Project Period 11/01/2016 - 3/31/2019

Project Location Description (from Proposal) State and federal waters of Texas

Project Summary (from Proposal) Implement the smart device application iSnapper as an electronic data collection tool in the red snapper recreational fishery in the Gulf of Mexico. Project will recruit private anglers to electronically log their catch and effort information in order to supplement data collection and improve the timeliness and robustness of recreational catch data.

Project Status and Accomplishments iSnapper has collected catch and effort data from both private and for-hire boats on a voluntarily basis since 2015, with these data then being combined with creel data from our partner in the project, Texas Parks and Wildlife (TPWD), to calculate the annual total effort and harvest. The primary purpose of this grant was to continue to provide recreational anglers the ability to self-report their Red Snapper landings using the iSnapper app and to use these data to calculate harvest and effort estimates for 2017 and 2018. In 2017, a total of 548 private Red Snapper boats were creeled with 2,184 anglers harvesting 4,302 Red Snapper, for an estimated total harvest of 379,667 lbs (SE 171,681 lbs). In 2018, 693 boats were creeled with 2,750 private anglers harvesting 5,065 Red Snapper, for an estimated total harvest of 353,364 lbs (SE 74,581 lbs). Longer seasons have led to more angler opportunity to report, wherein more validations as well as randomizing site selection, have reduced standard error and allowed for more accurate harvest and effort estimates using the iSnapper data. We expect these trends to continue in coming years.

Lessons Learned One of the major lessons learned is that recreational anglers are willing and enthusiastic about self-reporting their catch if provided with a quick and easy mechanism. iSnapper was created to collect the most amount of data possible with the User only needing to navigate through three screens. Providing Users with a sense of importance also helped increase the likelihood of using the app. When anglers were informed about what the app was intended for (i.e., collecting additional data regarding harvest), as well as the efficiency of entry (less than 5 minutes), they tended to be more receptive to using it.

In addition, having a web-based data entry option also seemed to be important due to some angler's limited knowledge of smartphones. Some individuals did not want to download the app but were willing to provide their data on a website. The website was also used for data management. For example, data was available to be compiled and downloaded for comparison with the creel data. However, additional built in capabilities from an administrative aspect regarding editing trips and Users' account information would have been preferred. For example, if an angler forgot their username and password, we were not able to manually reset it through the website. Instead, a separate site where the raw data was stored had to be accessed to change such information. Thus, there is high value to maintaining a functional user-friendly web portal.

As with many projects that rely heavily on technology, there were several occasions where the app would encounter "glitches." These included the app not recording the harvest of Red Snapper (providing the angler entered it to begin with) and/or not recording the vessel registration numbers. This was mostly rectified by contacting the angler via email and asking for their trip information. We found that if anglers were willing to self-report their trip, they were relatively receptive to our emails and typically replied with the requested information in a timely manner. However, this requires administrative follow-up. Any trips that we could not get the number harvested was omitted from the harvest estimate (14 in 2017 and 18 in 2018). Without the vessel registration numbers, we are potentially missing additional validated trips. However, aside from somehow coupling our registration with the TPWD boater's registration, there is no way to ensure that anglers provide their actual registration numbers. Similarly, we have encountered several vessels at creel surveys that do not have their vessel numbers displayed on the boat. These are likely Coast Guard registered vessels (and therefore do not have to display their numbers) but this means that there is no way to match a self-reported trip to those vessels. While we have a 'work-around' to allow them to create an account in iSnapper, there is no way for creel agents to record boat information to allow us to validate that trip. We have told these Users that they must identify themselves as iSnapper Users and that they have a Coast Guard registered vessel, to attempt to include these vessels, but thus far we have had no trips validated

in this way. This identification problem will need to be solved in the future.

Despite our encouragement, similar to all other previous years, anglers were still reporting after they returned home from their trip. We promote submitting the trip before getting back to the dock, to decrease recall bias as well as to ensure that encountering a creel agent does not change the angler behavior or impact their reporting accuracy. However, further review does not indicate that anglers were intentionally misreporting their data and were in fact submitting trips with very accurate data. Due to this, we made the assumption that encountering a creel agent did not change the way the anglers reported their harvest. One of the important datums that iSnapper collects is the date and time the trip was actually submitted. This proved to be critical since we encouraged anglers to report their catch before returning to the docks. Without knowing when the trip was actually submitted we would have incorrectly assumed that all the self-reported data was submitted prior to creeling, which is the ideal scenario. However, since this did not happen, it was beneficial to see how much time anglers waited to submit their trips, which helped us gauge our confidence in our harvest estimates. We do not have a solution to this problem without requiring a trip ticket or similar mechanism for reporting before allowing the User to begin another trip. Implementing something like this would certainly require increased enforcement and cost, and a stricter reporting system. However, even then these problems have the potential to persist and will need to be overcome.

Activities and Outcomes

Funding Strategy: Planning, Research, Monitoring
Metric: FIF - Monitoring - # of trips monitored
Required: Recommended
Description: Number of fishing trips monitored using EM/ER technology over the grant period. In the notes, please specify total number of trips taken.

