the block. Larger box means higher number of fish.

Users reported fishing location for 150 red snapper, which was the most of all species. Location was aggregated to the nearest decimal degree or about 60 nautical miles for latitude and longitude. Northeast Florida had the highest number of locations for red snapper reported (**Figure 21**). Morehead City, NC ranked third in number of red snapper locations. Unfortunately, some locations are appearing inshore for this species which is highly unlikely (Charleston area) or rounding caused the location to appear onshore. With this in mind, the MyFishCount Team is developing maps with multiple displays for GPS coordinates to aid in better placement of the fishing location.

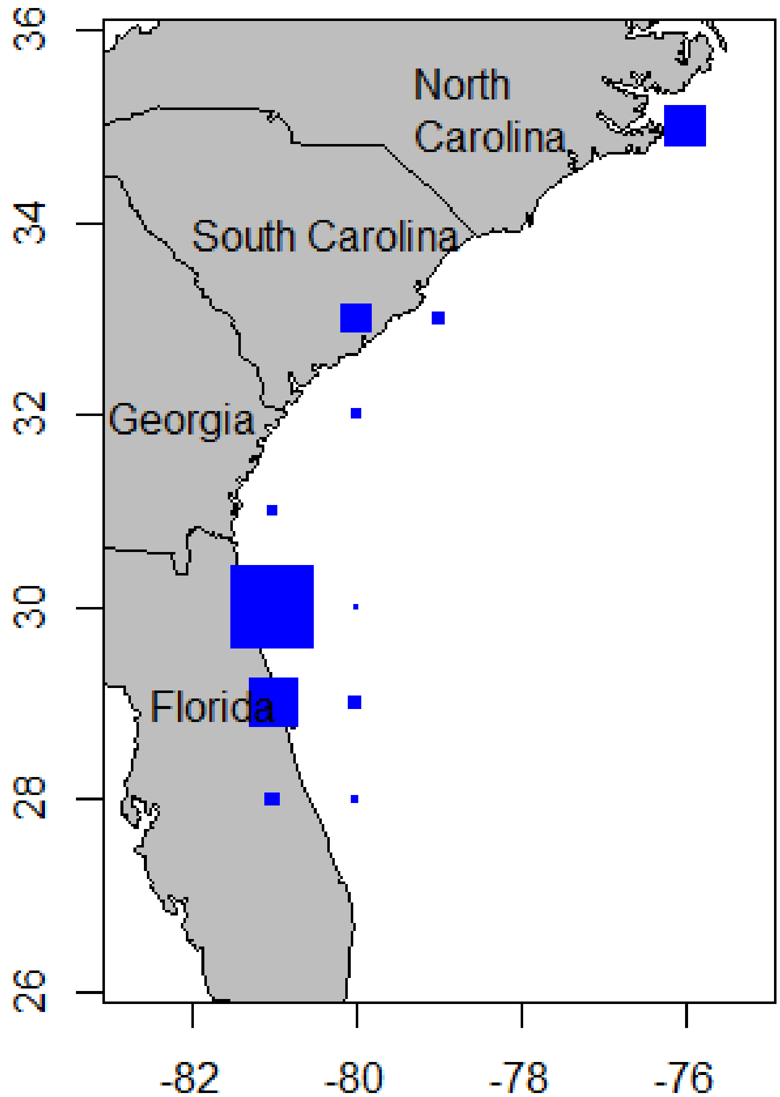

Figure 21. Fishing area for kept and released red snapper reported in MyFishCount. The map includes only locations for areas with three or more anglers reporting red snapper catch in the block. Larger box means higher number of fish.

Black sea bass had the next highest number of reported fishing locations (n=74). No aggregated location had greater than two fishermen reporting; therefore, no maps are available for black sea bass or other species. Most of the fishing locations for black sea bass were reported off Georgia and South Carolina.

Other Data

Users were able to report information on location of hooking, hook type, release treatment, and depth fished (in categories). This information could be used in describing the recreational fishery. Users reported 40.9% of the red snapper were not treated, while 56.5% were treated by either venting, descending, or descending and venting (**Figure 22**). These treatments are used to reduce the impacts of barotrauma on fish coming from depth. It is not known if the fish that were not treated had signs of barotrauma, but users reported treating fish for barotrauma more often in deeper water (>=90 feet) (**Figure 23**).

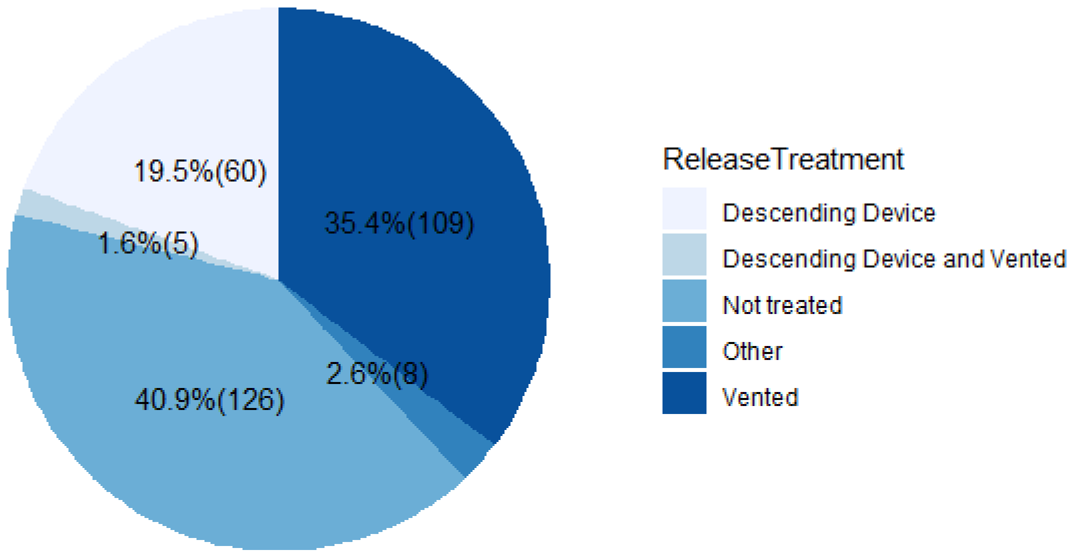

Figure 22. Release treatment of red snapper reported in MyFishCount. Percentages are based on fish that were reported to have been treated upon release.

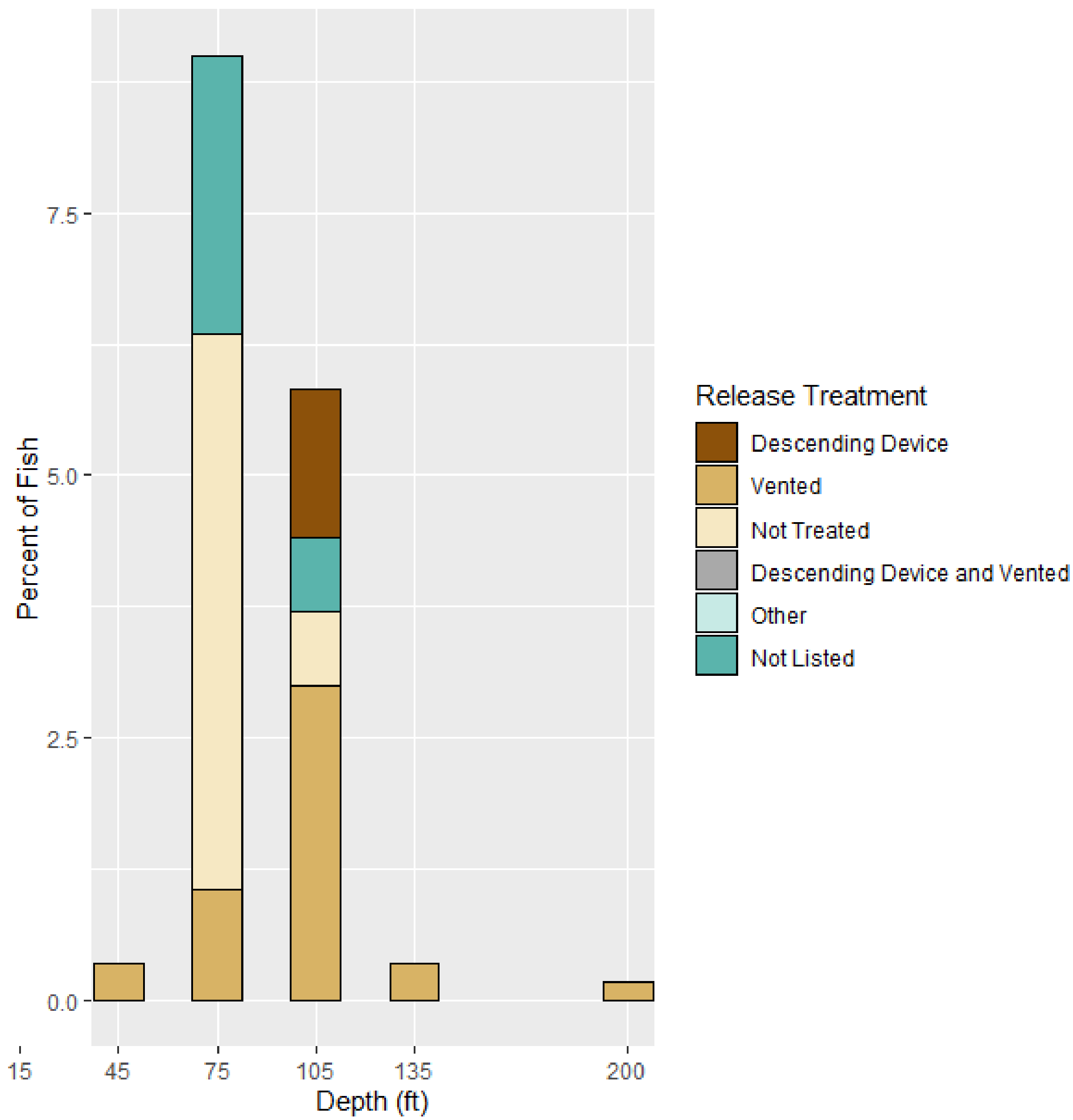

Figure 23. Release treatment of red snapper by depth as reported in MyFishCount in 2017 and 2018.

Hooking location and hook type are two other pieces of information commonly reported by fishermen. Non-offset circle hooks were the most common hook type reported when catching red snapper, followed by offset circle hooks (**Figure 24**). Users reported red snapper were typically hooked in the jaw. Few reports indicated red snapper were hooked in the throat. Those that did also typically reported that fish were caught using non-offset circle hooks (<5%).

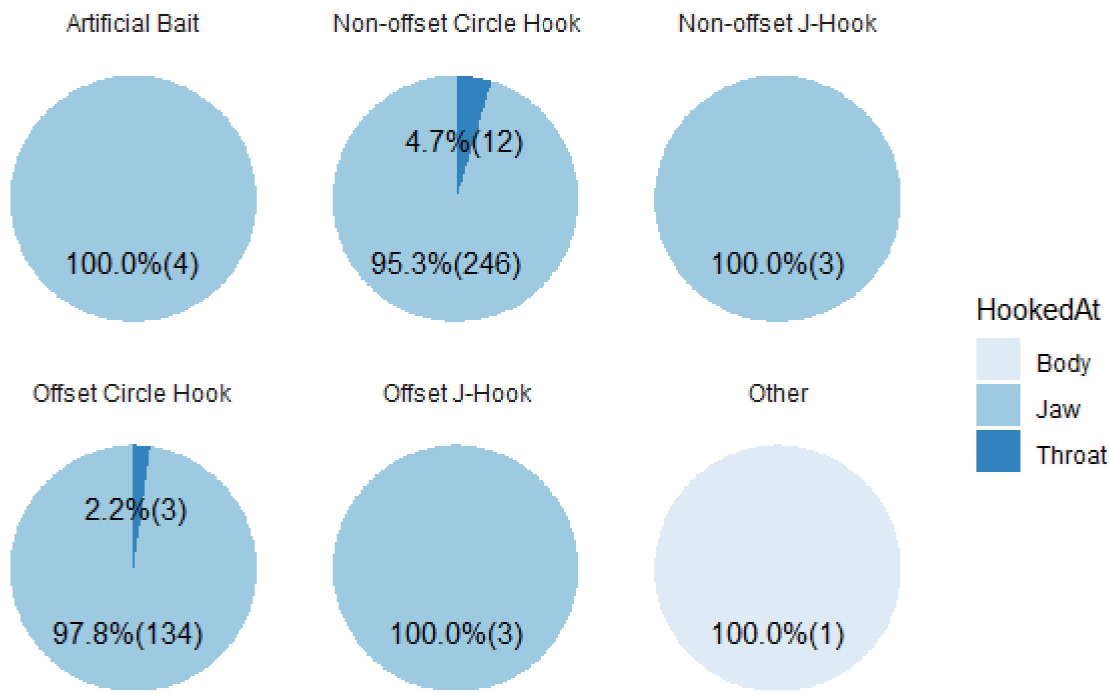

Figure 24. Reported hooking location by hook type for red snapper as reported in MyFishCount.

It is important for managers to gauge why stakeholders might release fish, especially when setting bag limits and size limits for desirable species. MyFishCount users indicated "the why" for red snapper. The most common reason was over bag limit. The second most common reason was because the fish was too small even though there is no federal red snapper size limit.

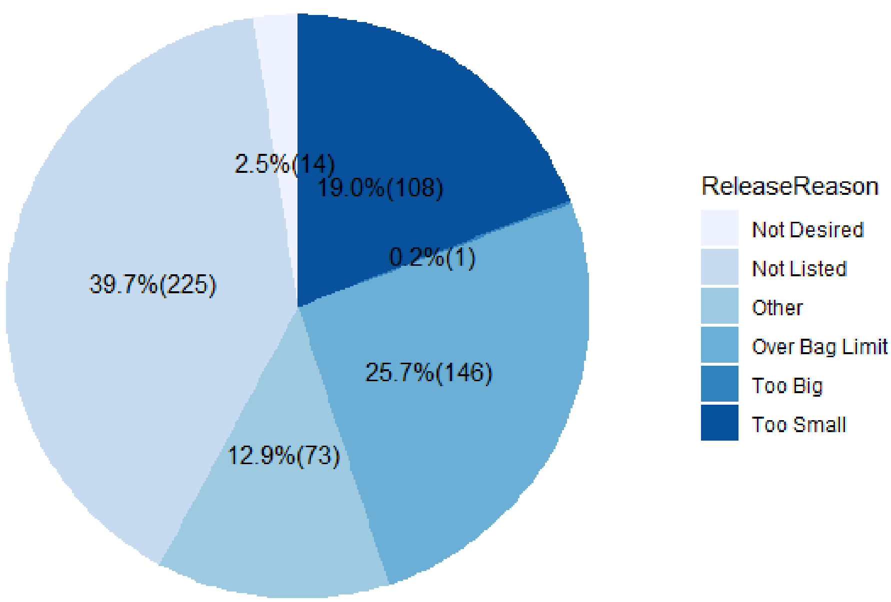

Figure 25. Reported reasons for releasing red snapper in 2017 and 2018.

DISCUSSION AND CONCLUSIONS

This project successfully developed the MyFishCount app, database, and a supporting website that anglers used to voluntarily report fishing activity and catches. This is the first region-wide reporting system for private recreational anglers that can submit data to the ACCSP. Many users appreciated this opportunity and expressed support for the program in their comments through the app and emails to administrators. Some users did become frustrated with the app because of the amount of information requested. We agree that the first time using the app can be overwhelming. After using the app a couple of times, user comfort and efficiency should increase. The data fields in the app allowed for this detailed report, aiding in an in-depth look at the private recreational fishery. The value of this information should not be overlooked or underestimated. Several pieces of information presented in the report have not been described for anglers in the South Atlantic region. For instance, the depth of release and release treatment for red snapper will be extremely valuable when considering release mortality estimates in future stock assessments. Over time, as more data are entered into the database, more detailed analyses can be conducted to better understand private recreational fishing characteristics for other snapper grouper species in addition to red snapper.

MyFishCount was designed to collect data for a variety of management strategies ranging from fully voluntary to mandatory. Currently each angler, trip, and catch has a unique identification. This design was based on the mandatory reporting system in Mississippi, Tails-n-Scales. The Tails-n-Scales system requires a hail out before fishermen leave the dock. This creates a trip identifier, informs management of effort, and aids enforcement of the reporting requirements. The Mid-Atlantic Fishery Management Council recommended mandatory reporting for blueline and golden tilefish in Amendment 6 to the Golden and Blueline Tilefish Fishery Management Plan that would require reports to be completed prior to disembarking the vessel, but the reporting requirement will need additional development before it can be implemented[2]. MyFishCount could be used in either of these reporting programs since the fishermen can start a trip and enter data throughout the day while the data is stored on the app. Once they return to cell phone range, connectivity is restored, and the trip can be submitted. Additionally, MyFishCount reports departure city, which could be useful when port sampling. Sampling effort could be concentrated at certain locations based on departure city and port type to increase the probability of getting matching port side intercepts that would be used to verify the self-reported data.

One of the goals was to have several hundred anglers report using the app for several snapper grouper species. Due to timing, the program has been red snapper focused. The launches of the web-portal and mobile app occurred around the red snapper mini-seasons. Moving forward, outreach is needed to encourage anglers to report for deep-water species (rare event species) such as blackfin snapper, blueline tilefish, golden tilefish, queen snapper, silk snapper, snowy grouper, and wreckfish. SAFMC staff are currently working on outreach efforts to engage with anglers that catch these species.

One very encouraging aspect of the program was the level of data some users reported voluntarily. Users (a subset of completed, private vessel trips) reported hook type, hook

[2] Federal Register. https://www.federalregister.gov/documents/2017/11/15/2017-24710/fisheries-of-the-northeastern-united-states-amendment-6-to-the-tilefish-fishery-management-plan

location, and depth for over 30% of the fish reported. Fishing location (latitude), length, and release reason were reported for over 20% of the fish reported. Only weight (18%) and release treatment (7%) were reported for less than 20% of the caught fish. These users clearly wanted to participate in improving data on recreational fishing. Once more anglers have reported in the app, the impact of avidity can be investigated to see if anglers that fish/report frequently have different behaviors then fishermen that only report a few times.

Although it was encouraging to the see the level of data some users reported, participation needs to be increased to ensure the data are representative of the fishery. On average, there were two fishermen that reported departing from each nearest city (city with at least one reported departure). It is unlikely that two anglers per city would provide a representative sample and an increase in users is needed ensure the provided data are representative of the fishery. On a positive note, having users from a broad geographic area reduces potential due to area fished (Jiorle et al. 2016) and MyFishCount users reported from a broad geographic range from Key West, Florida to Cape Lookout, North Carolina with a high number of reports coming from areas where public comments about red snapper from private recreational fishermen are common. Additional data collection is needed before information from MyFishCount can be expanded to represent a population of anglers beyond the users, and validation is necessary to ensure the data collected are reliable and accurate.

The MyFishCount Team conducted extensive outreach efforts to the media, which resulted in several articles (>20) written about the program in fishing magazines and newspapers to further promote the app. MyFishCount was described in these articles with a positive light, but some articles expressed some apprehension to requiring reporting from the private component of the recreational sector (see Appendix A). Getting buy-in from the fishing industry is critical for a voluntary system to work and should be sought even if a mandatory requirement is implemented. The goals and objectives for reporting need to be clearly articulated so the public knows why they would be required to complete the reports and why accurate information is important.

Based on a survey conducted by Erin Spencer, users are more likely to use voluntary reporting apps such as MyFishCount if other fishermen are using them or they feel it will be useful for science and management (see Appendix B). Reports were provided to people that signed up for MyFishCount after the red snapper season and after 2018 to let users know that fishermen are reporting and to share the information provided. The click rates for these reports were typically high, with over 50% of the emails being opened by the recipients. In comparison, other emails sent out by SAFMC staff have open rates less than 10%. Outreach will need to be conducted annually to keep user engagement high and recruit new users. Even if reporting is mandated, outreach for the program will still need to continue so that users are aware of the goals of the program and how data are used to manage their fisheries.

Another accomplishment of MyFishCount is the ability to submit reported data to ACCSP, a regional fishery dependent database (partners are NMFS Headquarters, Southeast and Northeast Regions; all Atlantic coast states; US Fish & Wildlife Service; ASMFC; Potomac River Fisheries Commission; and the 3 East Coast Councils), where scientists and managers can access the data. Submission is accomplished through an API created so that the MyFishCount fields match other ACCSP fields reported by other data sources. Once the data have been reviewed by administrators, the data can be uploaded to ACCSP for storage and accessed by other management agencies. Based on what we've learned and recommendations from NOAA, this system will enable better use of recreational data. If managers require reporting for the private vessel component of the recreational sector, the API should enable MyFishCount and other programs that meet the data standards to be used for reporting without having to design a whole new reporting program. If recreational reporting becomes mandatory, a regional or national database that is designed specifically for recreational fishing trips should be considered. This would allow a more streamlined experience for anglers, and easier use of data by managers on the back end. The massive number of reports in a mandatory system for recreational anglers should justify the consideration. Currently, there are less than 2,500 federal snapper grouper permit holders (charter and headboat 1,811 and commercial – 507 unlimited and 96 225 lb limited permits[3]) in the South Atlantic region. On the Florida west coast, where reef fish fishermen must sign up for a survey, there are 500,000 anglers that have signed up for the survey[4].

For other reporting programs, some agencies are considering developing a unique trip identifier so that all data for the trip can be linked together. MyFishCount creates this unique identifier for each trip. This could enable length and age samples collected by port samplers, effort information reported by the user, and compliance by enforcement to all be linked together. The trip identifier is supplied in the data transfer to ACCSP after administrative review, but a new protocol could be developed to allow quicker transfer of the trip identifier shortly after a trip is created. Two recent publications described how trip identifiers could be useful in developing estimates of reporting error and improving estimates from MRIP. Recently the South Carolina Department of Natural Resources published a paper on methods to develop trip comparisons with a logbook and survey framework (Dukes et al. 2015). Lui et al. (2017) and Williams (2018) developed methods to incorporate data from voluntary systems into a survey platform to improve the accuracy of catch estimates. Incorporating self-reported data into the survey essentially creates a mark recapture system to improve estimates of the survey based on intercepts of tagged trips (trip identifier). Vessel number and trip identifier variables in MyFishCount could be very useful in developing comparisons of catch with MRIP and incorporating reported data into MRIP. This would aid in validation and estimation of error and bias in self-reported data such as that provided by MyFishCount.

Angler reports not only could be used to improve MRIP, but they can also be used to improve management. They can aid in the SAFMC's understanding of trips taken by recreational fishermen and how different management actions would impact trips. Information from MyFishCount was used to describe departure city, target species, port type, day of week fishing, length of time to report, catch, measured fish, length and weight of fish, fishing location, release treatment, hook type, and hook location. Some of this information can be gathered from MRIP while other elements are only provided through angler-based reporting such as that used for MyFishCount.

The SAFMC staff worked with the Angler Action Foundation to develop a flexible reporting system that could be used in a voluntary reporting framework or a mandatory reporting framework based on the management alternatives included in Amendment 46 to the Fishery Management Plan for Snapper Grouper Species in the South Atlantic Region (as of August

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[3] https://www.fisheries.noaa.gov/southeast/frequent-freedom-information-act-requests-southeast-region, accessed 8/19/2019

[4] https://myfwc.com/research/saltwater/fishstats/gulf-reef-fish-survey/update/

2019). The SAFMC can use the information gathered in the MyFishCount pilot project to better evaluate the reporting alternatives. One of the important aspects the SAFMC will need to consider is cost of administration. The cost of MyFishCount ($356,210) was high for the number of reports that were received, but this should be expected whenever a new system is developed. The cost per report will steadily decrease over time as more anglers participate and more reports are provided. The costs included development of an app, database to maintain the data, development of an API to transfer the data, and outreach. All components were necessary to develop a successful program and could not have been done without the networking of Angler Action Foundation. Angler Action Foundation helped connect the outreach staff with important influencers in the recreational fishing community to get the word out about MyFishCount. The two web pages dedicated to the project were important to show the SAFMC's involvement and let fishermen better understand the goals and objectives. Without major modifications to MyFishCount, the reporting system could be maintained for less than $100,000; however, if additional outreach is needed or system modifications are needed, then costs would increase.

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APPENDIX A – EXAMPLE NEWS COVERAGE

FROM THE EDITOR

Insomniacs Anonymous

Jeff Weakley
EDITOR IN CHIEF

My wife has grown vaguely tolerant of a red-lamped cyclops lurching around the bedroom at 3 a.m. on Saturday morning, hunting flip flops, wallet and rain jacket.

She's accepting of the fact that, somewhere around 1 p.m., I'll hand a mackerel fillet to my cats and fall asleep on the glider.

She knows I'm useless on the weekend, but government scientists seems to think I have some mental capacity remaining. Okay, I'm trying.

On my limited Saturday afternoon to-do list, I've been logging trips on the South Atlantic Council's MyFishCount app.

First time I opened the app, I got lost. How many grunts did we catch? What kind? Spanish, French, white, what? Pictures? Of grunts? How many inches? Where was the hook, in the lip or throat? Hell, I don't know. I swiped the damn thing away and went back for my nap.

Monday morning, I had an email from a biologist in Charleston. Chip consoled me for not catching cobia (cobia? Oh yeah, our Fish Group 1 Target Species...), but he congratulated me for catching a few fish anyway. And could he help me finish the entry?

That woke me up.

Honestly: Skeptical as I sometimes am about government surveys, I'm giving Chip the benefit of the doubt. I think our fisheries management people need the best data they can get, and I'm willing to shuffle through. Will you come with me, fellow angler-insomniac?

See, the Marine Recreational Information Program, or MRIP, is the statistical device fishery managers use to estimate how many fish we're catching. It helps scientists make sensible (usually) limits. Also helps decision-makers see our stake in the allocation game.

The old MRIP has hit some bumps in the road. Used to be, guv'ment types would call your house now and then to ask questions like who's fishing, and how often. Nowadays, of course, no one answers their landlines. I have one. I can attest. We just let it ring.

In recent times, NOAA has sent out postal mailers—and they've found better rates of return. However: They're finding a startling increase in recreational trips. Are people actually fishing and catching more? Or is the survey catching more? The answers may have strange implications for stock assessments.

All this makes it all the more important that we help provide alternate models for the numbers-crunchers. So, bleary-eyed folks like me are swiping, typing and learning more about the process.

Just one request, Chip: Go easy on us. Make these apps intuitive and R-E-A-L-L-Y simple.

Ask our family members. At the end of our Saturday fishing trips, we're kind of a mess.

We're tired, Chip, but we want to help. FS

MyFishCount, voluntary reporting app from South Atlantic Fishery Council.

APPENDIX B – UNC SURVEY RESULTS

Survey of MyFishCount participants conducted by Erin Spencer, UNC Chapel Hill. The survey was done in two parts. One before the red snapper season in 2018 and one after the season. Methods of the survey can be reviewed here and results can be viewed here.

APPENDIX C – MYFISHCOUNT LINKS

Main MyFishCount Website and web portal

https://www.myfishcount.com/

SAFMC MyFishCount webpages for outreach

https://safmc.net/electronic-reporting-projects/myfishcount/

App Demonstration Videos

https://youtu.be/2CZKWf0Hic0

https://youtu.be/kYiRhJVOMtw

https://youtu.be/xaZy5ukjlDE

MyFishCount Reports

https://www.myfishcount.com/2017

https://www.myfishcount.com/2018S1

https://www.myfishcount.com/season2019

https://www.myfishcount.com/2018S3

Other reports

https://safmc.net/electronic-reporting-projects/myfishcount/

Shiny App

https://data.safmc.net/MyFishCount/

APPENDIX D – CODE TO ANALYZE MYFISHCOUNT DATA

Code is written in R

```
library(sp)
library(ggplot2)
library(scales)
library(MASS)
library(survey)
library(pscl)
library(lmtest)
library(Hmisc)
library(mgcv)
library(ggplot2)
library(maps)
library(mapdata)
library(maptools)
library(scales)
library(graphics)
library(rgdal)
library(sp)
library(raster)
library(rgeos)
library(shapefiles)
library(TeachingDemos)
library(xlsx)
library(ggplot2)
library(plyr)
library(mapproj)
library(rgdal)
library(RColorBrewer)
library(classInt)
library(XML)
library(gpclib)
library(dplyr)
library(gridExtra)
library(geosphere)
library(UScensus2010)
library(data.table)
library(dplyr)
library(reshape)
library(corrplot)
library(ggpubr)
library(lubridate)

######################  READ ME BEFORE ####################################################
## The figures created below are not in the same order as the paper.  Some code might need to be adjusted by adding or removing species, port type, etc.

####Before you start remove the () from the catch file and change the second status to Catch_Status (released or kept) remove spaces in title
### Change Red Snapper under species on the catch file to Snapper_Red.  This is a remenant from the 2017 piloting
```