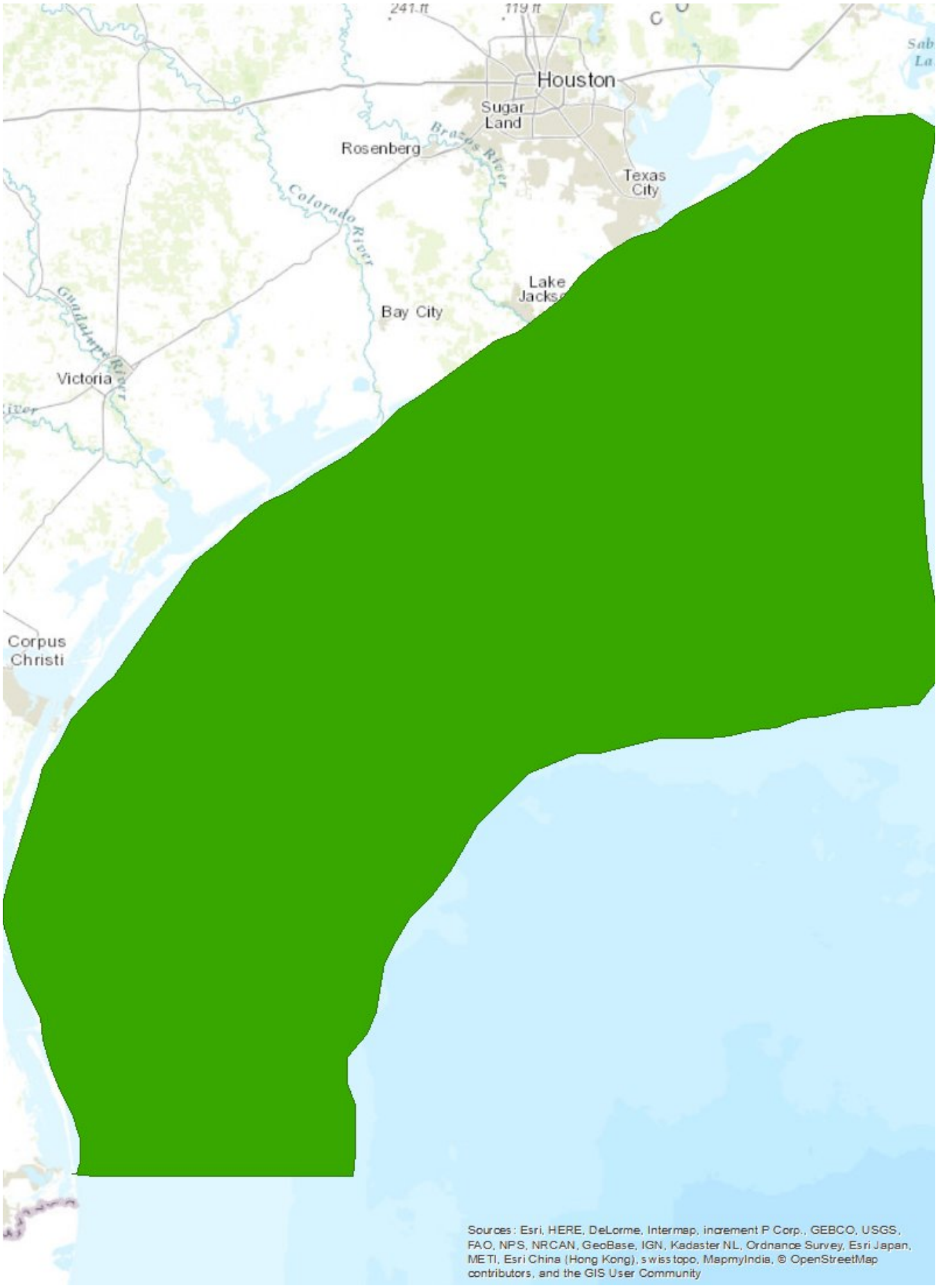
Starting Value	0.00 # of trips monitored
Value To Date	451.00 # of trips monitored
Target value	350.00 # of trips monitored

Note:

Funding Strategy: Planning, Research, Monitoring
Metric: FIF - Monitoring - # vessels in monitoring program
Required: Recommended
Description: Number of vessels directly engaged/participating in monitoring program(s)

Starting Value	0.00 # vessels in monitoring program
Value To Date	190.00 # vessels in monitoring program
Target value	200.00 # vessels in monitoring program

Note:


241 ft
119 ft
Houston
Sugar Land
Rosenberg
Brazos River
Texas City
Colorado River
Lake Jackson
Bay City
Victoria
Guadalupe River
Corpus Christi
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

The following pages contain the uploaded documents, in the order shown below, as provided by the grantee:

Upload Type	File Name	Uploaded By	Uploaded Date
Final Report Narrative - Marine	NFWF Final Report iSnapper_Mar19.doc	Stunz, Greg	03/18/2019
Photos - Jpeg	Kesley creeling.jpg	Stunz, Greg	03/18/2019
Photos - Jpeg	TPWD iSnapper ad 2018.jpg	Stunz, Greg	03/18/2019
Photos - Jpeg	TPWD iSnapper TSF ad 2018.jpg	Stunz, Greg	03/18/2019
Photos - Jpeg	Figure1-StudyAreaRamps.jpg	Stunz, Greg	03/18/2019

The following uploads do not have the same headers and footers as the previous sections of this document in order to preserve the integrity of the actual files uploaded.