###Remove all commas. They might be added by users in trip name or in comments of catch and trip. Commas will mess up analysis in R

```
	setwd("C:/Users/chip.SAFMC/Desktop/Completion Report for MFC")
	catch <- read.csv("Catch 06052019.csv")	#catch downloaded from MyFishCount (MFC) Admin Page
	trip <- read.csv("trip 06052019.csv")		#trip downloaded from MyFishCount Admin Page
	user <- read.csv("users 05302019.csv")  #users downloaded from MyFishCount Admin Page
	sedarlenwt <- read.csv("LifeHistoryforFPRAll.csv")  #This is a file built from SEDAR Docs
rslendata<-read.csv("red snapper length percents.csv")  #this was developed to combine MRIP and MFC
bsblendata<-read.csv("black sea bass length percents.csv")	#this was developed to combine MRIP and MFC
vslendata<-read.csv("vermilion snapper length percents.csv")  #this was developed to combine MRIP and MFC
	citylat<- read.csv("zip_codes_states coastal counties3.csv") #this was created to develop location for each city listed in MFC
#### Now we are off to prep the data sets.  I use dummy to create a dummy variable a bit in this code
	users<-cbind.data.frame(user, dummy=1)
	catch<-cbind.data.frame(catch, dummy=1)
	trip<-cbind.data.frame(trip, dummy=1)
	### #I'm sure there is a better way to set up date but here is my attempt
	trip$departdate <- as.Date(as.character(trip$DepartureDate), "%m/%d/%Y")
	trip$Year<-as.numeric(format(trip$departdate,'%Y'))
	trip$Month<-as.numeric(format(trip$departdate,'%m'))
	trip$arrivedate <- as.Date(as.character(trip$ArrivalDate), "%m/%d/%Y")
### This subsets trip based on date
	trip1<-subset(trip, departdate> "2017-11-02" & departdate<"2017-11-06")
	trip2<-subset(trip, departdate> "2017-11-09" & departdate<"2017-11-13")
	trip3<-subset(trip, departdate> "2017-12-07" & departdate<"2017-12-11")
	trip4<-subset(trip, departdate> "2018-08-09" & departdate<"2018-08-13")
	catch$departdate <- as.Date(as.character(catch$DepartureDate), "%m/%d/%Y")
	catch$arrivedate <- as.Date(as.character(catch$DepartureDate), "%m/%d/%Y")
	catch4<-aggregate(dummy ~ Type , catch, sum)
	trips4<-aggregate(dummy ~ Type , trip, sum)
	trips5<-aggregate(dummy ~ Status, trip, sum)
	trips6<-aggregate(dummy ~ Status + Type, trip, sum)
	trips7<-aggregate(dummy ~ Status + Year, trip, sum)
	catch4<- subset(catch, Length>=1 & Type=="Private")
	catch6<-aggregate(dummy ~ Species, catch4, sum)
## Setting up a filter based on species.  This only filters catch and does not filter trips
	#sedarlenwt<- subset(sedarlenwt, Species=="Red Snapper")  #This one is for the length weight comparison with sedar
	SpecInt <- "Snapper_Red"  #This is for all the other plots
	trip<-subset(trip, departdate> "2016-12-31" & departdate<"2019-01-01")
#Figure 5
	g2<-ggplot(trip, aes(Type))
	g2 + geom_bar(aes(fill=Status)) + labs(y="Number of Trips", x="Type of Trip")

	##Getting info for just private trips
	ptrip<-subset(trip, trip$Type=="Private")
##Not used
	g3<-ggplot(ptrip, aes(Year))
	g3 + geom_bar(aes(fill=Status)) + labs(y="Number of Trips", x="Year")

#Not used
	g4<-ggplot(ptrip, aes(Month))
	g4 + geom_bar(aes(fill=Status)) + labs(y="Number of Trips", x="Month") + facet_wrap(~State)
#Not used
	 g5<-ggplot(ptrip, aes(State))
```

```
 g5 + geom_bar(aes(fill=Status)) + labs(y="Number of Trips", x="State of Departure") +
facet_wrap(~Year) + theme(axis.text.x = element_text(angle=45))
#Figure 6
 numusers<-aggregate(dummy ~ Email + Status, ptrip, sum)
 g6<-ggplot(numusers, aes(dummy))
 g6 + geom_bar(aes(fill=Status)) + labs(y="Number of Users", x="Number of Trips Reported", cex=1.2) +
theme(strip.text.y = element_text(size=12, face="bold"))
 numusersyr<-aggregate(dummy ~ Email + Status + Year, ptrip, sum)
 g6<-ggplot(numusersyr, aes(dummy))
 g6 + geom_bar(aes(fill=Status)) + labs(y="Number of Users", x="Number of Trips Reported") +
facet_wrap(~Year)


## Creates sample numbers to be added into plots below this needs to be changed for each plot because x and y can
change

 sumlenplrs <- aggregate(TotNum ~ Type + Year, rslendata, sum)
 dat_textrs1 <- data.frame(
 ForkLength=30,
 PerFish=17,
 lab = c(paste0("N = ",sumlenplrs[1,3]), paste0("N = ",sumlenplrs[4,3]), paste0("N = ",sumlenplrs[3,3]),
   paste0("N = ",sumlenplrs[3,3]),paste0("N = ",sumlenplrs[5,3]), paste0("N = ",sumlenplrs[8,3]),
   paste0("N = ",sumlenplrs[7,3]), paste0("N = ",sumlenplrs[7,3])),
 Type=rep(c("MFC Lengths", "MRIP Measured", "MRIP Lengths", "MRIP Expanded"), 2),
 Year=rep(c(2017, 2018), each=4))

 sumlenplbsb <- aggregate(TotNum ~ Type, bsblendata, sum)
 dat_textbsb1 <- data.frame(
 ForkLength=17,
 PerFish = 20,
 label = c(paste0("N = ",sumlenplbsb[1,2]), paste0("N = ",sumlenplbsb[4,2]), paste0("N =
",sumlenplbsb[3,2]), paste0("N = ",sumlenplbsb[3,2])),
 Type= c("MFC Lengths", "MRIP Measured", "MRIP Lengths", "MRIP Expanded")
   )


 sumlenplvs <- aggregate(TotNum ~ Type, vslendata, sum)
 dat_textvs1 <- data.frame(
 ForkLength=17,
 PerFish = 20,
 label = c(paste0("N = ",sumlenplvs[1,2]), paste0("N = ",sumlenplvs[4,2]), paste0("N = ",sumlenplvs[3,2]),
paste0("N = ",sumlenplvs[3,2])),
 Type= c("MFC Lengths", "MRIP Measured", "MRIP Lengths", "MRIP Expanded")
   )

##Percent Comps for MRIP and MFC
#Figures 13 to 14
 rslenplot<- ggplot(transform(rslendata, Type=factor(Type, levels=c("MFC Lengths", "MRIP Measured",
"MRIP Lengths", "MRIP Expanded"))))
 r2<- rslenplot + geom_bar(aes(x=ForkLength, y=PerFish), stat='identity') + labs(y="Percent of Fish",
x="Red Snapper Fork Length (in)") + facet_grid(Type~Year)
 r2 + geom_text(data = dat_textrs1, aes(x=33, y=18, label = lab))

 bsblenplot<- ggplot(transform(bsblendata, Type=factor(Type, levels=c("MFC Lengths", "MRIP
Measured", "MRIP Lengths", "MRIP Expanded"))))
```

```
    bsblenplot + geom_bar(aes(x=ForkLength, y=PerFish), stat='identity') + labs(y="Percent of Fish",
x="Black Sea Bass Total Length (in)") + facet_wrap(Type~., ncol=1) +
        geom_text(data=dat_textbsb1, aes(x=17, y=25, label= label))

    vslenplot<- ggplot(transform(vslendata, Type=factor(Type, levels=c("MFC Lengths", "MRIP Measured",
"MRIP Lengths", "MRIP Expanded"))))
    vslenplot + geom_bar(aes(x=ForkLength, y=PerFish), stat='identity') + labs(y="Percent of Fish",
x="Vermilion Snapper Fork Length (in)") + facet_wrap(Type~., ncol=1) +
        geom_text(data=dat_textvs1, aes(x=17, y=25, label= label))


##Sampled Number for MRIP and MFC
## Not used
    dat_textrs2 <- data.frame(
    ForkLength=30,
    TotNum=17,
    lab = c(paste0("N = ",sumlenplrs[1,3]), paste0("N = ",sumlenplrs[3,3]), paste0("N = ",sumlenplrs[5,3]),
paste0("N = ",sumlenplrs[7,3])),
    Type=rep(c("MFC Lengths", "MRIP Lengths"), 2),
    Year=rep(c(2017, 2018), each=2))

    dat_textbsb2 <- data.frame(
    ForkLength=17,
    TotNum = 20,
    label = c(paste0("N = ",sumlenplbsb[1,2]), paste0("N = ",sumlenplbsb[3,2])),
    Type= c("MFC Lengths", "MRIP Lengths")
    )

    samlenrs<-subset(rslendata, Type %in% c("MFC Lengths", "MRIP Lengths"))
    rssamplot<- ggplot(transform(samlenrs, Type=factor(Type, levels=c("MFC Lengths", "MRIP Lengths"))))
    rssamplot + geom_bar(aes(x=ForkLength, y=TotNum), stat='identity') + labs(y="Number of Fish", x="Red
Snapper Fork Length (in)") + facet_grid(Type~Year) +
        geom_text(data = dat_textrs2, aes(x=33, y=18, label = lab))

    samlenbsb<-subset(bsblendata, Type %in% c("MFC Lengths", "MRIP Lengths"))
    bsbsamplot<- ggplot(transform(samlenbsb, Type=factor(Type, levels=c("MFC Lengths", "MRIP
Lengths"))))
    bsbsamplot + geom_bar(aes(x=ForkLength, y=TotNum), stat='identity') + labs(y="Number of Fish",
x="Black Sea Bass Total Length (in)") + facet_wrap(Type~., ncol=1) +
        geom_text(data=dat_textbsb2, aes(x=17, y=25, label= label))


    ##Released vs Kept
    rvklenrs<-cbind.data.frame(catch, Year=as.numeric(format(catch$departdate,'%Y')), yummy=1)
    rvklenrs<-subset(rvklenrs, Species =="Snapper_Red" & Length>=2 & Year %in% c(2017, 2018))
    sumyumrs <- aggregate(yummy ~ Catch_Status + Year, rvklenrs, sum)
    dat_textrs <- data.frame(
    forkin=30,
    yummy=20,
    fut1= c("Kept", "Released"),
    lab = c(paste0("N = ",sumyumrs[1,3]), paste0("N = ",sumyumrs[2,3]), paste0("N = ",sumyumrs[3,3]),
paste0("N = ",sumyumrs[4,3])),
    Catch_Status   = rep(c("Kept", "Released"),2),
    Year=rep(c(2017, 2018), each=2))

    rvklenrs$totalmm<-rvklenrs$Length*25.4539
```

```
	rvklenrs$forkmm<-rvklenrs$totalmm*.95-1.03
	rvklenrs$forkin<-round(rvklenrs$forkmm/25.4539,0)
	rsrvkplot<- ggplot(rvklenrs, aes(forkin, yummy))
	rsrvkplot + geom_bar(stat='identity') + labs(y="Number of Fish", x="Red Snapper Fork Length (in)") + 
facet_grid(Catch_Status ~ Year) +
		geom_text(data = dat_textrs, aes(label = lab))

	rsrvkplot2<- ggplot(rvklenrs, aes(forkin, yummy, fill=ReleaseReason))
	rsrvkplot3<- rsrvkplot2 + geom_bar(stat='identity') + labs(y="Number of Fish", x="Red Snapper Fork 
Length (in)") + facet_grid(Catch_Status ~ Year)
	rsrvkplot3 + geom_text(data = dat_textrs, aes(x=30, y=17, label = lab, color=fut1), inherit.aes=FALSE, 
show.legend=FALSE) + scale_color_manual(values=c("black", "black"))


	rvklenbsb<-cbind.data.frame(catch, Year=as.numeric(format(catch$departdate,'%Y')), yummy=1)
	rvklenbsb<-subset(rvklenbsb, Species =="Sea Bass_Black" & Length>=2 & Year ==2018)
	sumyum <- aggregate(yummy ~ Catch_Status, rvklenbsb, sum)
	dat_text <- data.frame(
	futu= c("black", "black"),
	 label = c(paste0("N = ",sumyum[1,2]), paste0("N = ",sumyum[2,2])),
	Catch_Status   = c("Kept", "Released")
		)
	rvklenbsb$forkin<-round(rvklenbsb$Length,0)
	bsbrvkplot<- ggplot(rvklenbsb, aes(forkin, yummy))
	bsbrvkplot + geom_bar(stat='identity') + labs(y="Number of Fish", x="Black Sea Bass Length (in)") + 
facet_wrap(.~Catch_Status, ncol=1) +
		geom_text(data = dat_text,  mapping = aes(x = 19, y = 10, label = label))

	bsbrvkplotrea<- ggplot(rvklenbsb, aes(forkin, yummy, fill=ReleaseReason))
	p2<- bsbrvkplotrea + geom_bar(stat='identity') + labs(y="Number of Fish", x="Black Sea Bass Length 
(in)") + facet_wrap(.~Catch_Status, ncol=1)
	p2 + geom_text(data=dat_text, aes(x=17, y=12, label= c("N = 23", "N = 36"), colour= futu), inherit.aes = 
FALSE, show.legend=FALSE) + scale_color_manual(values=c("black", "black"))

		#write.csv(rvklenbsb, "bsb routput.csv")

## Count number of users
	users1 <- sum(user$dummy)
	trippers1 <- sum(trip$dummy)


##Removes any trip/catch listed as active
	trip<-cbind.data.frame(trip, status1=ifelse(trip$Status=="Active", 3, 1), typetest=ifelse(trip$Type=="Test", 
3, 1))
	trip<-subset(trip, status1==1)
	trip<-subset(trip, typetest==1)

	catch<-cbind.data.frame(catch, status1=ifelse(catch$Status=="Active", 3, 1), 
typetest=ifelse(catch$Type=="Test", 3, 1))
	catch<-subset(catch, status1==1)
	catch<-subset(catch, typetest==1)
	catch$ReleaseReason<-sub("^$", "Not Listed", catch$ReleaseReason)


###Easiest way to get hours away from dock is to use excel. because the code below does not fix the problem with 
the date.
```

```
        #trip$arrival_datetime[trip$arrival_datetime =="0000-00-00 00:00:00"] <- "01/01/2001 01:01:01"
        #trip$hours_out <- trip$depart_datetime - trip$arrival_datetime

# I know this is a redo, but it was already there.
        trip$departdate <- as.Date(as.character(trip$DepartureDate), "%m/%d/%Y")
        trip$arrivedate <- as.Date(as.character(trip$ArrivalDate), "%m/%d/%Y")
        trip1<-subset(trip, departdate> "2017-11-02" & departdate<"2017-11-06")
        trip2<-subset(trip, departdate> "2017-11-09" & departdate<"2017-11-13")
        trip3<-subset(trip, departdate> "2017-12-07" & departdate<"2017-12-11")
        trip4<-subset(trip, departdate> "2018-08-09" & departdate<"2018-08-13")
        trip5<-subset(trip, departdate> "2016-12-31" & departdate<"2019-01-01")
        trip5$year <- as.numeric(format(trip5$departdate, '%Y'))
        trip5$month <- as.numeric(format(trip5$departdate, '%m'))
        catch$departdate <- as.Date(as.character(catch$DepartureDate), "%m/%d/%Y")
        catch$arrivedate <- as.Date(as.character(catch$DepartureDate), "%m/%d/%Y")
        catch1<-subset(catch, departdate> "2017-11-02" & departdate<"2017-11-06")
        catch2<-subset(catch, departdate> "2017-11-09" & departdate<"2017-11-13")
        catch3<-subset(catch, departdate> "2017-12-07" & departdate<"2017-12-11")
        catch4<-subset(catch, departdate> "2018-08-09" & departdate<"2018-08-13")
        catch5<-subset(catch, departdate> "2016-12-31" & departdate< "2019-01-01")

##Use below to subset to time period selected
        trip<-trip5
        catch<-catch5
        #trip<- rbind.data.frame(trip1, trip2, trip3)
        #catch<-rbind.data.frame(catch1, catch2, catch3)
        #trip<- rbind.data.frame(trip2, trip3)
        #catch<-rbind.data.frame(catch2, catch3)

checktrip<-cbind.data.frame(trip$AuthorizationNumber, trip$departdate, trip$LastName, trip$Status)
checkcatch<-cbind.data.frame(catch$AuthorizationNumber, catch$departdate, catch$LastName)

###If you want to subset, rename either trip1 or trip2 to trip.  Do the same for catch

###Check summary for odd values (ie - dates are out of the range, lengths don't make sense, number caught way too
high)
        summary(trip)
        summary(catch)
        sum(trip$dummy)
###this should be used to determine number of anglers.  I used email address but may want to look for individual
angler number

### right now this is set up to look at number of email addresses.  Change this variable for number if needed
#summary(anglers)
        anglers4<-cbind.data.frame(dummy=1, trip)
        anglers4<-cbind.data.frame(aggregate(dummy ~ Type + State + Email + Year, anglers4, sum),darn=1)
        anglers6<-aggregate(darn ~ State + Year + Type, anglers4, sum)
        anglers6<-cbind.data.frame(State=anglers6$State, Type=anglers6$Type, Anglers=anglers6$darn,
Year=anglers6$Year)
        anglers6


###this is number of trips reporting
        trippers<-cbind.data.frame(trip, dummy=1)
        trippers1 <- sum(trippers$dummy)
```

```
	trippers1
	trippers4<-aggregate(dummy ~ Year + Type + State, trippers, sum)
	trippers4
	camerontable<-trippers4
	camerontable<-merge(anglers6, trippers4, by=c("State", "Year", "Type"))

	camerontable2<- cbind.data.frame(State=camerontable$State, Type= camerontable$Type, Year=
camerontable$Year, Fishermen=camerontable$Anglers, Reports=camerontable$dummy)
	camerontable2

	newmerge <-cbind.data.frame(merge(trip, catch, by="AuthorizationNumber", all=TRUE), dummy=1)
	rednewmerge<-subset(newmerge, Species==SpecInt)
	rednewmerge1<-cbind.data.frame(aggregate(dummy ~ State.x + AuthorizationNumber, rednewmerge,
sum), added=1)
	redmerge<-aggregate(added~ State.x, rednewmerge1, sum)

	newmerge1 <-cbind.data.frame(aggregate(dummy ~ State.x + AuthorizationNumber + Target1, newmerge,
sum), adder=1)
	newmerge2 <- aggregate(adder ~ State.x + Target1, newmerge1, sum)

	tripreports <- aggregate(dummy ~ Year + Type.x, newmerge, sum)
	tripreports
	compreports <- subset(newmerge, Catch_Status %in% c("Kept", "Released", "No Catch"))
	compreports2<- aggregate(dummy ~ Year + Type.x, compreports, sum)
	compreports2
	comreports4<-newmerge %>% distinct(AuthorizationNumber, .keep_all= TRUE)
	compreport6<- aggregate(dummy ~ Year + Type.x, comreports4, sum)
	compreport6

#This does number of trips abandoned vs completed.

	abandon<-trippers

	abandon2<-cbind.data.frame(abandon, Completed=ifelse(abandon$Status=="Completed", "Completed",
"Abandoned"))
	abansum<-aggregate(dummy ~ State + Year, abandon2, sum)
	abandon3<-aggregate(dummy~ Completed + State + Year, abandon2, sum)
	abandon4<-merge(abansum, abandon3, by=c("State", "Year"))
	abandon4$percompleted <- percent(abandon4$dummy.y/abandon4$dummy.x)
	abanper<-cbind.data.frame(State=abandon4$State, Count=abandon4$dummy.y,
Trip=abandon4$Completed, Percent=abandon4$percompleted)
		dklsa<-subset(abandon, Status=="Completed")
		dklas<-cbind.data.frame(dklsa$AuthorizationNumber, dklsa$LastName, dklsa$departdate)

#This does trip type
	triptip<- cbind.data.frame(trippers, TripType=ifelse(trippers$Type=="Private", "Private",
"Charter/Headboat"))
	sumtype<-sum(triptip$dummy)
	tripsum<-aggregate(dummy~ TripType, triptip, sum)
	tripper<-cbind.data.frame(Trip_Type=tripsum$TripType, Percent=percent(tripsum$dummy/sumtype))

#This will do port type
# Figure 8
	porttype<- subset(trip, ReportingMethod=="Vessel" & Status=="Completed" & Type=="Private")
```

```
porttype2<- porttype  %>% group_by(PortType, NoofAnglers) %>% tally(wt=dummy, name="Anglers by Port")
cast(porttype2, PortType ~ NoofAnglers)

porttype1<- cbind.data.frame(Ported=ifelse(porttype$PortType %in% c("Private Dock", "Private Marina"), "Private", ifelse(porttype$PortType %in% c("Public Boat Ramp",
        "Public Dock", "Public Marina"), "Public", "Other")),
NoAnglers=ifelse(porttype$NoofAnglers<=2, 2, ifelse(porttype$NoofAnglers>=6, 6, porttype$NoofAnglers)))

porttype4<- porttype1  %>% group_by(Ported, NoAnglers) %>% tally(name="Anglers by Port")
porttype5<-subset(porttype4, Ported %in% c("Public", "Private") & NoAnglers<=6)
anglerstest<- chisq.test(cast(porttype5,  NoAnglers ~ Ported))
anglerstest
corrplot(anglerstest$residuals, is.cor = FALSE)

###Hours are a continuous variable so an anova was used

#figure not used
hoursdock <-subset(trip, Status=="Completed" & Type=="Private" & HoursFished>0)
hoursdock$Port<-ifelse(hoursdock$PortType %in% c("Private Dock", "Private Marina"), "Private", ifelse(hoursdock$PortType %in% c("Public Boat Ramp",
        "Public Dock", "Public Marina"), "Public", "Other"))
hoursdock$away<-ifelse(hoursdock$HoursFished>=11, 11, hoursdock$HoursFished)
hoursdock$Reporting<- ifelse(hoursdock$ReportingMethod =="Vessel", "Vessel", ifelse(hoursdock$ReportingMethod=="Individual", "Individual","Unknown"))
hoursdock2<-subset(hoursdock, Port %in% c("Private", "Public") )
ggboxplot(hoursdock2, x="Reporting", y="away")

res.aov <- aov(away ~ Reporting + Port + Reporting*Port, data=hoursdock2)
summary(res.aov)
TukeyHSD(res.aov, which="Reporting")
hoursdock3<- hoursdock2 %>% group_by(Reporting, Port) %>% tally(wt=dummy, name="hours by port")

tripfor <-subset(trip, Status=="Completed" & Type=="Private")
tripfor$tspeciesgroup <- ifelse(tripfor$Target1 %in% c("Black Sea Bass", "Bottomfish", "Grouper", "Red Snapper", "Snapper"), "Snapper/Grouper",
ifelse(tripfor$Target1 %in% c("Red Drum/Spotted Sea Trout", "Flounder", "Panfish"), "Inshore Species",
ifelse(tripfor$Target1 %in% c("Cobia", "Mackerel"), "Coastal Pelagics",
ifelse(tripfor$Target1 %in% c("Billfish", "Dolphin/Wahoo"), "Offshore Pelagics", "Other"))))

tripfor$Port<-ifelse(tripfor$PortType %in% c("Private Dock", "Private Marina"), "Private", ifelse(tripfor$PortType %in% c("Public Boat Ramp",
        "Public Dock", "Public Marina"), "Public", "Other"))

tripfor <- subset(tripfor, HoursFished>0 & HoursFished<24)
tripfor$away<-ifelse(tripfor$HoursFished>=11, 11, tripfor$HoursFished)
res.aov2 <- aov(away ~ tspeciesgroup + ReportingMethod + tspeciesgroup*ReportingMethod, data=tripfor)
summary(res.aov2)
#Figure 10
porttype$tspeciesgroup <- ifelse(porttype$Target1 %in% c("Black Sea Bass", "Bottomfish", "Grouper", "Red Snapper", "Snapper"), "Snapper/Grouper",
ifelse(porttype$Target1 %in% c("Red Drum/Spotted Sea Trout", "Flounder", "Panfish"), "Inshore Species",
ifelse(porttype$Target1 %in% c("Cobia", "Mackerel"), "Coastal Pelagics",
ifelse(porttype$Target1 %in% c("Billfish", "Dolphin/Wahoo"), "Offshore Pelagics", "Other"))))
porttype$Ported<-ifelse(porttype$PortType %in% c("Private Dock", "Private Marina"), "Private", ifelse(porttype$PortType %in% c("Public Boat Ramp",
```

```
                              "Public Dock", "Public Marina"), "Public", "Other"))

        tripfor4<- porttype  %>% group_by(Ported, tspeciesgroup) %>% tally(name="Trips by target port")
        tripfor5<-subset(tripfor4, Ported %in% c("Public", "Private"))
        anglerstest2<- chisq.test(cast(subset(tripfor5, !tspeciesgroup=="Coastal Pelagics"),  Ported ~
tspeciesgroup))
        anglerstest2
        corrplot(anglerstest2$residuals, is.cor = FALSE)


#Figure 9

        hoursaway <- subset(porttype, !X.HooksinWater=="")
        hoursaway2<- hoursaway  %>% group_by(PortType, X.HooksinWater) %>% tally(wt=dummy,
name="Effort by Port")
        cast(hoursaway2, PortType ~ X.HooksinWater)
        hoursaway1<- cbind.data.frame(Ported=ifelse(hoursaway$PortType %in% c("Private Dock", "Private
Marina"), "Private", ifelse(hoursaway$PortType %in% c("Public Boat Ramp",
                              "Public Dock", "Public Marina"), "Public", "Other")),
HooksFished=hoursaway$X.HooksinWater)

        hoursaway4<- hoursaway1  %>% group_by(Ported, HooksFished) %>% tally(name="Effort")
        hoursaway4$Effort[is.na(hoursaway4$Effort)] <- 0
        hoursaway5<-subset(hoursaway4, Ported %in% c("Public", "Private") & !HooksFished %in% "91-100%")

        efforttest<- chisq.test(cast(hoursaway5, Ported ~ HooksFished))
        efforttest
        corrplot(efforttest$residuals, is.cor = FALSE)

        dayfished<- subset(trip, Type=="Private")
        dayfished$day<-weekdays(as.Date(dayfished$departdate))

        dayfished4<- dayfished  %>% group_by(Status, Year, day) %>% tally(name="Days Reported")

## Time to report
# Table 13
        trip$minutesreporting<-difftime(mdy_hm(trip$LastUpdated), mdy_hm(trip$DateCreated), units="mins")
        reporttime<-subset(trip, Status %in% c("Completed", "Abandoned") & Type == "Private")
        reporttime$bigminutes <- round(reporttime$minutesreporting/10)
        reporttime$roundtime<-ifelse(reporttime$minutesreporting>=600, 600,
ifelse(reporttime$minutesreporting>=10, floor(reporttime$minutesreporting/10)*10+5,
reporttime$minutesreporting))
        reporttrip<- reporttime %>% group_by(Status, roundtime) %>% tally(name="MinutesReporting")
        write.csv(reporttrip, "timer2.csv")
##Number of fish per trip
        remerge<- merge(trip, catch, by.x = "ID", by.y= "TripID", all.x=TRUE)
        fishtrip<- subset(remerge, Status.x=="Completed" & Type.x=="Private")
        fishtrip$anglers<-ifelse(fishtrip$NoofAnglers>=1, fishtrip$NoofAnglers, 1)
        fishtrip$anglers[is.na(fishtrip$anglers)] <-1
        fishtrip$Species[is.na(fishtrip$Species)] <- "No Catch"
        fishtrip3<- fishtrip  %>% group_by(ID, anglers, ReportingMethod, Target1, Year, Species) %>%
tally(name="RemoveNos")
        fishtrip3$RemoveNos[(fishtrip3$Species=="No Catch")] <- 0
        fishtrip3<-subset(fishtrip3, Species %in% "Snapper_Red")
        fishtrip1<- fishtrip3 %>% group_by(ID, anglers, ReportingMethod, Target1, Year) %>%
tally(wt=RemoveNos, name="FishperTrip")
```

```
fishtrip1$FishperTrip[is.na(fishtrip1$FishperTrip)]<- 0
fishtrip1$cpu <- fishtrip1$FishperTrip/fishtrip1$anglers
kepttrip<- subset(fishtrip, Catch_Status=="Kept" & Species %in% "Snapper_Red")
kepttrip$dummy <-1
kepttrip1<- kepttrip  %>% group_by(ID, anglers) %>% tally(wt=dummy, name="KeptperTrip")
kepttrip1$KeptperTrip[is.na(kepttrip1$KeptperTrip)]<-0

#Figures 16 to 19.  Need to adjust if restricting to species
cpumerge<-merge(fishtrip1, kepttrip1, by=c("ID", "anglers"), all.x=TRUE)
cpumerge$KeptperTrip[is.na(cpumerge$KeptperTrip)]<-0
cpumerge$kpu<-cpumerge$KeptperTrip/cpumerge$anglers

snapcpumerge<- subset(cpumerge, Target1=="Red Snapper")
write.csv(snapcpumerge, "rs numcaught.csv")
snapcpumerge$dummy<-1
snapcpumerge$rcpu <-factor(ifelse(snapcpumerge$cpu==0,0, ifelse(snapcpumerge$cpu<0.5,
0.25,ifelse(snapcpumerge$cpu<1, 0.75, ifelse(snapcpumerge$cpu<2, 1,
ifelse(snapcpumerge$cpu<3, 2, ifelse(snapcpumerge$cpu<4, 3, ifelse(snapcpumerge$cpu<5, 4,
ifelse(snapcpumerge$cpu<6, 5, 6)))))))))
snancpu <-ggplot(snapcpumerge, aes(factor(rcpu, levels=c("0", "0.25", "0.75", "1", "2", "3", "4", "5","6")),
dummy))
cpu <- snancpu + geom_bar(stat='identity') + scale_x_discrete("Number of Fish Caught Per Angler",
drop=FALSE, labels=c("0", "0.25", "0.75", "1", "2", "3", "4", "5",">6")) +labs(y="Number of Trips") +
facet_wrap(Year ~ ReportingMethod)


snapcpumerge$rkpu <-ifelse(snapcpumerge$kpu==0,0, ifelse(snapcpumerge$kpu<0.5,
0.25,ifelse(snapcpumerge$kpu<1, 0.75, ifelse(snapcpumerge$kpu<2, 1,
ifelse(snapcpumerge$kpu<3, 2, ifelse(snapcpumerge$kpu<4, 3, ifelse(snapcpumerge$kpu<5, 4,
ifelse(snapcpumerge$kpu<6, 5, 6))))))))
snancpu2 <-ggplot(snapcpumerge, aes(as.factor(rkpu), dummy))
cpu2 <- snancpu2 + geom_bar(stat='identity') + scale_x_discrete("Number of Fish Kept Per Angler",
drop=FALSE, labels=c("0.0", "0.25", "0.75", "1", "2", "3", "4", "5",">6")) +labs(y="Number of Trips") +
facet_wrap(Year ~ ReportingMethod)
cpu
cpu2


#Table 15
fishmeasured<- subset(remerge, Status.x=="Completed" & Type.x=="Private" & Length >=2)
fishmeasured1<-fishmeasured  %>% group_by(Year, Species, Catch_Status) %>%
tally(name="Measured")
fishmeasured1


##Number of Fish Reported
#Table 15
table(fishtrip$Species, fishtrip$Catch_Status, fishtrip$Year)

## plot length distribution for all fish

#Figure 11
somespecieslengths<- subset(fishmeasured, Species %in% c("Snapper_Red", "Snapper_Vermilion", "Sea
Bass_Black", "Triggerfish_Gray", "Grouper_Gag", "Grunt_White",
"Mackerel_King", "Snapper_Gray")  & Length <=60)
```

```
	somespecieslengths$Species_names <-ifelse(somespecieslengths$Species=="Snapper_Red","Red
Snapper",
						ifelse(somespecieslengths$Species=="Snapper_Vermilion", "Vermilion
Snapper",
						ifelse(somespecieslengths$Species=="Sea Bass_Black", "Black Sea Bass",
						ifelse(somespecieslengths$Species=="Triggerfish_Gray", "Gray Triggerfish",
						ifelse(somespecieslengths$Species=="Grouper_Gag", "Gag Grouper",
						ifelse(somespecieslengths$Species=="Grunt_White", "White Grunt",
						ifelse(somespecieslengths$Species=="Snapper_Gray", "Gray Snapper",
						"King Mackerel")))))))

	somespecieslengths$Species_names_f <- factor(somespecieslengths$Species_names, levels=c("Black Sea
Bass","Gag Grouper", "Gray Snapper", "Gray Triggerfish",
							"King Mackerel", "Red Snapper", "Vermilion Snapper", "White
Grunt"))