Final Programmatic Report Narrative

Instructions: Save this document on your computer and complete the narrative in the format provided. The final narrative should not exceed ten (10) pages; do not delete the text provided below. Once complete, upload this document into the online final programmatic report task as instructed. **Please note** that this narrative will be made available on NFWF's Grants Library and therefore should provide brief context for the need of your project and should not contain unexplained terms or acronyms.

1. Summary of Accomplishments

iSnapper has collected catch and effort data from both private and for-hire boats on a voluntarily basis since 2015, with these data then being combined with creel data from our partner in the project, Texas Parks and Wildlife (TPWD), to calculate the annual total effort and harvest. The primary purpose of this grant was to continue to provide recreational anglers the ability to self-report their Red Snapper landings using the *iSnapper* app and to use these data to calculate harvest and effort estimates for 2017 and 2018. In 2017, a total of 548 private Red Snapper boats were creeled with 2,184 anglers harvesting 4,302 Red Snapper, for an estimated total harvest of 379,667 lbs (SE 171,681 lbs). In 2018, 693 boats were creeled with 2,750 private anglers harvesting 5,065 Red Snapper, for an estimated total harvest of 353,364 lbs (SE 74,581 lbs). Longer seasons have led to more angler opportunity to report, wherein more validations as well as randomizing site selection, have reduced standard error and allowed for more accurate harvest and effort estimates using the *iSnapper* data. We expect these trends to continue in coming years.

2. Project Activities & Outcomes

Activities

Continue implementation of iSnapper as a data collection app (for Apple and Android platforms including a web portal) for recreational anglers in the Gulf of Mexico.

In 2011 an electronic reporting app, *iSnapper*, was piloted to enable for-hire captains to self-report their offshore catch and harvest data with specific interest regarding Red Snapper. The pilot was widely successful, and to build on this success the app was redesigned in 2015 to also include private recreational anglers. While this user group was initially skeptical of the process and how the data would be used, by the 2017 and 2018 seasons we encountered more anglers that were familiar with, and Users of, the app suggesting angler 'buy-in' was continuing. There are several reasons we attribute to the increased use. First, despite using a multitude of media sources, many anglers were unaware of the app during the 2015 season. Furthermore, those that did know of *iSnapper* were largely distrustful of the data collection process in light of continued shortening of the federal season. Many anglers did not want to report their data for fear of it being "used against them" in that if they reported their harvest and it was more than Texas Parks and Wildlife anticipated, the season would be cut even shorter. This was allayed in 2017 when a 39-day season extension was provided, and further quelled in 2018 by the approval of the Exempted Fishing Permit that provided Texas private anglers a total of 82 days to fish in federal waters. With these two positive changes, along with more anglers being knowledgeable about the app, private anglers became much more receptive to self-reporting their data.

For this grant, we chose to improve and modify the app as well as make some minor modifications. Most of these changes were related to app functionality with little noticeable difference to the app interface. This was important since we did not want previous Users of the app to become confused when they reported their catch and maintain the user-friendly app interface. However, all Users

were required to re-register since passwords were not transferred with the app development package. During the registration process, as we had with the previous version, Users were required to provide their vessel identification information. The vessel numbers were used to match *iSnapper* trips with creel survey data for validation purposes, which were ultimately used to estimate the total effort for and harvest of Red Snapper.

Data collection involved Users submitting their catch and effort data. For every trip the following data were collected: time and date, marina/dock launching from, number of anglers, species and number harvested, general fishing location, and depth were all required. For Red Snapper, number released, and depth fished were also required fields. However, these were not required for any other species. Supplemental information including the method of release and the release condition could be provided on an additional screen if the angler chose to do so.

Catch and effort data collection was not limited to just the *iSnapper* app. To provide individuals that did not have smartphones the ability to report, we continued to host the iSnapperonline.org website. This collected the exact same data but could be accessed from any computer, thereby allowing all anglers with internet access the ability to report their catch. The website was the primary portal to download data, with an administrative account that had access to all trip and catch/harvest data submitted since 2017. Having immediate access to the data proved to be helpful in 2018 when states were in charge of managing their own quota. While TPWD was a partner in this project, their own long-term assessment methodologies to were used calculate official harvest estimates, and the *iSnapper* harvest estimates were used to compare effort and harvest trends run as a side-by-side comparison to examine multi-year trends.

Since this was not the "debut" of the app but instead was a continuation of previous work, several methods of advertisement were used to remind current *iSnapper* Users as well as promote new angler participation to ultimately try and increase submitted trips during this project. To directly target known anglers, post cards were mailed out to previously identified Red Snapper anglers the month before the season opened. These postcards showed the anglers the 3-step process of submitting a trip and reminded them to submit their trips prior to coming back to the dock (see attached images). We also promoted the app through our Sportfish Center website (SportfishCenter.org), social media accounts, television and radio interviews, fishing magazines, online fishing forums, and on TPWD's website.

Catch estimates and validation of user-entered data collected via iSnapper

Catch estimates and validation of the *iSnapper* self-reported data were done by conducting additional creels at boat ramps with access to the Gulf of Mexico provided as match to the project by TPWD. Despite the extensive Texas coastline, there are only 25 boat ramps that routinely have anglers landing Red Snapper. In such, we used TPWD's well-developed creel survey methodologies to intercept private recreational anglers at harbors and marinas for all ports along the TX coast. One of the most important modifications to our site selection in 2018 was to use TPWD's stratified proportional random sampling of creel locations with the intention of trying to lower our overall standard error. By randomizing site selection, we were able to incorporate all of the creel surveys to calculate a total harvest and effort estimate.