	lengthplotsbyspecies <- ggplot(somespecieslengths, aes(x=Length, y=dummy.x, fill=Catch_Status))+
geom_bar(stat='identity') +
			facet_wrap(Species_names_f ~ ., ncol=2, scales="free_y") +labs(x="Length (inches)",
y="Number of Fish Measured")

#somespecieslengths<- subset(fishmeasured, Species %in% c("Red Snapper", "Vermilion Snapper", "Black Sea
Bass", "Gray Triggerfish", "Gag Grouper", "White Grunt", "Gray Snapper"))
#This looks at what info the fishermen supplied

	totsmagoat<- newmerge %>% group_by(Year) %>% tally(wt=dummy, name="TotalReported")
	totcom<- subset(newmerge, Status.x==("Completed") & Type.x %in% "Private")
	totcomnos<- totcom %>% group_by(Year) %>% tally(wt=dummy, name="TotalCompleted")
	latfill<-subset(newmerge, Latitude.y>=5 & Type.x %in% "Private")
	latfillnos <- latfill %>% group_by(Year) %>% tally(wt = dummy, name="Location")

	depthn <- subset(newmerge, Depth %in% c(">500", "0-30", "31-60", "61-90", "91-120", "121-150", "151-
300", "301-500") & Type.x %in% "Private")
	#depthn <- subset(newmerge, Year == 2018 & Depth %in% "301-500")
	depthnos<- depthn %>% group_by(Year) %>% tally(wt = dummy, name="Other")
	depthnos1<- cbind.data.frame(Year=2017, Other=0)
	depthnos<- rbind.data.frame(depthnos1, depthnos)
	lenn <- subset(newmerge, Length>=2 & Type.x %in% "Private")
	lennos <- lenn %>% group_by(Year) %>% tally(wt = dummy, name="Length")
	weightn<- subset(newmerge, Weight>=0.01 & Type.x %in% "Private")
	weightnos <- weightn %>% group_by(Year) %>% tally(wt = dummy, name="Weight")

	hookloc <- subset(newmerge, HookedAt %in% c("Body", "Eyes", "Gill", "Jaw", "Throat") & Type.x %in%
"Private")
	hooklocnos <- hookloc %>% group_by(Year) %>% tally(wt = dummy, name="Hook.Location")
	hooktypen <- subset(newmerge, HookedType %in% c("Artificial Bait", "Non-offset J-Hook", "Non-offset
Circle Hook", "Offset Circle Hook", "Offset J-Hook", "Other") & Type.x %in% "Private")
	hooktypenos <- hooktypen %>% group_by(Year) %>% tally(wt = dummy, name="Hook.Type")
	releasetreat <- subset(newmerge, ReleaseTreatment %in% c("Vented", "Descended", "Not Treated",
"Other") & Type.x %in% "Private")
	releasetreatnos <- releasetreat %>% group_by(Year) %>% tally(wt = dummy, name="Release.Treatment")
	releasereason <- subset(newmerge, ReleaseReason %in% c("Too Small", "Too Big", "Not Desired", "Over
Bag Limit", "Other") & Type.x %in% "Private")
	releasereasonnos <- releasereason %>% group_by(Year) %>% tally(wt = dummy,
name="Release.Reason")
```

```
	filleddata<- cbind.data.frame(totsmagoat, "Total Completed" = totcomnos$TotalCompleted, latfillnos$Location, Depth= depthnos$Other,
				lennos$Length, weightnos$Weight, "Hook Location"= hooklocnos$Hook.Location, "Hook Type" = hooktypenos$Hook.Type,
			"Release Treatment"=releasetreatnos$Release.Treatment, "Release Reason"= releasereasonnos$Release.Reason)

###Prepping data for future use
	avglencat<- cbind.data.frame(catch, dummy=1)   #need to figure out what the variable is
	totcatbystatedep<- aggregate(dummy ~ State, avglencat, sum)
	totcatbylat<-aggregate(dummy ~ floor(Latitude), avglencat, sum)  ###Need to check this to see how it works
	sumtot<-sum(avglencat$dummy)
	pertotlat<-cbind.data.frame(totcatbylat, sumtot)
	pertotlat<-cbind.data.frame(pertotlat, pertotlat$dummy/sumtot)  ###Check to see if variables are correct

###Number of red snapper kept and released
	rssumkept <- subset(avglencat,Catch_Status=="Kept" & Species==SpecInt)
	rssumkept <- sum(rssumkept$dummy)
	rssumrel1 <- subset(avglencat, Catch_Status=="Released" & Species==SpecInt)
	rssumrel <- sum(rssumrel1$dummy)

###this will be used to plot length for kept and released.  Two options - pie chart (lenplots) or bar chart (r7 + ......)  # Not used
	avglencat1 <- subset(avglencat, Length>=2)
	avglencat1 <- subset(avglencat1, Length<=50)
	avglencat1<- subset(avglencat1, Species==SpecInt)
	avglencat1<-cbind.data.frame(avglencat1, Length2=ifelse(avglencat1$Length>=30, "Greater than 30 inches", ifelse(avglencat1$Length>=20, "20 to 30 inches", "Less than 20 inches")))
	totcat<- sum(avglencat1$dummy)
	sumkept <- subset(avglencat1,Catch_Status=="Kept")
	sumkept <- sum(sumkept$dummy)
	sumrel1 <- subset(avglencat1, Catch_Status=="Released")
	sumrel <- sum(sumrel1$dummy)
	avgtotcat2<- aggregate(dummy ~ Catch_Status, avglencat1, sum)
	avglencat2 <- cbind.data.frame(totcat, aggregate(dummy ~ Length + Catch_Status, avglencat1, sum))
	avglencat2 <- cbind.data.frame(avglencat2, pertot=100*avglencat2$dummy/avglencat2$totcat, cattot=ifelse(avglencat2$Catch_Status=="Kept", sumkept, sumrel))
	avglencat2 <- cbind.data.frame(avglencat2, percat=100*avglencat2$dummy/avglencat2$cattot)
	r7<- ggplot(avglencat2,aes(x=Length, y=percat)) + geom_histogram(stat='identity') + scale_y_continuous(labels = comma) + scale_fill_manual("Number Landed")
	r8<- r7 + facet_grid (Catch_Status~.) + labs(x="Total Length (Inches)", y= "Percent of Fish", cex=1.2) + theme(strip.text.y = element_text(size=12, face="bold"))
	r8

###This adds reason for release to the length plots  #Not used
	avglencat20 <- subset(avglencat, Length>=2)
	avglencat20 <- subset(avglencat20, Length<=50)
	avglencat20<- subset(avglencat20, Species==SpecInt)
	avglencat20<-cbind.data.frame(avglencat20, Length2=ifelse(avglencat20$Length>=30, "Greater than 30 inches", ifelse(avglencat20$Length>=20, "20 to 30 inches", "Less than 20 inches")))
	totcat20<- sum(avglencat20$dummy)
	sumkept20 <- subset(avglencat20,Catch_Status=="Kept")
	sumkept20 <- sum(sumkept20$dummy)
	sumrel20 <- subset(avglencat20, Catch_Status=="Released")
```

```
	sumrel20 <- sum(sumrel20$dummy)
	avgtotcat21<- aggregate(dummy ~ Catch_Status + ReleaseReason, avglencat20, sum)
	avglencat21 <- cbind.data.frame(totcat20, aggregate(dummy ~ Length + Catch_Status + ReleaseReason, 
avglencat20, sum))
	avglencat21 <- cbind.data.frame(avglencat21, pertot20=100*avglencat21$dummy/avglencat21$totcat20, 
cattot20=ifelse(avglencat21$Catch_Status=="Kept", sumkept20, sumrel20))
	avglencat21 <- cbind.data.frame(avglencat21, percat20=100*avglencat21$dummy/avglencat21$cattot20)
	r70<- ggplot(avglencat21,aes(x=Length, y=percat20, fill=ReleaseReason)) + 
geom_histogram(stat='identity') + scale_y_continuous(labels = comma)
	r80<- r70 + facet_grid (Catch_Status~.) + labs(x="Total Length (Inches)", y= "Percent of Fish", cex=1.2) + 
theme(strip.text.y = element_text(size=12, face="bold"))
	r80


###This adds color code for fish with weight measurements  # Not used
	lencompare <- subset(avglencat, Length>=2 & Length<= 50 & Species==SpecInt)
	lencompare20<-cbind.data.frame(lencompare, Weighed=ifelse(lencompare$Weight>=0.5, "Weighed", 
"Not Weighed"))
	totlencomp20<- sum(lencompare20$dummy)
	sumkeptcomp <- subset(lencompare20,Catch_Status=="Kept")
	sumkeptcomp <- sum(sumkeptcomp$dummy)
	sumrelcomp <- subset(lencompare20, Catch_Status=="Released")
	sumrelcomp <- sum(sumrelcomp$dummy)
	lencompare21<- aggregate(dummy ~ Catch_Status + Weighed, lencompare20, sum)
	lencompare21 <- cbind.data.frame(totlencomp20, aggregate(dummy ~ Length + Catch_Status + Weighed, 
lencompare20, sum))
	lencompare21 <- cbind.data.frame(lencompare21, 
pertotcomp=100*lencompare21$dummy/lencompare21$totlencomp20, 
cattotcomp=ifelse(lencompare21$Catch_Status=="Kept", sumkeptcomp, sumrelcomp))
	lencompare21 <- cbind.data.frame(lencompare21, 
percatcomp=100*lencompare21$dummy/lencompare21$cattotcomp)
	r700<- ggplot(lencompare21,aes(x=Length, y=percatcomp, fill=Weighed)) + geom_bar(stat='identity', 
position="stack") + scale_y_continuous(labels = comma)
	r800<- r700 + facet_grid (Catch_Status~.) + labs(x="Total Length (Inches)", y= "Percent of Fish", 
cex=1.2) + theme(strip.text.y = element_text(size=12, face="bold"))
	r800

#### How about some pie charts # not used

	lenpie <- aggregate(dummy ~ Catch_Status + Length2, avglencat1, sum)
	pielen <- cbind.data.frame(lenpie, perlen=round(lenpie$dummy/(ifelse(lenpie$Catch_Status=="Kept", 
sumkept, sumrel)),2))
	pielenk<- subset(pielen, Catch_Status=="Kept")
	pielenk<- cbind.data.frame(pielenk, pos=1-(cumsum(pielenk$perlen)-pielenk$perlen/2))
	pielenr<- subset(pielen, Catch_Status=="Released")
	pielenr<- cbind.data.frame(pielenr,  pos=1-(cumsum(pielenr$perlen)-pielenr$perlen/2))
	pielen<- rbind.data.frame(pielenk, pielenr)

	bp<- ggplot(pielen, aes(x="", y=perlen, fill=Length2)) +
		geom_bar(width = 1, stat = "identity")
	pie <- bp + coord_polar("y")
	blank_theme <- theme_minimal()+
		theme(
		axis.title.x = element_blank(),
		axis.title.y = element_blank(),
		panel.border = element_blank(),
```

```
                    panel.grid=element_blank(),
                    axis.ticks = element_blank(),
                    plot.title=element_text(size=14, face="bold")
                              )

          lenplots<- pie + scale_fill_manual(name="Length Category",
                    limits=c("Less than 20 inches", "20 to 30 inches", "Greater than 30 inches"), values=c("#deebf7",
"#9ecae1", "#3182bd")) + blank_theme +
                    theme(axis.text.x=element_blank()) + facet_wrap(~Catch_Status) +
                    geom_text(aes(y=pos, label=paste0(percent(perlen),"(", dummy, ")")), size=4)


##This looks at the lenght and weight relationship.  Annotatee might need to move location as we get more data
# Figure 15
          lenwt<- subset(avglencat, Length>=2 & Species %in% c("Snapper_Red", "Sea Bass_Black",
"Snapper_Vermilion") & Weight>=0.1)

          lims <- (lenwt %>% group_by(Species)
                    %>% summarise(xmin=0, xmax=max(Length)))
          bfun <- function(limits) {
                    grp <-which(lims$xmin==limits[1] & lims$xmax==limits[2])
                    bb <-facet_bounds[grp,]
                    pp<- pretty(c(bb$xmin, bb$xmax), n=bb$breaks)
                    return(pp)
          }
          scales_x <-list(
                    to_string <- as_labeller(c('Snapper_Red' = "Red Snapper",
                    'Sea Bass_Black' = "Black Sea Bass", 'Snapper_Vermilion' = "Vermilion Snapper") ))


          lenwtmyfish<- cbind.data.frame(Length=lenwt$Length, Weight=lenwt$Weight, Source="MyFishCount")
          lenwtsedar<- cbind.data.frame(Length=sedarlenwt$Length, Weight=sedarlenwt$Weight,
Source="SEDAR")

          lenwtplot <- ggplot() + geom_point(data=lenwt, aes(x=Length, y=Weight)) + labs(x="Total Length
(inches)", y="Weight (pounds)", cex=1.2) +
                    facet_wrap(~Species, ncol=1, scales="free", labeller=to_string) + geom_line(data=sedarlenwt,
aes(x=Length, y=Weight), inherit.aes=FALSE)


###This plots the weight distribution for kept and released fish  # not used
          avgwtcat<-subset(avglencat, Species==SpecInt & Weight>=0.5)
          totwtcat<- sum(avgwtcat$dummy)
          sumwtkept <- subset(avgwtcat,Catch_Status=="Kept")
          sumwtkept <- sum(sumwtkept$dummy)
          sumwtrel1 <- subset(avgwtcat, Catch_Status=="Released")
          sumwtrel <- sum(sumwtrel1$dummy)
          avgwtcat2<- aggregate(dummy ~ Catch_Status, avgwtcat, sum)
          avgwtcat2 <- cbind.data.frame(totwtcat, aggregate(dummy ~ Weight + Catch_Status, avgwtcat, sum))
          avgwtcat2 <- cbind.data.frame(avgwtcat2, pertot=100*avgwtcat2$dummy/avgwtcat2$totwtcat,
catwttot=ifelse(avgwtcat2$Catch_Status=="Kept", sumwtkept, sumwtrel))
          avgwtcat2 <- cbind.data.frame(avgwtcat2, percat=100*avgwtcat2$dummy/avgwtcat2$catwttot)
          r10<-ggplot(avgwtcat2,aes(x=Weight, y=percat)) + geom_histogram(stat='identity') +
scale_y_continuous(labels = comma) + scale_fill_manual("Number Landed")
          r11<- r10 + facet_grid (Catch_Status~.) + labs(x="Weight (pounds)", y= "Percent of Fish", cex=1.2) +
theme(strip.text.y = element_text(size=12, face="bold"))
```

```
	r11


#Percent of fish using descending device
#Figure 22
	justreleased<- subset(rednewmerge, Catch_Status=="Released" & Type.x=="Private" & ReleaseTreatment
%in% c("Descending Device", "Descending Device and Vented",
					"Not treated", "Other", "Vented"))
	sumreleased<- sum(justreleased$dummy)
	releasetreat <-cbind.data.frame(aggregate(dummy ~ ReleaseTreatment, justreleased, sum), sumreleased)
	releasetreat1 <- cbind.data.frame(releasetreat, pertreat= releasetreat$dummy/releasetreat$sumreleased) #
figure out how to do the division
	releasetreat1 <- releasetreat1 %>%mutate(pos=1-(cumsum(releasetreat1$pertreat)-releasetreat1$pertreat/2))
#releasetreat1$ReleaseTreatment <- c("Descending Device", "Not treated", "Vented", "Descending Device and
Vented", "Other")
	bp<- ggplot(releasetreat1, aes(x="", y=pertreat, fill=ReleaseTreatment)) +
		geom_bar(width = 1, stat = "identity")
	pie <- bp + coord_polar("y")
	blank_theme <- theme_minimal()+
		theme(
		axis.title.x = element_blank(),
		axis.title.y = element_blank(),
		panel.border = element_blank(),
		panel.grid=element_blank(),
		axis.ticks = element_blank(),
		plot.title=element_text(size=14, face="bold")
			)

	releaseplot<- pie + scale_fill_brewer() + blank_theme +
		theme(axis.text.x=element_blank()) +
		geom_text(aes(y=pos, label=paste0(percent(pertreat), "(", dummy, ")")), size=4)  #y coordinates
will need to be changed based on the values



### Hook type and location
# Figure 24
	#	jawplots <- jawplot %>% group_by(HookedType) %>%mutate(Location=factor(Location))
	#	reasoning<- cbind.data.frame(reasoning, posp=1-(cumsum(reasoning$pos)-reasoning$pos/2))
	jawhook <- aggregate(dummy ~ HookedAt + HookedType, rednewmerge, sum)
	jawhooker<- subset(jawhook, HookedAt %in% c("Eyes", "Jaw", "Throat", "Gill", "Body"))
	jawcrack<- subset(jawhooker, HookedType %in% c("Artificial Bait", "Non-offset Circle Hook", "Offset J-
Hook", "Offset Circle Hook", "Non-offset J-Hook", "Other"))
	jawtest <-subset(jawhook[3:6,])  #The number of rows might need to change
	jawtest1<- cbind.data.frame(jawtest, Location=ifelse(jawtest$HookedAt=="Jaw", "Jaw", "Other"))
	sumjawa<-aggregate(dummy ~ HookedAt + HookedType, jawcrack, sum)
	sumhookoj<-subset(sumjawa, HookedType=="Offset J-Hook")
	sumhookoj<-sum(sumhookoj$dummy)
	sumhooknj<-subset(sumjawa, HookedType=="Non-offset J-Hook")
	sumhooknj<-sum(sumhooknj$dummy)
	sumhooknc<-subset(sumjawa, HookedType=="Non-offset Circle Hook")
	sumhooknc<-sum(sumhooknc$dummy)
	sumhookoc<-subset(sumjawa, HookedType=="Offset Circle Hook")
	sumhookoc<-sum(sumhookoc$dummy)
	sumhookab<-subset(sumjawa, HookedType=="Artificial Bait")
	sumhookab<-sum(sumhookab$dummy)
```

```
	sumhookother<-subset(sumjawa, HookedType=="Other")
	sumhookother<-sum(sumhookother$dummy)

	jawplot<-cbind.data.frame(sumjawa,hooks=ifelse(sumjawa$HookedType=="Non-offset J-Hook",
sumhooknj, ifelse(
		sumjawa$HookedType=="Offset J-Hook", sumhookoj, ifelse(
		sumjawa$HookedType=="Non-offset Circle Hook", sumhooknc, ifelse(
		sumjawa$HookedType=="Offset Circle Hook", sumhookoc, ifelse(
		sumjawa$HookedType=="Artificial Bait", sumhookab,
		sumhookother))))))
	jawplot<-cbind.data.frame(jawplot, perjaw=jawplot$dummy/jawplot$hooks)

	jawplot <- jawplot %>% group_by(HookedType) %>%mutate(pos=1-(cumsum(perjaw)-perjaw/2))
	bp<- ggplot(jawplot, aes(x="", y=perjaw, fill=HookedAt)) +
		geom_bar(width = 1, stat = "identity")
	pie <- bp + coord_polar("y")
	blank_theme <- theme_minimal()+
		theme(
		axis.title.x = element_blank(),
		axis.title.y = element_blank(),
		panel.border = element_blank(),
		panel.grid=element_blank(),
		axis.ticks = element_blank(),
		plot.title=element_text(size=14, face="bold")
			)

	pie + scale_fill_brewer() + blank_theme +
		theme(axis.text.x=element_blank()) +
		geom_text(aes(y=pos, label=paste0(percent(perjaw), "(", dummy, ")")), size=4) +
facet_wrap(~HookedType) #y coordinates will need to be changed based on the values.  Coordinates go
counterclockwise.

### Reason for release
#Figure 25
	sumrelease1 <- subset(rednewmerge, Catch_Status=="Released")
	sumrel2 <- sum(sumrelease1$dummy)

	reasoning <- cbind.data.frame(aggregate(dummy~ ReleaseReason, sumrelease1, sum), sumrel2)
	reasoning <- cbind.data.frame(reasoning, perreason=reasoning$dummy/reasoning$sumrel2)


	reasoning <- reasoning %>%mutate(pos=perreason)
	reasoning<- cbind.data.frame(reasoning, posp=1-(cumsum(reasoning$pos)-reasoning$pos/2))
	bp<- ggplot(reasoning, aes(x="", y=perreason, fill=ReleaseReason)) +
		geom_bar(width = 1, stat = "identity")
	pie <- bp + coord_polar("y")
	blank_theme <- theme_minimal()+
		theme(
		axis.title.x = element_blank(),
		axis.title.y = element_blank(),
		panel.border = element_blank(),
		panel.grid=element_blank(),
		axis.ticks = element_blank(),
		plot.title=element_text(size=14, face="bold")
		)
```

```
	reasonplot<-pie + scale_fill_brewer() + blank_theme +
		theme(axis.text.x=element_blank()) +
		geom_text(aes(y=posp, label=paste0(percent(perreason), "(", dummy, ")")), size=4)  #y
coordinates will need to be changed based on the values.  Coordinates go counterclockwise.

#Departure Port Type
#Table 7
	sumcatrs<- subset(newmerge, Species==SpecInt & Type.x=="Private")
	sumcatport<-aggregate(dummy ~ PortType, sumcatrs, sum)
	sumkeptrs<-subset(sumcatrs, Catch_Status=="Kept")
	sumkeptport<-aggregate(dummy ~ PortType, sumkeptrs, sum)
	tripdum <- cbind.data.frame(subset(trip, Status=="Completed" & Type=="Private"), dummy=1)
	sumtriport<-aggregate(dummy ~ PortType, tripdum, sum)
	portype<-cbind.data.frame(Port_Type=sumcatport$PortType, trips=sumtriport$dummy,
countsrs=sumcatport$dummy, countrskept=sumkeptport$dummy)

#Depth fished.  Note it was switched from a user supplied number to depth categories
#	depthrs<- subset(newmerge, as.numeric(Depth)>=10 & Species==SpecInt)
#	depthagg<- aggregate(dummy ~ Depth + Catch_Status, depthrs, sum)
#	depthkept<- sum(depthagg$dummy[depthagg$Catch_Status=="Kept"])
#	depthrel<-  sum(depthagg$dummy[depthagg$Catch_Status=="Released"])
#	depthplotter<-cbind.data.frame(depthagg, perdep=ifelse(depthagg$Catch_Status=="Kept",
depthagg$dummy/depthkept*100, depthagg$dummy/depthrel*100))

#	r20<-ggplot(depthplotter,aes(x=Depth, y=perdep)) + geom_histogram(stat='identity') +
scale_y_continuous(labels = comma) + scale_fill_manual("Percent")
#	r21<- r20 + facet_grid (Catch_Status~.) + labs(x="Depth (ft)", y= "Percent of Fish", cex=1.2) +
theme(strip.text.y = element_text(size=12, face="bold"))
##Depth fished and release treatment
	depthtreat<- subset(newmerge, Species==SpecInt & Catch_Status=="Released")
	depthtreat<-cbind.data.frame(depthtreat, Treatment=ifelse(depthtreat$ReleaseTreatment=="Other",
"Other", ifelse(depthtreat$ReleaseTreatment=="Descending Device", "Descending Device",
ifelse(depthtreat$ReleaseTreatment=="Not treated",
		"Not Treated", ifelse(depthtreat$ReleaseTreatment=="Vented", "Vented",
ifelse(depthtreat$ReleaseTreatment=="Descending Device and Vented","Descending Device and Vented", "Not
Listed"))))))
	depthtreat$depthval <- ifelse(depthtreat$Depth=="0-30", 15,
						ifelse(depthtreat$Depth=="31-60",45 ,
						ifelse(depthtreat$Depth=="61-90", 75,
						ifelse(depthtreat$Depth=="91-120", 105,
						ifelse(depthtreat$Depth=="121-150", 135,
						ifelse(depthtreat$Depth=="151-300", 200,
						ifelse(depthtreat$Depth=="301-500", 400,
						ifelse(depthtreat$Depth==">500", 600, 0))))))))

	depthtreatagg<- aggregate(dummy ~ depthval + Catch_Status + Treatment, depthtreat, sum)
	depthtreatkept<- sum(depthtreatagg$dummy[depthtreatagg$Catch_Status=="Kept"])
	depthtreatrel<-  sum(depthtreatagg$dummy[depthtreatagg$Catch_Status=="Released"])
	depthtreatplotter<-cbind.data.frame(depthtreatagg, perdep= depthtreatagg$dummy/depthtreatrel*100)
	r200<-ggplot(depthtreatplotter,aes(x=depthval, y=perdep, fill=Treatment)) +
geom_histogram(stat='identity', color="black", width=15) + scale_fill_manual(name="Release Treatment",
		limits=c( "Descending Device", "Vented", "Not Treated", "Descending Device and Vented",
"Other", "Not Listed"), values=c("#8c510a", "#d8b365", "#f6e8c3", "darkgray", "#c7eae5", "#5ab4ac", "#01665e"))
+ scale_x_discrete(limits=c(0, 15, 45, 75, 105, 135, 200, 400), labels=c("Not Provided", "15", "45", "75", "105",
"135", "200", "400"))
```

```
#Not Used
	r210<- r200 + labs(x="Depth (ft)", y= "Percent of Fish", cex=1.2) + theme(strip.text.y = 
element_text(size=12, face="bold"))
	r210
#Figure 23
	depthtreatplotterreduced<-subset(depthtreatplotter, depthval>=1)
	r220<-ggplot(depthtreatplotterreduced,aes(x=depthval, y=perdep, fill=Treatment)) + 
geom_histogram(stat='identity', color="black", width=15) + scale_fill_manual(name="Release Treatment",
		limits=c( "Descending Device", "Vented", "Not Treated", "Descending Device and Vented", 
"Other", "Not Listed"), values=c("#8c510a", "#d8b365", "#f6e8c3", "darkgray",  "#c7eae5", "#5ab4ac", "#01665e"))
+ scale_x_discrete(limits=c(15, 45, 75, 105, 135, 200, 400), labels=c("15", "45", "75", "105", "135", "200", "400"))
	r230<- r220 + labs(x="Depth (ft)", y= "Percent of Fish", cex=1.2) + theme(strip.text.y = 
element_text(size=12, face="bold"))

##Starting Location stuff
	triplocde<-subset(trip, Latitude>10 & Latitude<40)
	triplocde$Latitude<-round(triplocde$Latitude, digits=0)
	triplocde$Longitude<-round(triplocde$Longitude, digits=0)
	summary(departure)

	triplocde<-subset(trip, Latitude>10 & Latitude<40 & Type=="Private")
	triplocde$Latitude<-round(triplocde$Latitude, digits=0)
	 triplocde$Longitude<-round(triplocde$Longitude, digits=0)
	 summary(departure)

##This starts the gis plotting for location of departure and catch
	triplocde<-subset(trip, Latitude>10 & Latitude<40)
	triplocde<- subset(trip, Type=="Private")
	triplocde$Latitude<-round(triplocde$Latitude, digits=0)
	triplocde$Longitude<-round(triplocde$Longitude, digits=0)
	summary(triplocde)
	departure<-triplocde

#This is departure location
	departure<-cbind.data.frame(Longitude=triploc$Longitude, Latitude=triploc$Latitude)
	capture<-cbind.data.frame(Longitude=triploc$Longitude.y, Latitude=triploc$Latitude.y)
	#sumloc<-sum(triploc$dummy)   #This is used to add random number to location
	#capture<-cbind.data.frame(Longitude=triploc$Longitude.y + runif(sumloc), Latitude=triploc$Latitude.y + 
runif(sumloc)) #This is used to add random number to location

##This preps the coordinates for plotting
	summary(departure)
		coordinates(departure)<-c("Longitude", "Latitude")


#This counts number of departure trips by city for trips
	sumcity <- aggregate(dummy ~ State + NearestCity, triplocde, sum)

	sumcomplete <- aggregate(dummy ~ State + NearestCity, subset(triplocde, Status=="Completed" & 
Type=="Private"), sum)

	departcity<-merge(sumcity, sumcomplete, by=c("NearestCity", "State"), all.x=T)
	departcity<- cbind.data.frame(departcity, State2=ifelse(departcity$State=="North Carolina", "NC", 
ifelse(departcity$State=="South Carolina", "SC", 
			ifelse(departcity$State=="Georgia", "GA", "FL"))))
```

```
        departcity<-cbind.data.frame(departcity, citystate=paste0(departcity$NearestCity, "_", departcity$State2))
        departlatlon<-merge(departcity, citylat, by="citystate")
                coordinates(departlatlon) <- c("Long", "Lat")
        varsized<-departlatlon$dummy.x/sum(departlatlon$dummy.x)  #  choose dummy.x for abandoned and
completed and dummy.y for completed.
        departlatlon<-subset(departlatlon, dummy.x>=5)  # removing low sample size
        sysize<-departlatlon$dummy.x
#This maps all trips
#Figure 7
        map('state', region=c("florida", "georgia", "south carolina", "north carolina"), xlim=c(-83, -75), ylim=c(24,
36), col="grey", fill=T)
        points(departlatlon$Long, departlatlon$Lat, pch=16, col="blue", cex=departlatlon$dummy.x/50)
        map.axes()
        text(-79.3, 35.2, "North \nCarolina", adj = c(0,0.5))
        text(-82, 33.9, "South Carolina", adj = c(0,0.5))
        text(-83, 32, "Georgia", adj = c(0,0.5))
        text(-82.5, 28, "Florida", adj = c(0,0.5))

##This starts the gis plotting for location of departure and catch
#Figure 20
        triploc<-subset(newmerge, Latitude.y>=10 & Latitude.y<=40 & Species %in% "Sea Bass_Black")
        triploc$Latitude<-round(triploc$Latitude.y, digits=0)
        triploc$Longitude<-round(triploc$Longitude.y, digits=0)
        capture10 <- cbind.data.frame(Longitude=triploc$Longitude, Latitude=triploc$Latitude,
Email=triploc$Email.x, Catch_Status=triploc$Catch_Status, dummy=1)
        capture5 <- cbind.data.frame(aggregate(dummy ~ Longitude + Latitude + Email, capture10, sum),
squirrel=1) # This will be used to id unique fishermen for location purposes
        capture55a <-aggregate(squirrel~ Longitude + Latitude, capture5, sum) # need to add number of fishiermen
        capture55b <-aggregate(dummy~ Longitude + Latitude, capture5, sum) # this adds number of fish
        capture55 <- merge(capture55a, capture55b, by=c("Longitude", "Latitude"), all=T)
        capture10<- aggregate(dummy ~ Catch_Status + Longitude + Latitude, capture10, sum)
                totcapturekept<-sum(capture10$dummy[capture10$Catch_Status=="Kept"])
                totcapturereleased<-sum(capture10$dummy[capture10$Catch_Status=="Released"])
        capturekept <- subset(capture10, Catch_Status=="Kept", tots=capture10$dummy/totcapturekept*10)
                coordinates(capturekept)<- c("Longitude", "Latitude")
                capturekepttot<- capture10$dummy/totcapturekept*10
        capturereleased <- subset(capture10, Catch_Status=="Released",
tots=capture10$dummy/totcapturereleased*10)
                coordinates(capturereleased)<- c("Longitude", "Latitude")
                capturereleasedtot<-capture10$dummy/totcapturereleased*10

        captureplot<- subset(capture55, squirrel>=3)

#This maps all trips
#Figure 20
        map('state', region=c("florida", "georgia", "south carolina", "north carolina"), xlim=c(-83, -75), ylim=c(26,
36), col="grey", fill=T)
        points(captureplot$Longitude, captureplot$Latitude, pch=15, col="blue", bg="black",
cex=captureplot$dummy/10)
        map.axes()
        text(-79.3, 35.2, "North \nCarolina", adj = c(0,0.5))
        text(-82, 33.9, "South Carolina", adj = c(0,0.5))
        text(-83, 32, "Georgia", adj = c(0,0.5))
        text(-82.5, 29, "Florida", adj = c(0,0.5))
```