All anglers intercepted at creel surveys were asked if they were using *iSnapper*. Any angler fishing for Red Snapper was given a wallet sized informational card and encouraged to report while being educated about the app and its utility. Creel agents also made a note on the creel data sheets for validation purposes and to gauge involvement. These face to face interactions proved to be very valuable. By 2017, anglers seemed to be aware of the app but still potentially hesitant to self-report their landings. By talking with these anglers, we believe we were able to dispel some of their concerns and in doing so increased our overall reporting rate.

The creel surveys occur between 10 a.m. and 6 p.m., as this time frame intercepts the greatest number of trips. During the survey itself, creel agents recorded at minimum: the TX boat number for identification, number of anglers, number of harvested Red Snapper, and the time of encounter. We required all *iSnapper* anglers to provide their vessel identification number during the registration process to use the app. This allowed us to cross-reference trips submitted by *iSnapper* participants with dock-

side creel surveys/intercepts to validate data entries. Because of the importance of validating the *iSnapper* trips, TPWD tripled their creel surveys during the high use (spring/summer) season for a total of 108 surveys at these Gulf only sites for both years of this project. In 2017, creel agents from the Center for Sportfish Science and Conservation (CSSC) targeted high use sites during the federal season to try to increase the number of trips that are validated in order to get more accurate harvest estimates that, due to the randomization of TPWD's creel surveys, may otherwise not typically be targeted. In 2018, all sites sampled were selected using TPWD's proportional random sampling, as we determined that while the number of angler encounters was important, the sampling regime was ultimately the factor driving our standard error and will now be the standard for site selection in future years.

With more private recreational anglers providing their catch and effort data, we were able to continue to estimate annual harvest and effort by private recreational anglers. By providing these anglers with a quick and easy way to self-report their catch and effort data, we were able to collect information from a much larger audience by not having to rely on physically encountering these anglers through creel surveys at boat ramps. *iSnapper* is not designed to replace creel surveys, but to be used as a supplemental data source. The creel surveys are still necessary in order to determine angler reporting rate and for data validation purposes. The methods of Liu et al. (2017) were used to calculate the total harvest and effort estimates by using the self-reported data and comparing it to the dock-side creel intercept data, in essentially a capture-recapture population estimate.

Collect and assess socioeconomic data from reef fish fishery participants using iSnapper

The socioecomonic survey was provided to all *iSnapper* Users in the form of a separate "button" on the home screen that they could select and submit. The questions remained unchanged from previous versions for annual comparisons, focusing on annual household and personal fishing effort, and costs of fuel, bait, and other more direct expense information. Data was submitted through the app or online through our website and could be accessed and downloaded by staff for analysis.

Survey questions included:

- How many people in total, including yourself, live in your household? Please include those people who fish and who don't fish.
- How many people in your household, including children and adults, have been recreational saltwater fishing in the last 12 months anywhere in the Gulf of Mexico region including inshore and offshore?
- How many days did you spend saltwater fishing in the last 12 months?
- How many of these days were spent offshore?
- If this fishing trip is part of a longer trip in which you will spend at least one night away from your permanent residence, how many days will this trip last?
- What is your primary and secondary (if applicable) zip code?
- Gender
- What is the total distance traveled by boat during this trip? (Miles)
- Do you keep your boat at a marina or trailered?
- What is the estimated bait and tackle expenses for this trip?
- What is the horsepower of your boat?
- What is the estimated fuel consumption used for this trip? (Gallons)
- Which of the following best describes your household's annual income, before taxes? (US$)

Outcomes

Continue implementation of iSnapper as a data collection app (for Apple and Android platforms including a web portal) for recreational anglers in the Gulf of Mexico.

When *iSnapper* was introduced to the private anglers in 2015 we had a total of 65 unique Users that submitted at least one trip. Unsurprisingly, the number of Users decreased slightly in 2016 to 56 likely due very shortened seasons and anglers perception of no value of going through the efforts of reporting when provided with such few fishing days. In 2017, after re-launching the app and having previous Users re-

register, a total of 66 unique Users submitted at least one trip with the app, so there were slightly more individuals using the app than in the previous year, potentially due to the elongated season. In 2018, we had a significant increase in usage with 151 Users, which we attribute to the 82-day season.

Compare iSnapper data to TPWD creel survey data to validate the electronic data collection.

The 2017 private recreational Red Snapper season was essentially two seasons within one year due to the temporary rule mandated by the Secretary of Commerce, re-opening of the federal waters for an additional 39 days. This additional season was the result of immense pressure from Gulf-state managers and anglers to members of Congress, who felt as though a 3-day season was unwarranted and that calculation of the season length was based on poor data. During the 3-day season, 33 trips were reported by private recreational anglers using the *iSnapper* app. A total of 152 anglers harvested 271 Red Snapper, for a CPUE of 1.8 Red Snapper/Angler. The CPUE from the creel data was slightly higher at 1.9 Red Snapper/angler (1,696 Red Snapper harvested by 899 anglers). Approximately 24% of the trips submitted using the app were validated dockside by creels (8 trips). The reporting rate was 4.03% and the estimated total harvest of private anglers during the initial Federal season was 123,121 (61,844 SE) Red Snapper.

For the additional 39-day season, 81 Red Snapper trips were reported using *iSnapper.* A total of 354 anglers reported harvested 667 Red Snapper (CPUE = 1.9 Red Snapper/Angler). A total of 304 Red Snapper trips were intercepted during creel surveys and 1,195 anglers harvested 2,398 Red Snapper (CPUE = 2.0 Red Snapper/Angler). The total harvest estimate for the entire federal season (42 days, initial and extended) was 43,992 (15,311 SE) Red Snapper, with a reporting rate of 2.53%.

During the 2018 federal season for private recreational Red Snapper anglers, a total of 337 trips were reported using the *iSnapper* app. Those trips resulted in a total of 1,468 anglers and 2,851 Red Snapper harvested and a CPUE of 1.9 Red Snapper/Angler. Due to the prolonged season, a total of 134 angler-intercept creel sites were surveyed, with three surveys canceled due to inclement weather. During these surveys a total of 632 boats targeting or harvesting Red Snapper were encountered. A total of 2,539 angler-trips harvested 4,620 Red Snapper during the federal season for private recreational anglers. The CPUE for those anglers encountered at creel locations was 1.8 Red Snapper/Angler. The reporting rate was 2.67% and the estimated total harvest of private anglers during the Federal season was 88,170 (24,682 SE) Red Snapper.

The decrease in the estimated Red Snapper harvest despite the longer season in 2017 is a prime example of how these data collection techniques (even electronic ones) do not work effectively with such an abbreviated season. With such a narrow amount of time to collect data (hence a small sample size) there is no way to precisely calculate the harvest. This creates a conundrum when determining total harvest – estimates of harvest for such abbreviated season are imprecise, but fisheries managers must use these numbers in determining the total harvest. In contrast, the estimates for the 82-day season in 2018 were much more precise due to the ability to perform more creel surveys and thus collecting more data (Topping et al. 2019, *in Review*).

During the 2017 season, the priority was to try to get as high of a reporting rate and validation as possible, not having any a priori idea of what the parameters would be. Heavily used boat ramps were the prime target for the creel agents with the CSSC and during the initial 3-day season the reporting rate was fairly good (4.03%). However, the rates dropped substantially for the extended season (2.53%). In addition, the standard error calculated from the *iSnapper* data was much higher as compared to TPWD, leading us to reevaluate and adjust our sampling strategy to proportional random sampling in 2018 (as mentioned above), once we were comfortable in that we would have the User-base and enough encounters for validation. Despite having a very similar reporting rate between the two years (approximately 2.5%), we greatly reduced our standard error, indicating that while reporting rate is important, it is more critical to have randomly select sites.

Despite the increased number of federal season days, the annual harvest of Red Snapper as calculated using the estimator has stayed relatively consistent throughout the years. For 2015 and 2016, the annual number harvested was approximately 57,000 Red Snapper. For 2017, the annual harvest was an estimated 71,883 Red Snapper (SE 31,042), which then calculated to a total annual harvest of 379,667 lbs (SE 171,681). In 2018, despite almost twice as many federal season days as compared to 2017, the number harvested was estimated at 66,136 (SE 12,925) for an annual harvest of 353,364 lbs (SE 74,581). It appears as though Texas anglers are harvesting Red Snapper independent of how long the federal season lasts. With state waters open year-round to private anglers, they have the opportunity to fish for and harvest the species at their discretion. It is possible that

one explanation for the increase in annual pounds harvested is the longer federal seasons, however with such high standard errors for 2015–2017, it is difficult to be confident with these estimates and therefore draw these overreaching conclusions.

When comparing the *iSnapper* self-reported data to the creel data, we were encouraged to see that the self-reported data had relatively low standard error considering voluntary data entry. In 2017, there were 14 private recreational trips and one for-hire trip validated through creel surveys. Of those private recreational trips, nine reported a harvest that was the same as was observed by creel agents. There was no consistency in under-reporting versus over-reporting, with three trips reporting slightly less fish and two trips reporting slightly more fish than observed. The gross *iSnapper* reporting error was 15.0%, however the net error was -1.7% compared to the creel harvest. Marina or the boat ramp listed for their launch location was much more variable, with only half of the locations corresponding to the TPWD creel sites. We don't believe Users intentionally put the incorrect marina, but instead simply did not realize what exact boat ramp they were at. For example, one common error was with the Sansom-Yarbrough State Ramp and the Texas City Dike public ramp, which are only 3.8 miles away from each other. In fact, if the latitude and longitude for Sansom-Yarbrough ramp from the TPWD creel manual are input to Google Maps, the location on the map is listed as Texas City Dike. Similarly, the Broadway Public Ramp listed in the TPWD manual is denoted as Sabine Pass Public Boat Ramps on Google Maps. If we eliminate those two common errors, only three trips (21%) reported incorrect launch location. For 2018, when omitting the aforementioned ramps, three launch locations were incorrectly reported, however two of the sites selected were within six miles of the site selected. Only one vessel that was validated had a different number of harvest than was reported. The reporting error (both gross and net) was 2.0%, with the one trip reporting four additional fish than were observed at the creel.