#####The below code was used to create Figure 1. Note this requires downloading the publicly available MRIP data.

```
library(readr)
library(data.table)
library(dplyr)
library(plyr)
library(survey)
library(crayon)
options(scipen = 999)
setwd("C:/Users/chip.SAFMC/Documents/MRIP Catch 03-14/mrip fes/catch/pre fes")
files = list.files(pattern="*.csv")
myfiles = do.call(rbind.fill, lapply(files, function(x) read.csv(x, stringsAsFactors = FALSE)))
dataearly<-myfiles

setwd("C:/Users/chip.SAFMC/Documents/MRIP Catch 03-14/mrip fes/catch/fes")
files = list.files(pattern="*.csv")
myfiles2 = do.call(rbind.fill, lapply(files, function(x) read.csv(x, stringsAsFactors = FALSE)))
datalate <- myfiles2
datalate2<- datalate

catchall<-rbind.fill(dataearly, datalate2)

#check to make sure ID_CODE and SP_CODE are notin scientific notation
#head(catchall)


setwd("C:/Users/chip.SAFMC/Documents/MRIP Catch 03-14/mrip fes/effort/fes")
files = list.files(pattern="*.csv")
# First apply read.csv, then rbind
myfiles4 = do.call(rbind.fill, lapply(files, function(x) read.csv(x, stringsAsFactors = FALSE)))
triplate2<- myfiles4


rectripcatch2<- cbind.data.frame(merge(triplate2, catchall, by=c("ID_CODE", "strat_id",
"kod","MODE_FX","ST","SUB_REG","WAVE","YEAR", "AREA_X", "region", "month", "wp_int"), all=T),
dummy=1)
summary(rectripcatch2)
#This creates a subset for monroe county. This is for all species
monroe<- subset(rectripcatch2, ST==12 & CNTY==87)
monroe$SUB_REG<-6

SAMRIP<-subset(rectripcatch2, SUB_REG==6)
SAMONROE2 <- rbind.data.frame(monroe, SAMRIP)
#SAMONROE2<- SAMRIP  #This should be used to compare with values on MRIP website
#Below is counties to keep
#SAMONROE <- subset(SAMONROE2, common %in% c("BLACK SEA BASS", "SCUP") & ST ==37
& CNTY %in% c(13, 19, 31, 49, 95, 129, 133, 137, 141, 147))
#Below is counties to delete. I just delete Currituck and Dare counities because they are the only two
costal counties north of CH. Note there could some harvest south of CH in Dare county from Frisco and Hatteras.
SAMONROE <- subset(SAMONROE2, !(common %in% c("BLACK SEA BASS", "SCUP") & ST ==37
& CNTY %in% c(53, 55)))

saprivate<-subset(SAMONROE2, MODE_FX==7 & AREA_X<=4)  #this is just private vessels in the
ocean
```