One factor encountered under the current methodology constraints was the validated trips have the potential to be reported after the angler was creeled. In 2017, only three trips were submitted on the day the User fished. For those trips, the average time between the creel and data submission was 4.5 hours. Overall, the average time before the User submitted his/her trip was three days, with a maximum of 16 days. The 16-day lag was likely due to the User simply not submitting their trip and not realizing it until he/she went to complete another trip. This being the case, it is unlikely that angler recall had a significant impact on our harvest estimation due to a majority (57%) of the trips being submitted approximately 24-hours after the creel survey. In 2018, five trips were submitted on the day the User went fishing, with an average lag time of 6 hours. The overall average length of time in between creel and User reporting was 2.6 days, with a maximum of 17 days. Despite this, there was a decrease in the number of trips submitting after 24-hours (49%). However, with only one trip having a different reported harvest we feel very confident with our harvest estimates for 2018.

Collect and assess socioeconomic data from reef fish fishery participants using iSnapper.

Due to the voluntary nature of the app and that anglers were already self-reporting that catch and effort, we did not see as many socioeconomic surveys submitted as we did during the first year *iSnapper* was released to private recreational anglers. In 2017, a total of 29 surveys were completed by private recreational anglers. One for-hire boat submitted a survey, but with only one response we are not including it in the data analysis. Overall, respondents spent an average of 26 days out of the last 12-month saltwater fishing, with an average of seven days spent offshore fishing. The average trip length was 1.7 days, indicating that at least some individuals take several days and do a longer fishing trip with multiple overnight stays. A majority of boats were trailered (76%) and all but three respondents (90%) were males. The average total distance traveled for the trip was 76 miles, indicating that anglers were likely fishing about 30 – 40 miles offshore. The average fuel consumption was 57 gallons. With premium fuel prices in 2017 averaging $2.70/gallon, that's an estimated $154 in fuel costs per trip. Interestingly, when asked the cost of bait and tackle expenses, the average was $8,490. We believe that items such as rods, reels, lures, and other items that the angler might have already purchased was included in this estimate and it does not reflect a "per trip" cost but rather more of an annual cost. Finally, a total of 22 respondents provided their annual household income. A majority (45%) of respondents had an income of $100,000–$149,999. Approximately 77% of respondents indicated a household income of at least $100,000. One person reported less than $75,000 and three indicated greater than $200,000. This was very similar to what we saw in 2015, respondents could be considered in the "wealthy" category. Considering the costs for owning a

boat as well as the items we asked (fuel, bait, frequency of fishing) it is logical that the "typical" Red Snapper fisherman has a sufficient source of income.

In 2018, a total of 50 surveys were completed by private recreational anglers. Overall, respondents spent an average of 38 days out of the last 12-month saltwater fishing, with an average of 17 days spent offshore fishing. Surprisingly, the average trip length was similar to that of 2017 at 1.6 days, despite the long 82-day season. With the long season being announced in the spring, we expected anglers to make more multiple day trips, but that was not the case. While a majority of trips were still submitted by boats that were trailered (68%), there was a slight increase in trips submitted by boats that are kept in marinas. All surveys were submitted by male respondents. The average total distance traveled for the trip was 108 miles, almost 25 miles more than in 2017. It is possible that with an 82-day season, anglers were more likely to pick the best days to go offshore and therefore traveled a greater distance to maximize their catch by fishing bluer water, closer to the 50-mile range. Due to the increased average distance, the average fuel consumption was also greater at 87 gallons. With premium fuel prices in 2018 averaging $3.00/gallon, that's an estimated $260 in fuel costs per trip. For the cost of bait and tackle expenses, the average was $20,617. There was one respondent that said $250,000, wherein he likely included the cost of the boat. If this respondent's answer is omitted, the cost becomes $15,630, approximately twice as much as the 2017 responses. Again, we believe that anglers included items that they had already purchased in this estimate and it does not reflect a "per trip" cost but rather more of an annual cost. Finally, a total of 44 respondents provided their annual household income. The category with the most responses (32%) was a household income of $200,000 and above. Close to 80% of respondents had a household income of at least $100,000. However, five respondents reported an annual household income of less than $75, 000. It is possible that the extended season allowed anglers that have a lower income and potentially only have the opportunity to go fishing on the weekends more access to the fishery. In general, however, Red Snapper anglers continue to be in the "wealthy" category.

3. Lessons Learned

One of the major lessons learned is that recreational anglers are willing and enthusiastic about self-reporting their catch if provided with a quick and easy mechanism. *iSnapper* was created to collect the most amount of data possible with the User only needing to navigate through three screens. Providing Users with a sense of importance also helped increase the likelihood of using the app. When anglers were informed about what the app was intended for (i.e., collecting additional data regarding harvest), as well as the efficiency of entry (less than 5 minutes), they tended to be more receptive to using it.

In addition, having a web-based data entry option also seemed to be important due to some angler's limited knowledge of smartphones. Some individuals did not want to download the app but were willing to provide their data on a website. The website was also used for data management. For example, data was available to be compiled and downloaded for comparison with the creel data. However, additional built in capabilities from an administrative aspect regarding editing trips and Users' account information would have been preferred. For example, if an angler forgot their username and password, we were not able to manually reset it through the website. Instead, a separate site where the raw data was stored had to be accessed to change such information. Thus, there is high value to maintaining a functional user-friendly web portal.