#This is the full list of SA Species. You can subset to just one species. It saves time if you do it earlier in the code.

```
sacatch<-subset(saprivate, common %in% c(
 "ALMACO JACK",
 "ATLANTIC SPADEFISH" ,
 "BANDED RUDDERFISH" ,
  "BANK SEA BASS" ,
  "BAR JACK" ,
 "BLACK GROUPER" ,
 "BLACK SEA BASS" ,
 "BLACKFIN SNAPPPER" ,
  "BLUELINE TILEFISH" ,
  "CONEY" ,
  "COTTONWICK" ,
  "CUBERA SNAPPER" ,
  "DOLPHIN" ,
  "GAG GROUPER" ,
  "GOLDEN TILEFISH" ,
 "GOLIATH GROUPER" ,
  "GRAY SNAPPER" ,
  "GRAY TRIGGERFISH" ,
  "GRAYSBY" ,
  "GREATER AMBERJACK" ,
 "HOGFISH" ,
  "JOLTHEAD PORGY" ,
 "KING MACKEREL" ,
  "KNOBBED PORGY" ,
  "LANE SNAPPER" ,
  "LESSER AMBERJACK" ,
  "LONGSPINE PORGY" ,
  "MARGATE" ,
 "MISTY GROUPER" ,
 "MUTTON SNAPPER" ,
 "NASSAU GROUPER" ,
 "OCEAN TRIGGERFISH" ,
  "QUEEN SNAPPER" ,
  "RED GROUPER" ,
 "RED HIND" ,
  "RED PORGY" ,
 "RED SNAPPER" ,
 "ROCK HIND" ,
  "ROCK SEA BASS" ,
  "SAILORS CHOICE" ,
  "SAND TILEFISH" ,
  "SAUCEREYE PORGY" ,
  "SCAMP" ,
  "SCUP" ,
  "SILK SNAPPER" ,
  "SNOWY GROUPER" ,
  "SPANISH MACKEREL" ,
  "SPECKLED HIND" ,
  "SPINY LOBSTER" ,
  "TOMTATE" ,
  "VERMILION SNAPPER" ,
 "WAHOO" ,
  "WARSAW GROUPER" ,
```

```
 "WHITE GRUNT" ,
 "WHITEBONE PORGY" ,
 "WRECKFISH" ,
"YELLOWEDGE GROUPER" ,
"YELLOWFIN GROUPER" ,
 "YELLOWMOUTH GROUPER" ,
 "YELLOWTAIL SNAPPER"
          ))
#This gets rid of missing PSU_ID
    sacatch <- subset(sacatch, !(sacatch$psu_id.x=="NA"))
    summary(sacatch)

    newsactch<-subset(sacatch, YEAR >=2017)
    scampcatch<-subset(newsactch, common=="SCAMP")
    scampcatch
    reducedsa<-distinct(newsactch, PRT_CODE, common, .keep_all=TRUE)
    reducedsa %>% freq(common, YEAR)
    setwd("C:/Users/chip.SAFMC/Desktop/Completion Report for MFC")
    options(frequency_render = TRUE)
     options(frequency_open_output = TRUE)
    sacatch17<- subset(sacatch, YEAR==2017)
    freq(sacatch17[,'common'], maxrow=50, file="data2017.html")
    sacatch18<- subset(sacatch, YEAR==2018)
    freq(sacatch18[,'common'], maxrow=50, file="data2018.html")
    attach(reducedsa)
    reducedsa<-reducedsa[order(common, WAVE),]
    ggplot(reducedsa, aes(x=common, y=dummy)) + geom_bar(stat="identity") + coord_flip() +
  facet_wrap(.~YEAR) + scale_x_discrete("Species")  + scale_y_continuous("Number of Trips")
```