As with many projects that rely heavily on technology, there were several occasions where the app would encounter "glitches." These included the app not recording the harvest of Red Snapper (providing the angler entered it to begin with) and/or not recording the vessel registration numbers. This was mostly rectified by contacting the angler via email and asking for their trip information. We found that if anglers were willing to self-report their trip, they were relatively receptive to our emails and typically replied with the requested information in a timely manner. However, this requires administrative follow-up. Any trips that we could not get the number harvested was omitted from the harvest estimate (14 in 2017 and 18 in 2018). Without the vessel registration numbers, we are potentially missing additional validated trips. However, aside from somehow coupling our registration with the TPWD boater's registration, there is no way to ensure that anglers provide their actual registration numbers. Similarly, we have encountered several vessels at creel surveys that do not have their vessel numbers displayed on the boat. These are likely Coast Guard registered vessels (and therefore do not have to display their numbers) but this means that there is no way to match a self-reported trip to those vessels. While we have a 'work-around' to allow them to create an account in *iSnapper*, there is no way for

creel agents to record boat information to allow us to validate that trip. We have told these Users that they must identify themselves as *iSnapper* Users and that they have a Coast Guard registered vessel, to attempt to include these vessels, but thus far we have had no trips validated in this way. This identification problem will need to be solved in the future.

Despite our encouragement, similar to all other previous years, anglers were still reporting after they returned home from their trip. We promote submitting the trip before getting back to the dock, to decrease recall bias as well as to ensure that encountering a creel agent does not change the angler behavior or impact their reporting accuracy. However, further review does not indicate that anglers were intentionally misreporting their data and were in fact submitting trips with very accurate data. Due to this, we made the assumption that encountering a creel agent did not change the way the anglers reported their harvest. One of the important datums that *iSnapper* collects is the date and time the trip was actually submitted. This proved to be critical since we encouraged anglers to report their catch before returning to the docks. Without knowing when the trip was actually submitted we would have incorrectly assumed that all the self-reported data was submitted prior to creeling, which is the ideal scenario. However, since this did not happen, it was beneficial to see how much time anglers waited to submit their trips, which helped us gauge our confidence in our harvest estimates. We do not have a solution to this problem without requiring a trip ticket or similar mechanism for reporting before allowing the User to begin another trip. Implementing something like this would certainly require increased enforcement and cost, and a stricter reporting system. However, even then these problems have the potential to persist and will need to be overcome.

4. Dissemination

Electronic data collection has become a more acceptable form of data collection and in such, has garnered much support from the general fishing community. When we are creeling anglers at boat ramps, we typically are gauging interest and asking *iSnapper* Users if they have suggestions for making the app more user-friendly. Aside from that, due to the collaborative nature of the project, TPWD is always briefed and informed with the landings and effort estimates calculated using *iSnapper*. We've recently had discussions with TPWD about co-authoring general articles informing anglers about how their self-reported data has been used and our findings to encourage them to either continue or start reporting.

In addition, PI Stunz serves on the Gulf of Mexico Fishery Management Council and is a former member of the Science and Statistical Committee. Thus, he is actively involved in the current management of Red Snapper and these affiliations will help ensure these results are conveyed to the managers in the most efficient manner. PI Stunz has attended and given presentations to the Council where the results of this and other ongoing studies were the primary subject and a major scientific contribution to the workshop material.

5. Project Documents

Include in your final programmatic report, via the Uploads section of this task, the following:

- 2-10 representative photos from the project. Photos need to have a minimum resolution of 300 dpi. For each uploaded photo, provide a photo credit and brief description below;
- Report publications, Power Point (or other) presentations, GIS data, brochures, videos, outreach tools, press releases, media coverage;
- Any project deliverables per the terms of your grant agreement.

POSTING OF FINAL REPORT: *This report and attached project documents may be shared by the Foundation and any Funding Source for the Project via their respective websites. In the event that the Recipient intends to claim that its final report or project documents contains material that does not have to be posted on such websites because it is protected from disclosure by statutory or regulatory provisions, the Recipient shall clearly mark all such potentially protected materials as "PROTECTED" and provide an explanation and complete citation to the statutory or regulatory source for such protection.*

Make your Red Snapper Catch Count

Texas Parks and Wildlife Department sent this bulletin at 05/31/2018 03:00 PM CDT

Report Red Snapper Landings

Your catch counts!

Summer means snapper! The federal **red snapper season begins June 1**. The hard-fighting and great-tasting red snapper is one of the finest sport fish to inhabit the Gulf of Mexico and the number one targeted species offshore of Texas.

We need your help to make sure that Texas gets its share of red snapper – report your red snapper landings.

The free iSnapper app makes reporting even easier. Download the app now at www.iSnapper.org. You can also report your catch online at www.iSnapperonline.org.

How to Report: At the end of each day's trip or soon afterwards, use the app or online reporting tool to submit the basic information about your total red snapper catch. Only one person needs to report for the entire angling party.*

Why to Report: Your help is important. As you may know, management of red snapper continues to be challenging and controversial. In April, Texas gained authority from the National Marine Fisheries Service to open and close the red snapper fishery in federal water. Texas bag and size limits (less than 9 nautical miles from shore) still differ from federal regulations (greater than 9 nautical miles from shore) for red snapper. In federal water it is 2 fish per person daily with a 16-inch minimum size limit, and 4 fish per person daily with a 15-inch minimum in state waters. The collected data will help with monitoring programs and will also serve as an indicator of the health of the red snapper fishery off Texas shores. Your reports will provide that important information.

Thank you in advance for your help.