APPENDIX E – CODE USED TO DEVELOP THE MYFISHCOUNT SHINY APP

This code has not been annotated.

```
specieslist<-read.csv("Data/specieslist.csv")
lifehist<-read.csv("Data/LifeHistoryforFPRall.csv")
userlist<-read.csv("Data/users 02092019.csv")
catchlist<-read.csv("Data/catch02092019 v2.csv")
triplist<-read.csv("Data/Trip 02092019.csv")
speciescomp<-read.csv("Data/speciescomp2.csv")
monthlist<-read.csv("Data/monthlist.csv")
agemaxmin<-read.csv("Data/agemaxmin.csv")

library(shiny)
library(plotly)
library(ggplot2)
library(plotly)
library(scales)
library(RColorBrewer)

Gajtext1 <- "The greater amberjack, Seriola dumerili, is a pelagic and epibenthic member of the family Carangidae (Manooch and Potts 1997a). This species occurs in the Indo-West Pacific, and in the Western and Eastern Atlantic Oceans. In the Western Atlantic, it occurs as far north as Nova Scotia, Canada, southward to Brazil, including the Gulf of Mexico (Carpenter 2002; Manooch and Potts 1997a; Manooch and Potts 1997b)."
Gajtext2 <- "Spawning occurs from January through June, with peak spawning in April and May. Although fish in spawning condition were captured from North Carolina through the Florida Keys, spawning appears to occur primarily off south Florida and the Florida Keys (Harris et al. 2007). "
Gajtext3 <- "Greater amberjack are gonochorists (separate sexes)."
Gajtext4 <- "Tagging data indicated that greater amberjack are capable of extensive movement that might be related to spawning activity. Greater amberjack tagged off South Carolina have been recaptured off Georgia, east Florida, Florida Keys, west Florida, Cancun Mexico, Cuba, and the Bahamas (MARMAP, unpublished data)."
Gajtext5 <- "This species is the largest jack and the maximum reported size is 75 inches and 178 pounds (Paxton et al. 1989).  Females tend to be larger at age than males (Harris et al. 2007)."
Gajtext6 <- "Maximum reported age is 17 years (SEDAR 15)."
Gajtext7 <- "Greater amberjack are not overfished and overfishing is not occurring (SEDAR 15)."

Bsbtext1 <- "The Black Sea Bass, Centropristis striata, is a temperate/warm-temperate demersal fish supporting the most productive reef and structure bottom fisheries from Cape Cod to Cape Canaveral, Florida.  Although it does occur north and south of these geographic features it is not abundant, until recently in the Gulf of Maine.  There is a separate subspecies in the northeastern Gulf of Mexico, but its significance in supporting bottom fisheries is not great, particularly when compared to other grouper and snapper fisheries. "
```

Bsbtext2 <- "Black Sea Bass spawning multiple times during winter to summer depending on water temperature and latitude. Spawning in what may be hierarchical groups,
occurs on mid-shelf and offshore reef formations at depths from 90 to 300 feet. "
Bsbtext3 <- "Black Sea Bass are protogynous hermaphrodites (= reversing sex from female to male). The sexual transformation to males occurs primarily between ages 2 and 5 (Mercer 1978; Waltz et al. 1979; Wenner et al. 1986)."
Bsbtext4 <- "Based on migratory patterns, spawning activity, habitat use and life histories there is some indication that Atlantic Black Sea Bass populations can be divided into four separate stocks between Cape Cod and North Florida based on life history parameters and behavior, but two stocks are most often used in managing Black Sea Bass fisheries based on genetic evidence, a northern stock occurring between Cape Cod and Cape Hatteras, and a southern stock occurring between Cape Hatteras and Cape Canaveral."
Bsbtext5 <- "The Black Sea Bass has been fished recreationally and for commercial sale for over 200 years due to its valued culinary characteristics (Goode 1887)."
Bsbtext6 <- "Maximum reported age is 11 years (SEDAR 25)."
Bsbtext7 <- "Black Sea Bass are not overfished but overfishing is occurring (SEDAR 25 Update)."

Vstext1 <- "Vermilion snapper, Rhomboplites aurorubens, occur in the Western Atlantic, from North Carolina to Rio de Janeiro. It is most abundant off the southeastern United States and in the Gulf of Campeche (Hood and Johnson 1999)."
Vstext2 <- "Vermilion snapper spawn in aggregations (Lindeman et al. 2000) from April through late September in the southeastern United States (Cuellar et al. 1996). Zhao et al. (1997) indicated that most spawning in the South Atlantic Bight occurs from June through August. "
Vstext3 <- "Vermilion snapper are gonochorists (separate sexes). All vermilion snapper are mature at 2 years of age and 20.0 cm (7.9 in) (SEDAR 2 2003b)."
Vstext4 <- "Little is known about the migration patterns of vermilion snapper."
Vstext5 <- "Vermilion snapper are also known as beeliners. "
Vstext6 <- "Maximum reported age is 19 years (SEDAR 17)."
Vstext7 <- "Vermilion snapper are not overfished and overfishing is not occurring (SEDAR 55)."

Rptext1 <- "Red porgy, Pagrus pagrus, occurs in both the Eastern and Western Atlantic Oceans. In the Western Atlantic, it ranges from New York to Argentina, including the northern Gulf of Mexico. "
Rptext2 <- "Red porgy spawn from December through May off the southeastern United States, with potential from January to April (Harris and McGovern 1997; Daniel 2003; Manooch 1976). "
Rptext3 <- "Red porgy are protogynous hermaphrodites (= reversing sex from female to male). "
Rptext4 <- "Tagging studies have not shown long-range migrations (Manooch and Hassler 1978)."
Rptext5 <- "Red porgy are a common aquaculture species in Europe. "
Rptext6 <- "Maximum reported age is 18 years (SEDAR 1)."
Rptext7 <- "Red porgy are overfished but overfishing is not occurring (SEDAR 01 2012 Update)."

Kmtext1 <- "King mackerel, Scomberomorus cavalla, is a temperate/warm-temperate demersal fish supporting the most productive reef and structure bottom fisheries from Cape Cod to Cape Canaveral, Florida. Although it does occur north and south of these geographic features it is not abundant, until recently in the Gulf of Maine. There is a separate subspecies in the northeastern Gulf of Mexico, but its significance in supporting bottom fisheries is not great, particularly when compared to other grouper and snapper fisheries. "
Kmtext2 <- "Spawning of Atlantic king mackerel occurs during the summer. "
Kmtext3 <- "King mackerel are gonochorists (separate sexes). "
Kmtext4 <- "Tagging data show that small, young fish from the eastern Gulf and Atlantic mix off south Florida in winter; fish from the eastern Gulf and western Gulf mix in the north central Gulf in summer; and at least some

young migrants from the western Gulf migrate into Mexican waters in winter (SEDAR 38). "
Kmtext5 <- "Chemical composition and shape of the otolith (fish earbone) has been used to identify king mackerel stocks (SEDAR 38)."
Kmtext6 <- "Maximum reported age is 26 years (SEDAR 38)."
Kmtext7 <- "King mackerel are not overfished and overfishing is not occurring (SEDAR 38)."

Smtext1 <- "Spanish mackerel, Scomberomorus maculatus, is mainly a continental, pelagic species that ranges along the Atlantic coast from Cape Cod in the Gulf of Maine to Miami, but most commonly from Cape Hatteras southward; in the Gulf of Mexico (GoM) from the Florida Keys to the Yucatan Peninsula, Mexico (Erdman 1949, Powell 1975, Collette et al. 1977, Collette and Russo 1979, Fischer 1978, Sutherland and Fable 1980, Godcharles and Murphy 1986, Fable et al. 1987); occasionally occurs at Bermuda (Briggs 1958, Randall 1968), and absent from Barbados and the Antilles except Cuba and Haiti (Robins et al. 1986). "
Smtext2 <- "Spawning occurs along the inner continental shelf in waters deep from April to September (Powell 1975) and spawning fish have been found as deep as 600 feet (McEachran and Finucane 1978, Benson 1982). Spanish mackerel may spawn almost daily once spawning begins (Cooksey 1996). "
Smtext3 <- "Spanish mackerel are gonochorists (separate sexes)."
Smtext4 <- "In the Atlantic, Spanish mackerel move north in the spring, remain in the north off the mid-Atlantic states until September, then migrate southward (GMFMC/SAFMC 1980). In the fall, migration is back to the wintering grounds in south Florida waters (Moe 1972, Sutherland and Fable 1980). "
Smtext5 <- "Japanese Spanish mackerel form a loose school as juveniles which may reduce the risk of cannibalism in this piscivorous species (Masuda et al. 2003)."
Smtext6 <- "Maximum reported age is 12 years (SEDAR 28)."
Smtext7 <- "Spanish mackerel are not overfished and overfishing is not occurring (SEDAR 28)."

Rstext1 <- "Red snapper, Lutjanus campechanus, can be found in the Gulf of Mexico including the Campeche area of Yucatan, and the Atlantic Coast as far north as Cape Hatteras, North Carolina. SEDAR 24 listed the range of red snapper as also extending through the Caribbean to Brazil. A similar species (Caribbean red snapper) occurs in the Caribbean with a range as far south as Brazil (Rivas 1966; Allen 1985) although it has been questioned if this is a distinct species (Cervigon 1983). "
Rstext2 <- "The spawning season for red snapper in the South Atlantic region extends from Spril thorugh September with a peak in June (SEDAR 41)."
Rstext3 <- "Red snapper are gonochorists (separate sexes)."
Rstext4 <- "Large scale movements of red snapper are rare and may occur after large storms. Red snapper do make daily feeding migrations and spawning migrations (SEDAR 41)."
Rstext5 <- "Red snapper were being vented by fishermen in the Keys in the late 1800s to increase the survival of fish that were going to be transported live to Cuba (Collins 1885)."
Rstext6 <- "Maximum reported age is 51 years (SEDAR 41)."
Rstext7 <- "Red snapper are overfished and overfishing is occurring based on data through 2014 (SEDAR 41)."

catchlist<-merge(catchlist, speciescomp, by="Species")
catchlist$departdate <- as.Date(as.character(catchlist$DepartureDate), "%m/%d/%Y")
catchlist$departmonth<-as.numeric(format(catchlist$departdate, format= "%m"))
catchlist <- cbind.data.frame(catchlist, typetest=ifelse(catchlist$Type=="Test", 3, 1))
catchlist$dummy <- 1
catchlist$ReleaseReason<-ifelse(catchlist$ReleaseReason =="Not Desired", "Not Desired", ifelse(catchlist$ReleaseReason =="Other", "Other", ifelse(catchlist$ReleaseReason =="Over Bag Limit", "Over Bag Limit",

```
ifelse(catchlist$ReleaseReason =="Too Big", "Too Big", ifelse(catchlist$ReleaseReason =="Too Small",
"Too Small", "Not Listed")))))
catchlist$ReleaseTreatment<-ifelse(catchlist$ReleaseTreatment=="Other", "Other",
ifelse(catchlist$ReleaseTreatment=="Descending Device", "Descending Device",
ifelse(catchlist$ReleaseTreatment=="Not treated",

"Not Treated", ifelse(catchlist$ReleaseTreatment=="Vented", "Vented",
ifelse(catchlist$ReleaseTreatment=="Descending Device and Vented", "Descended and Vented", "Not
Listed")))))
catchlist$Depth<-ifelse(catchlist$Depth=="0-30", 15, ifelse(catchlist$Depth=="31-60", 45,
ifelse(catchlist$Depth=="61-90", 75, ifelse(catchlist$Depth=="91-120", 105,
ifelse(catchlist$Depth=="121-150", 135, ifelse(catchlist$Depth=="151-300", 200, "Not Listed"))))))

lenlist <- subset(catchlist, Length>=2)

triplist$departdate <- as.Date(as.character(triplist$DepartureDate), "%m/%d/%Y")
triplist$departmonth<-as.numeric(format(triplist$departdate, format= "%m"))

usercount<-cbind.data.frame(userlist[!duplicated(userlist$ID), ], dummy=1)
usercount<-sum(usercount$dummy)
usercount

triplist<-subset(triplist, Type=="Private")
trips<-cbind.data.frame(triplist[!duplicated(triplist$TripID), ], dummy=1)
trips<-sum(trips$dummy)
trips

catchest <-subset(catchlist, typetest==1)
fishes <- sum(catchest$dummy)
fishes2 <- data.frame("Variable"= c("Users", "Trips", "Fish"), "Total"=c(usercount, trips, fishes))

lenwtstuffmfc <- cbind.data.frame(Species=catchlist$NewSpecies, Length=catchlist$Length,
Weight=catchlist$Weight, data="MyFishCount")
lenwtstufflh <- cbind.data.frame(Species=lifehist$Species, Length=lifehist$Length,
Weight=lifehist$Weight, data="SEDAR")
lenwt <- rbind.data.frame(lenwtstuffmfc, lenwtstufflh)

ui=
  fluidPage(
    fluidRow(column(12, align="center",
                div(style="display: inline-block", img(src="myfish v1.png", height=200, width=1500))
    )),

    tabsetPanel(type="tabs",
            tabPanel("Welcome Page", fluid = TRUE,
                  sidebarLayout(
                    sidebarPanel(
                      helpText("Thank you for visiting the MyFishCount Output Page")

                    ),
```

```
                        mainPanel(
                          h4("MyFishCount is a data reporting platform developed through a partnership between
Snook and Gamefish Foundation and South Atlantic Fishery Management Council.
                             MyFishCount is a pilot project to aid managers in the development of a fishery
management plan considering reporting requirements for the private recreational fishery in federal waters.
                             At public hearings, many fishermen requested an opportunity to report their data and
MyFishCount provides fishermen the opportunity to report their catches.  The app also allows fishermen
                             to report data beyond just catch and this information can be useful to managers."),
                          fluidRow(column(12, align="center",
                                          div(style="display: inline-block", img(src="SAFMClogocolorHighRes.png",
height=100, width=100)),
                                          div(style="display: inline-block", img(src="White box.png", height=50,
width=100)),
                                          div(style="display: inline-block", img(src="snook_gamefish_logo.png",
height=100, width=100)))),
                          h3(" "),

                          h4("Please remember the data presented here were collected through the MyFishCount
web-portal and are preliminary!"),

                          h3(" ") ,
                          h4("The table below includes the number of users that have created accounts in
MyFishCount, the number of
                             trips reported (test trips are excluded), and number of fish reported as of 2/06/2019."),
                          h4(tableOutput('tableintro')),
                          h3(""),
                          h5("Your individual data are completely confidential.  Information about your personal
trips and catches will never be shared. Information from your trips will be
                             combined with at least three other fishermen (on other vessels) when describing catch
and effort in a public setting.  Information collected on an individual fish
                             such as release treatment, length of fish,
                             hook location, etc may be displayed.  Fishing locations will be no smaller than 2
square mile blocks that include at least three anglers reporting in that location.
                             Your individual catch information will be shared with management agencies
                             such as the National Marine Fisheries Service, Councils, and state agencies to enable
better fisheries management.")


                          )
               )),

               tabPanel("Catch Information", fluid = TRUE,
                      sidebarLayout(
                        sidebarPanel(
                          helpText("Please select the time period and type of information you would like to
display"),
                          selectInput("Time_Periods1", label= "Choose a time period to display",
                                      choices=list("Last Two Weeks"=13, "January"=1, "February"=2, "June"=6,
"July"=7, "August"=8, "September"=9, "October"=10, "November"=11, "December"=12)),
```

```
                selectInput("data_opt", label= "Choose the type of information to display",
                        choices=list("Catches"= "catch", "Targeted Trips"="target", "Effort"="effort"))

               ),
               mainPanel("Catch Info",
                     h4(paste("The data displayed below comes from information reported through
MyFishCount.  More data will be added as they become available.
                          The current data available are November and December 2017 and June 2018
through February 6, 2019.")),
                     h2(""),
                      h4(textOutput("text4")),
                      tableOutput('tablecatch1'),
                      h4(textOutput("text5")),
                      tableOutput('tablecatch2')

               )
              )),


        tabPanel("MyFishCount Fish", fluid = TRUE,
              sidebarLayout(
               sidebarPanel(
                helpText("Select Species and Figure to Display Information"),
                selectInput("species3", label= "Choose a Species",
                        choices=list( "Black Sea Bass", "Gag Grouper", "Gray Triggerfish", "Greater
Amberjack",
                                  "King Mackerel", "Red Snapper",
                                  "Vermilion Snapper", "White Grunt"
                                 )),
                selectInput("catchtype", label= "Information to Plot",
                        choices=list("Length"= "length", "Release"="released"))

               ),


               mainPanel("Information on kept and released fish reported through MyFishCount",
                      plotOutput("lengthplots"),
                      h4(textOutput("catchtext10")),
                       plotOutput("lengthplots2"),
                      h4(textOutput("catchtext20")),
                      h5("If there is a species you would like included on this page, please email
chip.collier@safmc.net.
                We will add new information as possible.")
                      )
        )),

   tabPanel("Life History", fluid = TRUE,
         sidebarLayout(
          sidebarPanel(
            helpText("Select Species and Figure to Display Information"),
            selectInput("Species1", label= "Choose a species to display",
```

```
                    choices=list("Black Sea Bass", "Greater Amberjack", "King Mackerel", "Red Porgy",
"Red Snapper", "Spanish Mackerel", "Vermilion Snapper")),
            radioButtons("radio", h3("Select Data to Display"),
                    choices=list("Life History Data Only"="lifehistory", "Life History Data with
MyFishCount Reports"="mwlh"))

          ),
          mainPanel("Background information was taken from the SAFMC Ecospecies Database and
most recent stock assessment (SEDAR).  The figures below display
           life history data of select species from recent stock assessments.  For some information, we
have combined MyFishCount reports with
               life history data so that you can see the potential age or weight of a fish.  ",
                h4(""),
                column(12, div(align="center",
                imageOutput("image2", width="5%", inline=TRUE))),
                htmlOutput("lifehistbackground"),
                plotOutput("lenageplot"),
                h4(textOutput("lhpantext1")),
                plotOutput("lenwtplot"),
                h4(textOutput("lhpantext2")),
                plotOutput("maturityplot"),
                h4(textOutput("lhpantext3")),
                h5("If there is a species you would like included on this page, please email
chip.collier@safmc.net.
                  We will add new information as possible.")
                )
          ))))

####I have been adding stuff under values_2 and output$lenageplot to add stuff for length at age.  need to
finish the table to do it as well.
server <- function(input, output) {

  lhpaneltext1 <- reactive({
    if (input$radio=="lifehistory")
    { paste0("The figure above displays the age and length for ", input$Species1) }
    else if (input$radio=="mwlh")
    {paste0("The figure above displays the potential age of ", input$Species1, " based on length.  The blue
boxes are the percent of ",
         input$Species1, " lengths reported through MyFishCount") }
  })


  lhpaneltext2 <- reactive({
    if (input$radio=="lifehistory")
    { paste0("The figure above displays weight and length for ", input$Species1) }
    else if (input$radio=="mwlh")
    {paste0("The figure above displays weight and length for ", input$Species1, " reported through
MyFishCount and SEDAR.") }
  })
```

```
  lhpaneltext3 <- reactive({
    if (input$radio=="lifehistory")
    { paste0("The proportion of females that are mature for", input$Species1, " based on length.") }
    else if (input$radio=="mwlh")
    {paste0("The proportion of females that are mature for", input$Species1, " based on length.") }
  })

  output$lhpantext1<-renderText({
    lhpaneltext1()})

  output$lhpantext2<-renderText({
    lhpaneltext2()})

  output$lhpantext3<-renderText({
    lhpaneltext3()})

  text_1<- reactive({
    if(input$radio=="lifehistory")
    {      maxage<- rbind.data.frame(specieslist[specieslist$Species %in% input$Species1, ])
    paste0("Maximum age of ", input$Species1, " is ", maxage$MaximumAge, ".")}
  })

  catchtext <- reactive({
    if(input$catchtype=="length")
    {
     paste("The figure above displays the percent of fish kept and released based on length (inches) for ",
input$species3, ".")
    }
    else if (input$catchtype=="released")
    {
      paste("The figure above displays the release treatment reported through MyFishCount for ",
input$species3, ".")
    }
  })
  output$catchtext10<-renderText({
    catchtext()})

  catchtext2 <- reactive({
    if(input$catchtype=="length")
    {
      paste("The figure above displays the percent of fish kept and released based on length (inches) for ",
input$species3, ".")
    }
    else if (input$catchtype=="released")
    {
      paste("The figure above displays the reason for release reported through MyFishCount for ",
input$species3, ".")
    }
  })
  output$catchtext20<-renderText({
    catchtext2()})
```

```
  values_1<- reactive({
    muts<-lifehist %>%
      filter(Species==input$Species)
    muts<-cbind.data.frame(Age=muts$Age, Total_Length=muts$Length, Weight=muts$Weight,
Mature=muts$FemaleMaturity, Label=muts$Ltype)
    muts

  })
  values_12<- reactive({
    muts<-subset(lifehist, Species==input$Species1)
    muts<-cbind.data.frame(Age=muts$Age, Total_Length=muts$Length, Weight=muts$Weight,
Mature=muts$FemaleMaturity, Label=muts$Ltype)
    muts
  })
  values_2<- reactive({
    if(input$radio=="lifehistory")
    {
      muts<-subset(lifehist, Species==input$Species1)
      muts<-cbind.data.frame(Age=muts$Age, Total_Length=muts$Length, Weight=muts$Weight,
Mature=muts$FemaleMaturity, Label=muts$Ltype)
      muts }
    else if (input$radio=="mwlh")
    { muts<-subset(agemaxmin, Species==input$Species1)
    muts$Len2 <- muts$Length
    minum <- min(muts$Length, na.rm=T)
    differ <- min(muts$Differ)
    butts<- subset(catchlist, NewSpecies==input$Species1 & Length>=5)
    butts$Len2 <- minum + round((butts$Length - minum)/differ, 0)*differ
    butts$Species <- butts$NewSpecies
    butts$dummy <- 1
    rutts<-          aggregate(dummy ~ Len2 + Species, butts, sum)
    muts<- merge(rutts, muts, by=c("Species", "Len2"))
    muts<- cbind.data.frame(muts, perc=percent(muts$dummy/sum(muts$dummy)), tagit=muts$Agemin +
(muts$Agemax-muts$Agemin)/2)
    muts
    }

  })
  values_3 <- reactive({
    if(input$radio=="mwlh")
    {      counted<- subset(lenwt, Species==input$Species1 & Length>=5 & Weight>0)
    counted
    }

  })

  values_4 <- reactive({
    if(input$radio=="mwlh")
    {catrel<- subset(catchlist, NewSpecies==input$Species1 & Length>=5)
    catrel$rLen<- floor(catrel$Length)
```

```
    catrel$dummy <- 1
    totcatrel <- sum(catrel$dummy)
    catrel <- aggregate(dummy ~ rLen + Catch_Status + totcatrel, catrel, sum)
    catrel$perstat<- catrel$dummy/catrel$totcatrel
    catrel
    }
  })

  values_catchlist <- reactive({
      if(input$catchtype=="length")
      {lengthcat <- subset(lenlist, NewSpecies==input$species3)
      totcat<- sum(lengthcat$dummy)
      sumkept <- subset(lengthcat,Catch_Status=="Kept")
      sumkept <- sum(sumkept$dummy)
      sumrel1 <- subset(lengthcat, Catch_Status=="Released")
      sumrel <- sum(sumrel1$dummy)
      avglencat2 <- cbind.data.frame(totcat, aggregate(dummy ~ Length + Catch_Status, lengthcat, sum))
      avglencat2 <- cbind.data.frame(avglencat2, pertot=100*avglencat2$dummy/avglencat2$totcat,
cattot=ifelse(avglencat2$Catch_Status=="Kept", sumkept, sumrel))
      avglencat2 <- cbind.data.frame(avglencat2, percat=100*avglencat2$dummy/avglencat2$cattot)
      avglencat2
      }
    else if(input$catchtype=="released")
    {
      sumrel1 <- subset(catchlist, Catch_Status=="Released" & NewSpecies==input$species3)
      sumrel <- sum(sumrel1$dummy)
      releasetreat <-cbind.data.frame(aggregate(dummy ~ ReleaseTreatment, sumrel1, sum), sumrel)
      releasetreat1 <- cbind.data.frame(releasetreat, pertreat= releasetreat$dummy/releasetreat$sumrel) #
figure out how to do the division
      releasetreat1 <- releasetreat1 %>%mutate(pos=1-(cumsum(releasetreat1$pertreat)-
releasetreat1$pertreat/2))
      releasetreat1
    }
  })
  values_catchrelease <- reactive({
    if(input$catchtype=="length")
    {lengthcat <- subset(lenlist, NewSpecies==input$species3 & Catch_Status=="Released")
    totcat<- sum(lengthcat$dummy)
    sumkept <- subset(lengthcat,Catch_Status=="Kept")
    sumkept <- 1
    sumrel1 <- subset(lengthcat, Catch_Status=="Released")
    sumrel <- sum(sumrel1$dummy)
    avglencat2 <- cbind.data.frame(totcat, aggregate(dummy ~ Length + Catch_Status + ReleaseReason,
lengthcat, sum))
    avglencat2 <- cbind.data.frame(avglencat2, pertot=100*avglencat2$dummy/avglencat2$totcat,
cattot=ifelse(avglencat2$Catch_Status=="Kept", sumkept, sumrel))
    avglencat5 <- cbind.data.frame(avglencat2, percat=100*avglencat2$dummy/avglencat2$cattot)
    avglencat5
    }
    else if(input$catchtype=="released")
    {
```

```
      sumrel1 <- subset(catchlist, Catch_Status=="Released" & NewSpecies==input$species3)
      sumrel <- sum(sumrel1$dummy)
      reasoning <- cbind.data.frame(aggregate(dummy~ ReleaseReason, sumrel1, sum), sumrel)
      reasoning <- cbind.data.frame(reasoning, perreason=reasoning$dummy/reasoning$sumrel)


      reasoning <- reasoning %>%mutate(pos=perreason)
      reasoning<- cbind.data.frame(reasoning, posp=1-(cumsum(reasoning$pos)-reasoning$pos/2))
      reasoning
    }
  })

  output$lengthplots <- renderPlot({
    if(input$catchtype=="length")
    {
    avglencat2 <- values_catchlist()
    r7<- ggplot(avglencat2,aes(x=Length, y=percat)) + geom_histogram(stat='identity') +
scale_y_continuous(labels = comma) + scale_fill_manual("Number Landed")
    r8<- r7 + facet_grid (Catch_Status~.) + labs(x="Total Length (Inches)", y= "Percent of Fish", cex=1.2)
+ theme(strip.text.y = element_text(size=12, face="bold"))
    r8
    }
    else if(input$catchtype=="released")
    { releasetreat1<- values_catchlist()
      bp<- ggplot(releasetreat1, aes(x="", y=pertreat, fill=ReleaseTreatment)) +
        geom_bar(width = 1, stat = "identity")
      pie <- bp + coord_polar("y")
      blank_theme <- theme_minimal()+
        theme(
          axis.title.x = element_blank(),
          axis.title.y = element_blank(),
          panel.border = element_blank(),
          panel.grid=element_blank(),
          axis.ticks = element_blank(),
          plot.title=element_text(size=14, face="bold")
        )

      releaseplot<- pie + scale_fill_brewer() + ggtitle("Release Treatment") + blank_theme +
        theme(axis.text.x=element_blank()) +
        geom_text(aes(y=pos, label=paste0(percent(pertreat), "(", dummy, ")")), size=4)  #y coordinates will
need to be changed based on the values

      releaseplot
    }
  })

  output$lengthplots2 <- renderPlot({
    if(input$catchtype=="length")
   { avglencat5 <- values_catchrelease()
      r70<- ggplot(avglencat5,aes(x=Length, y=percat, fill=ReleaseReason)) +
geom_histogram(stat='identity')
```

```
    r80<- r70 + labs(x="Total Length (Inches)", y= "Percent of Fish", cex=1.2) + theme(strip.text.y =
element_text(size=12, face="bold"))
    r80
 }
 else if (input$catchtype=="released")
 {  reasoning <- values_catchrelease()
 bp<- ggplot(reasoning, aes(x="", y=perreason, fill=ReleaseReason)) +
   geom_bar(width = 1, stat = "identity")
 pie <- bp + coord_polar("y")
 blank_theme <- theme_minimal()+
   theme(
     axis.title.x = element_blank(),
     axis.title.y = element_blank(),
     panel.border = element_blank(),
     panel.grid=element_blank(),
     axis.ticks = element_blank(),
     plot.title=element_text(size=14, face="bold")
   )

 reasonplot<-pie + scale_fill_brewer() + ggtitle("Reason for Release") + blank_theme +
   theme(axis.text.x=element_blank()) +
   geom_text(aes(y=posp, label=paste0(percent(perreason), "(", dummy, ")")), size=4)
 reasonplot
 }
 })
   output$text1<-renderText({
   text_1()})

 output$table1<-renderTable({
   values_2()
 })
 output$tableintro <- renderTable({
   fishes2
 })
 output$lenageplot<-renderPlot({

   if(input$radio=="lifehistory")
   {    muts <- values_2()
   muts$len<-ifelse(muts$Label=="TL", "Total Length (inches)", "Fork Length (inches)")
   ggplot(muts, aes(x=muts$Age, y=muts$Total_Length)) + geom_line() + labs(y=paste(muts$len),
x="Age")  +
     theme(axis.text.x = element_text(size=12),
           axis.text.y = element_text(size=12),
           axis.title.x = element_text(size=13),
           axis.title.y = element_text(size=13))
   }
   else if (input$radio=="mwlh")
   {      muts <- values_2()
   ggplot(muts) + geom_crossbar(aes(x=Len2, ymin=Agemin, ymax=Agemax, y=Agemin), fill="cyan")
+ labs(y="Age", x="Length")  +
     theme(axis.text.x = element_text(size=12),
```

```
          axis.text.y = element_text(size=12),
          axis.title.x = element_text(size=13),
          axis.title.y = element_text(size=13))  +
      geom_text(aes(y= tagit, x= Len2, label = perc))
    }
  })

  output$lenwtplot<-renderPlot({
    if(input$radio=="lifehistory")
    {
      muts <- values_12()
      muts$len<-ifelse(muts$Label=="TL", "Total Length (inches)", "Fork Length (inches)")
      ggplot(muts, aes(x=muts$Total_Length, y=muts$Weight)) + geom_line() + labs(y="Weight
(pounds)", x=paste(muts$len))  +
        theme(axis.text.x = element_text(size=12),
              axis.text.y = element_text(size=12),
              axis.title.x = element_text(size=13),
              axis.title.y = element_text(size=13))
    }
    else if (input$radio=="mwlh")
    { muts <- values_3()
    alpha <- ifelse(muts$data=="SEDAR", 0.9, 0.0)
    p1<-ggplot(muts, aes(x=Length, y=Weight, color=data)) + geom_point() + labs(y="Weight (pounds)",
x="Length") +
      theme(axis.text.x = element_text(size=12),
            axis.text.y = element_text(size=12),
            axis.title.x = element_text(size=13),
            axis.title.y = element_text(size=13))
     p1 + geom_line(data=function(x){muts[muts$data %in% "SEDAR", ]}, alpha=0.5)
    }
  })

  output$maturityplot<-renderPlot({
    muts <- values_12()
    muts$len<-ifelse(muts$Label=="TL", "Total Length (inches)", "Fork Length (inches)")
    ggplot(muts, aes(x=muts$Total_Length, y=muts$Mature)) + geom_line() + labs(y="Proportion
Mature", x=paste(muts$len))  +
      theme(axis.text.x = element_text(size=12),
            axis.text.y = element_text(size=12),
            axis.title.x = element_text(size=13),
            axis.title.y = element_text(size=13))


  })

  output$image2 <- renderImage({
    if (is.null(input$Species1))
      return(NULL)

    if (input$Species1 == "Greater Amberjack") {
      return(list(
```

```
      src = "images/GreaterAmberjack2.png",
      contentType = "image/png",
      alt = "Greater Amberjack"
    ))
  } else if (input$Species1 == "Red Porgy") {
    return(list(
      src = "images/RedPorgy2.png",
      contentType = "image/png",
      alt = "Red Porgy"
    ))
  }
  else if (input$Species1 == "King Mackerel") {
    return(list(
      src = "images/King Mackerel.png",
      contentType = "image/png",
      alt = "King Mackerel"
    ))
  }
  else if (input$Species1 == "Spanish Mackerel") {
    return(list(
      src = "images/Spanish mackerel.png",
      contentType = "image/png",
      alt = "Spanish Mackerel"
    ))
  }
  else if (input$Species1 == "Vermilion Snapper") {
    return(list(
      src = "images/Vermilion Snapper.png",
      contentType = "image/png",
      alt = "Vermilion Snapper"
    ))
  }
  else if (input$Species1 == "Red Snapper") {
    return(list(
      src = "images/Red Snapper.png",
      contentType = "image/png",
      alt = "Red Snapper"
    ))
  }
  else if (input$Species1 == "Black Sea Bass") {
    return(list(
      src = "images/Black seabass.png",
      contentType = "image/png",
      alt = "Black Sea Bass"
    ))
  }
 }, deleteFile = FALSE)

 output$image3 <- renderImage({
  if (is.null(input$Species))
    return(NULL)
```

```
    if (input$Species == "Greater Amberjack") {
      return(list(
        src = "images/GreaterAmberjack2.png",
        contentType = "image/png",
        alt = "Greater Amberjack"
      ))
    } else if (input$Species == "Red Porgy") {
      return(list(
        src = "images/RedPorgy2.png",
        contentType = "image/png",
        alt = "Red Porgy"
      ))
    }
    else if (input$Species == "King Mackerel") {
      return(list(
        src = "images/King Mackerel.png",
        contentType = "image/png",
        alt = "King Mackerel"
      ))
    }
    else if (input$Species == "Spanish Mackerel") {
      return(list(
        src = "images/Spanish mackerel.png",
        alt = "Spanish Mackerel"
      ))
    }
    else if (input$Species == "Vermilion Snapper") {
      return(list(
        src = "images/Vermilion Snapper.png",
        contentType = "image/jpeg",
        alt = "Vermilion Snapper"
      ))
    }
    else if (input$Species == "Red Snapper") {
      return(list(
        src = "images/Red Snapper.png",
        contentType = "image/jpeg",
        alt = "Red Snapper"
      ))
    }
    else if (input$Species == "Black Sea Bass") {
      return(list(
        src = "images/Black seabass.png",
        contentType = "image/jpeg",
        alt = "Black Sea Bass"
      ))
    }
  }, deleteFile = FALSE)
```

```
textfortrip<- reactive ({paste0("Currently there have been ", usercount, " users and ", trips, " Trips.")
})

output$text3 <- renderText({
 textfortrip()
})

output$lifehistbackground<- renderUI({
 if(input$Species1=="Greater Amberjack")
 {
 str1<- paste("<strong>Distribution:  </strong>", Gajtext1)
 str2 <- paste("<strong>Spawning:  </strong>", Gajtext2)
 str3 <- paste("<strong>Reproduction:  </strong>", Gajtext3)
 str4 <- paste("<strong>Movement:  </strong>", Gajtext4)
 str5 <- paste("<strong>Interesting Fact:  </strong>", Gajtext5)
 str6 <- paste("<strong>Age:  </strong>", Gajtext6)
 str7 <- paste("<strong>Stock Status:  </strong>", Gajtext7)
 HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
}
else if(input$Species1=="Black Sea Bass")
{
 str1<- paste("<strong>Distribution:  </strong>", Bsbtext1)
 str2 <- paste("<strong>Spawning:  </strong>", Bsbtext2)
 str3 <- paste("<strong>Reproduction:  </strong>", Bsbtext3)
 str4 <- paste("<strong>Movement:  </strong>", Bsbtext4)
 str5 <- paste("<strong>Interesting Fact:  </strong>", Bsbtext5)
 str6 <- paste("<strong>Age:  </strong>", Bsbtext6)
 str7 <- paste("<strong>Stock Status:  </strong>", Bsbtext7)
 HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
}
 else if(input$Species1=="Red Porgy")
 {
  str1<- paste("<strong>Distribution:  </strong>", Rptext1)
  str2 <- paste("<strong>Spawning:  </strong>", Rptext2)
  str3 <- paste("<strong>Reproduction:  </strong>", Rptext3)
  str4 <- paste("<strong>Movement:  </strong>", Rptext4)
  str5 <- paste("<strong>Interesting Fact:  </strong>", Rptext5)
  str6 <- paste("<strong>Age:  </strong>", Rptext6)
  str7 <- paste("<strong>Stock Status:  </strong>", Rptext7)
  HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
 }
 else if(input$Species1=="Vermilion Snapper")
 {
  str1<- paste("<strong>Distribution:  </strong>", Vstext1)
  str2 <- paste("<strong>Spawning:  </strong>", Vstext2)
  str3 <- paste("<strong>Reproduction:  </strong>", Vstext3)
  str4 <- paste("<strong>Movement:  </strong>", Vstext4)
  str5 <- paste("<strong>Interesting Fact:  </strong>", Vstext5)
  str6 <- paste("<strong>Age:  </strong>", Vstext6)
```

```
    str7 <- paste("<strong>Stock Status:  </strong>", Vstext7)
    HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
   }
   else if(input$Species1=="King Mackerel")
   {
    str1<- paste("<strong>Distribution:  </strong>", Kmtext1)
    str2 <- paste("<strong>Spawning:  </strong>", Kmtext2)
    str3 <- paste("<strong>Reproduction:  </strong>", Kmtext3)
    str4 <- paste("<strong>Movement:  </strong>", Kmtext4)
    str5 <- paste("<strong>Interesting Fact:  </strong>", Kmtext5)
    str6 <- paste("<strong>Age:  </strong>", Kmtext6)
    str7 <- paste("<strong>Stock Status:  </strong>", Kmtext7)
    HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
   }
   else if(input$Species1=="Spanish Mackerel")
   {
    str1<- paste("<strong>Distribution:  </strong>", Smtext1)
    str2 <- paste("<strong>Spawning:  </strong>", Smtext2)
    str3 <- paste("<strong>Reproduction:  </strong>", Smtext3)
    str4 <- paste("<strong>Movement:  </strong>", Smtext4)
    str5 <- paste("<strong>Interesting Fact:  </strong>", Smtext5)
    str6 <- paste("<strong>Age:  </strong>", Smtext6)
    str7 <- paste("<strong>Stock Status:  </strong>", Smtext7)
    HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
   }

   else if(input$Species1=="Red Snapper")
   {
    str1<- paste("<strong>Distribution:  </strong>", Rstext1)
    str2 <- paste("<strong>Spawning:  </strong>", Rstext2)
    str3 <- paste("<strong>Reproduction:  </strong>", Rstext3)
    str4 <- paste("<strong>Movement:  </strong>", Rstext4)
    str5 <- paste("<strong>Interesting Fact:  </strong>", Rstext5)
    str6 <- paste("<strong>Age:  </strong>", Rstext6)
    str7 <- paste("<strong>Stock Status:  </strong>", Rstext7)
    HTML(paste(str1, str2, str3, str4, str5, str6, str7, sep=c('<br/>','<br/>')))
   }
  })

  catchreports <- reactive({
   if(input$data_opt=="catch")
   {      timer<-as.numeric(input$Time_Periods1)
   if(input$Time_Periods1==13)
   { catchlist <-cbind.data.frame(subset(catchlist, departdate> "2019-01-01" & departdate< "2019-02-
06"),dummy=1)
   catchlists<- cbind.data.frame(aggregate(dummy ~ NewSpecies + TripID, catchlist, sum), added=1)
   catchtrip<-aggregate(dummy~ NewSpecies, catchlists, sum)
   catchtrip<-head(catchtrip[order(-catchtrip$dummy), ])
   catchtrip$NewSpecies }
   else if(timer<=12 )
   { catchlist <-cbind.data.frame(subset(catchlist, departmonth %in% input$Time_Periods1),dummy=1)
```

```
    catchlists<- cbind.data.frame(aggregate(dummy ~ NewSpecies + TripID, catchlist, sum), added=1)
    catchtrip<-aggregate(dummy~ NewSpecies, catchlists, sum)
    catchtrip<-head(catchtrip[order(-catchtrip$dummy), ])
    catchtrip$NewSpecies } }
    else if(input$data_opt=="target")
    {       timer<-as.numeric(input$Time_Periods1)
    if(input$Time_Periods1==13)
    { triplist <-cbind.data.frame(subset(triplist, departdate> "2019-01-01" & departdate< "2019-02-
06"),dummy=1)
    catchlists<- cbind.data.frame(aggregate(dummy ~ Target1 + TripID, triplist, sum), added=1)
    catchtrip<-aggregate(added~ Target1, catchlists, sum)
    catchtrip<-head(catchtrip[order(-catchtrip$added), ])
    catchtrip$Target1 }
    else if(timer<=12 )
    { triplist <-cbind.data.frame(subset(triplist, departmonth %in% input$Time_Periods1),dummy=1)
    catchlists<- cbind.data.frame(aggregate(dummy ~ Target1 + TripID, triplist, sum), added=1)
    catchtrip<-aggregate(added~ Target1, catchlists, sum)
    catchtrip<-head(catchtrip[order(-catchtrip$added), ])
    catchtrip$Target1 }
    }
    else if (input$data_opt=="effort")
    {timer<-as.numeric(input$Time_Periods1)
    if(input$Time_Periods1==13)
    {triplist <-cbind.data.frame(subset(triplist, departdate> "2019-01-01" & departdate< "2019-02-
06"),dummy=1)
    triplist <- cbind.data.frame(aggregate(dummy ~  State + TripID, triplist, sum), added=1)
    triplist <- aggregate(added ~  State , triplist, sum)
    trips <-sum(triplist$added)
    triplist$perstate <- percent(triplist$added/trips)
    triplists <- cbind.data.frame(State=triplist$State, TripPercent = triplist$perstate)
    triplists }
    else if (timer<=12)
    {triplist <-cbind.data.frame(subset(triplist, departmonth %in% input$Time_Periods1),dummy=1)
    triplist <- cbind.data.frame(aggregate(dummy ~  State + TripID, triplist, sum), added=1)
    triplist <- aggregate(added ~  State , triplist, sum)
    trips <-sum(triplist$added)
    triplist$perstate <- percent(triplist$added/trips)
    triplists <- cbind.data.frame(State=triplist$State, Precent_of_Trips = triplist$perstate)
    triplists }
    }
  })

  catchreports2 <- reactive({
    if(input$data_opt=="catch")
    {       timer1<-as.numeric(input$Time_Periods1)
    if (input$Time_Periods1==13)
    { catchlist <-cbind.data.frame(subset(catchlist, departdate> "2019-01-01" & departdate< "2019-02-
06"),dummy=1)
    catchlists<- cbind.data.frame(aggregate(dummy ~ NewSpecies + TripID, catchlist, sum), added=1)
    catchspecies<- aggregate(added~ NewSpecies, catchlists, sum)
    catchspecies<-head(catchspecies[order(-catchspecies$added), ])
```

```
  catchspecies$NewSpecies }
  else if(timer1<=12 )
  {      catchlist <-cbind.data.frame(subset(catchlist, departmonth %in%
input$Time_Periods1),dummy=1)
  catchlists<- cbind.data.frame(aggregate(dummy ~ NewSpecies + TripID, catchlist, sum), added=1)
  catchspecies<- aggregate(added~ NewSpecies, catchlists, sum)
  catchspecies<-head(catchspecies[order(-catchspecies$added), ])
  catchspecies$NewSpecies }

  }
  else if(input$data_opt=="target")
  {      timer1<-as.numeric(input$Time_Periods1)
  if (input$Time_Periods1==13)
  { triplist <-cbind.data.frame(subset(triplist, departdate> "2019-01-01" & departdate< "2019-02-
06"),dummy=1)
  catchlists<- cbind.data.frame(aggregate(dummy ~ Target2 + TripID, triplist, sum), added=1)
  catchspecies<- aggregate(added~ Target2, catchlists, sum)
  catchspecies<-head(catchspecies[order(-catchspecies$added), ])
  catchspecies$Target2 }
  else if(timer1<=12 )
  {      triplist <-cbind.data.frame(subset(triplist, departmonth %in% input$Time_Periods1),dummy=1)
  catchlists<- cbind.data.frame(aggregate(dummy ~ Target2 + TripID, triplist, sum), added=1)
  catchspecies<- aggregate(added~ Target2, catchlists, sum)
  catchspecies<-head(catchspecies[order(-catchspecies$added), ])
  catchspecies$Target2 }
  }
  else if (input$data_opt=="effort")
  {timer1<-as.numeric(input$Time_Periods1)
  triplist<- subset(triplist, HoursFished>0)
  if(input$Time_Periods1==13)
  {triplist <-cbind.data.frame(subset(triplist, departdate> "2019-01-01" & departdate< "2019-02-
06"),dummy=1)
  triplist <- cbind.data.frame(aggregate(dummy ~  HoursFished + TripID, triplist, sum), added=1)
  triplist <- aggregate(added ~  HoursFished , triplist, sum)
  trips <-sum(triplist$added)
  triplist$hours <- percent(triplist$added/trips)
  triplists <- cbind.data.frame(Hours=triplist$HoursFished, Precent_of_Trips = triplist$hours)
  triplists}
  else if(timer1<= 12)
  {triplist <-cbind.data.frame(subset(triplist, departmonth %in% input$Time_Periods1),dummy=1)
  triplist <- cbind.data.frame(aggregate(dummy ~  HoursFished + TripID, triplist, sum), added=1)
  triplist <- aggregate(added ~  HoursFished , triplist, sum)
  trips <-sum(triplist$added)
  triplist$hours <- percent(triplist$added/trips)
  triplists <- cbind.data.frame(Hours=triplist$HoursFished, Precent_of_Trips = triplist$hours)
  triplists}
  }
 })


 output$tablecatch1 <- renderTable({
```

```
   catchreports() }, include.colnames=FALSE)
  output$tablecatch2 <- renderTable({
   catchreports2() }, include.colnames=FALSE)


  timer<-reactive({
   timer3<-as.numeric(input$Time_Periods1)
   if (input$data_opt=="catch")
   {
    if (input$Time_Periods1==13)
    {
     paste("Most common species reported through MyFishCount during the last two weeks.")}
    else if (timer3 <=12)
    {    mtimer<-subset(monthlist, Mval %in% input$Time_Periods1)
    paste("Most common species reported through MyFishCount during", mtimer$Month,".")
    }
   }
   else if (input$data_opt=="target")
   {
    if (input$Time_Periods1==13)
    {
     paste("Most common target species/group reported through MyFishCount for Last Two Weeks.")}
    else if (timer3 <=12)
    {    mtimer<-subset(monthlist, Mval %in% input$Time_Periods1)
    paste("Most common target species/group reported through MyFishCount for", mtimer$Month,".")
    }
   }
   else if (input$data_opt=="effort")
   {
    if (input$Time_Periods1==13)
    {
     paste("Percent of trips by state reported in MyFishCount for Last Two Weeks.")}
    else if (timer3 <=12)
    {    mtimer<-subset(monthlist, Mval %in% input$Time_Periods1)
    paste("Percent of trips by state reported in MyFishCount for", mtimer$Month,".")
    }
   }
  })
  output$text4<- renderText({
   timer() })


  timer2<-reactive({
   timer4<-as.numeric(input$Time_Periods1)
   if (input$data_opt=="catch")
   {
    if (input$Time_Periods1==13)
    {
     paste("Fish with highest number kept reported through MyFishCount for Last Two Weeks.")}
    else if (timer4 <=12)
    {    mtimer1<-subset(monthlist, Mval %in% input$Time_Periods1)
```

```
      paste("Fish with highest number kept reported through MyFishCount for", mtimer1$Month, ".")
      }
    }
    else if (input$data_opt=="target")
    {
      if (input$Time_Periods1==13)
      {
        paste("Most common secondary target species/group reported through MyFishCount for Last Two
Weeks.")}
      else if (timer4 <=12)
      {     mtimer1<-subset(monthlist, Mval %in% input$Time_Periods1)
      paste("Most common secondary target species/group reported through MyFishCount for",
mtimer1$Month, ".")
      }
    }
    else if (input$data_opt=="effort")
    {
      if (input$Time_Periods1==13)
      {
        paste("Percent of trips by hours fished reported through MyFishCount for Last Two Weeks.")}
      else if (timer4 <=12)
      {     mtimer1<-subset(monthlist, Mval %in% input$Time_Periods1)
      paste("Percent of trips by hours fished reported through MyFishCount for", mtimer1$Month, ".")
      }
    }
  })
  output$text5<- renderText({
    timer2() })
}
shinyApp(ui, server)
```