*Anglers fishing from party boats are exempt from reporting because the captain reports for them. Party boats are generally larger boats where people pay per person, as opposed to paying a single fee (for one or more persons) for a guided trip.

Your Catch Counts!

TEXAS A&M UNIVERSITY CORPUS CHRISTI | HARTE RESEARCH INSTITUTE FOR GULF OF MEXICO STUDIES

TEXAS PARKS & WILDLIFE

Report your **Red Snapper** Landings

Get involved.
Help manage the red snapper fishery for future generations.

At the end of each day's trip, parties that land red snapper are strongly encouraged to report their landings via a mobile app or online. It's fast, simple and easy!

Download the free app at
www.iSnapper.org

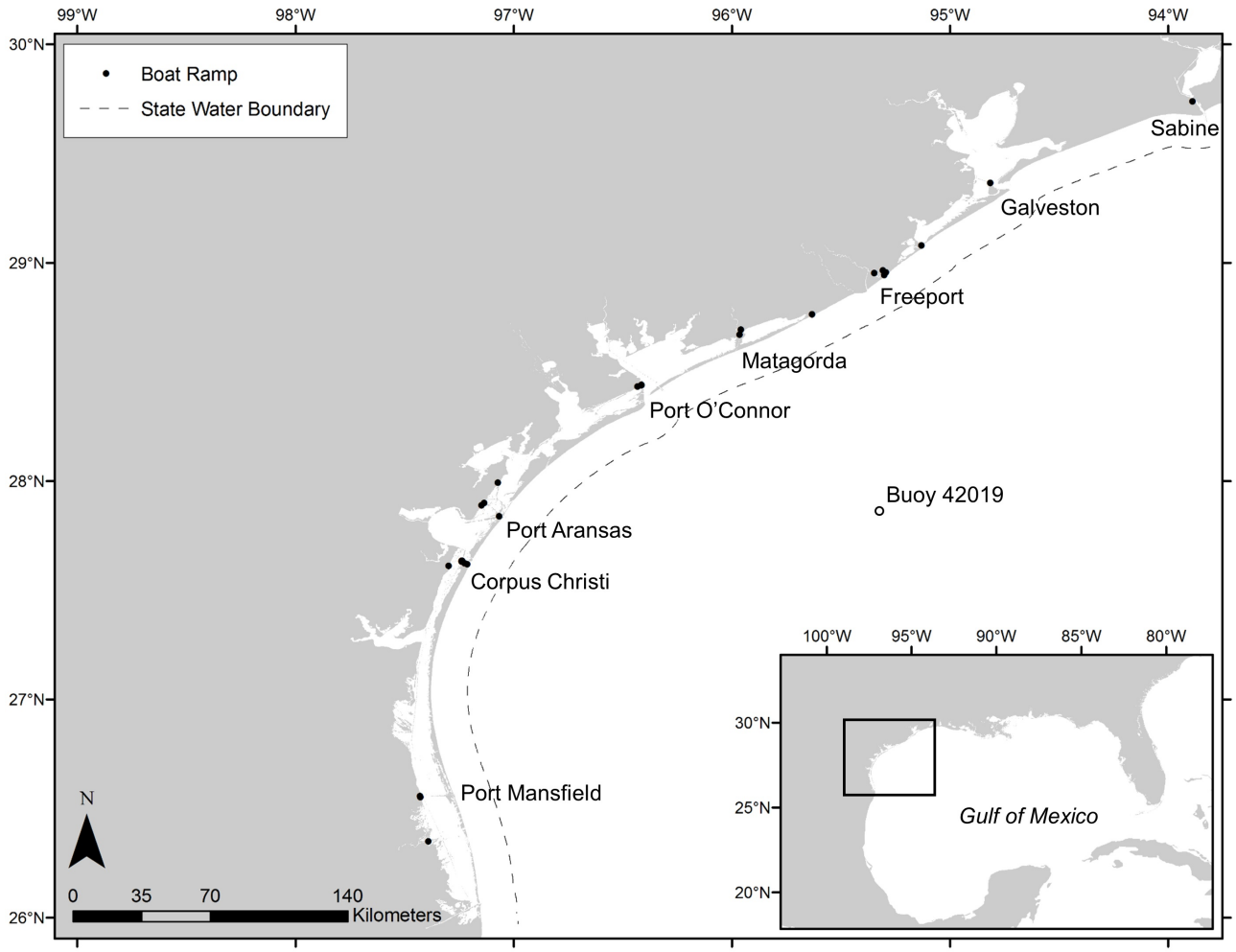
or report online at iSnapperonline.org

Each submittal is important to the management of the red snapper fishery off Texas shores and beyond.

Anglers fishing from party boats are exempt as the captain reports for you.

FOR INFO ABOUT THE REPORTING PROGRAM
Harte Research Institute
iSnapper@sportfishresearch.org
www.sportfishresearch.org

FOR INFO ON THE RED SNAPPER FISHERY
TPWD Coastal Fisheries
cfish@tpwd.texas.gov
www.tpwd.texas.gov


99°W
98°W
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30°N
29°N
28°N
27°N
26°N
Boat Ramp
State Water Boundary
Sabine
Galveston
Freeport
Matagorda
Port O'Connor
Buoy 42019
Port Aransas
Corpus Christi
Port Mansfield
N
0 35 70 140
Kilometers
100°W
95°W
90°W
85°W
80°W
30°N
25°N
20°N
Gulf of Mexico