



April 4, 2019

**Florida Fish
and Wildlife
Conservation
Commission**

Commissioners

Robert A. Spottswood
Chairman
Key West

Michael W. Sole
Vice Chairman
Tequesta

Joshua Kellam
Palm Beach Gardens

Gary Lester
Oxford

Gary Nicklaus
Jupiter

Sonya Rood
St. Augustine

Executive Staff

Eric Sutton
Executive Director

Thomas H. Eason, Ph.D.
Assistant Executive Director

Jennifer Fitzwater
Chief of Staff

Division of Marine
Fisheries Management
Jessica McCawley
Director

(850) 487-0554
(850) 487-4847 FAX

*Managing fish and wildlife
resources for their long-term
well-being and the benefit
of people.*

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: 850-488-4676

Hearing/speech-impaired:
800-955-8771 (T)
800 955-8770 (V)

MyFWC.com

Dr. John T. Carmichael
Deputy Executive Director for Science & Statistics
South Atlantic Fisheries Management Council
John.Carmichael@safmc.net

RE: MRIP Recalibration

Dear Dr. Carmichael,

This letter is written in response to your March 21, 2019 email requesting that state agency representatives provide a letter to the South Atlantic Fishery Management Council's Science and Statistical Committee (SSC) about concerns with revised Marine Recreational Information Program (MRIP) estimates of fishing effort and catch. These concerns are outlined in the two attached letters.

We are appreciative of attempts to improve the procedures used by MRIP. However, estimates of recreational landings using the Fishing Effort Survey (FES) are not consistent with our experience and understanding of managed fisheries and unrealistic. In the two attached letters, we provide examples about why we think that the estimates generated from the FES defy common sense.

We do not believe that the estimates generated from the FES should be used to determine stock status, catch advice, or allocation decisions until potential biases causing these unrealistic estimates have been identified and the estimates have been corrected. Until this recalibration has been done, utilization of the FES generated estimates in assessments and for allocation decisions can lead to inappropriate stock status determinations and allocation formulations.

Please feel free to call me at (850)-251-2458 if you have any questions.

Sincerely,

James R. Estes
Deputy Director

Enclosure

cc: Jessica McCawley
Gil McRae
Luiz Barbieri



Florida Fish and Wildlife Conservation Commission

Commissioners

Robert A. Spottswood
Chairman
Key West

Michael W. Sole
Vice Chairman
Tequesta

Joshua Kellam
Palm Beach Gardens

Gary Lester
Oxford

Gary Nicklaus
Jupiter

Sonya Rood
St. Augustine

Office of the
Executive Director
Eric Sutton
Executive Director

Thomas H. Eason, Ph.D.
Assistant Executive Director

Jennifer Fitzwater
Chief of Staff

850-487-3796
850-921-5786 FAX

*Managing fish and wildlife
resources for their long-term
well-being and the benefit
of people.*

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: 850-488-4676

Hearing/speech-impaired:
800-955-8771 (T)
800 955-8770 (V)

MyFWC.com

March 1, 2019

Jessica McCawley, Chairman
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

RE: MRIP Calibration

Dear Jessica:

Accurate information about angler effort, harvest and catch rates is necessary for proper management of our marine fisheries. The sustainability of these stocks is essential to provide for the economic and social benefits that are derived from them. The Florida Fish and Wildlife Conservation Commission (FWC) has concerns about the immediate use of the Marine Recreational Information Program (MRIP) Fishing Effort Survey (FES) effort estimates to calculate catch for the species managed by the South Atlantic Fishery Management Council (SAMFC). While the survey methodology underlying the FES is clearly an improvement from that used for the Coastal Household Telephone Survey (CHTS), the initial effort estimates based on the FES are dramatically higher than historical estimates and implausible based on our understanding of Florida fisheries. Also, it is important to note that the magnitude of these effort estimates differs dramatically from those generated by NOAA Fisheries certified surveys conducted by the Gulf states. Due to concern over these differences, the Gulf of Mexico Fishery Management Council (GMFMC) Scientific and Statistical Committee (SSC) has recommended a cautious approach when utilizing potentially conflicting estimates of harvest in stock assessments until these differences can be reconciled and corrected if necessary.

It is important that fisheries managers use the best available science when making decisions that impact fish stocks and the stakeholders that use these stocks. We believe that this process should include taking the time necessary to ensure that a newly implemented survey approach is generating plausible results free of bias. Although the National Academy of Sciences conducted a critical review of the methods used in the FES, we do not believe that the results of the survey are reliable. Fisheries managers already face a lack of confidence from stakeholders. It is important that the public is confident in the results of our data collection techniques so that managers' credibility is not further eroded. Additionally, the effect of the magnitude of changes of estimates of effort and harvest from the CHTS and FES to stock status and the allowable biological catch is unknown.

The magnitude of differences in new catch estimates generated from FES compared to those generated from the CHTS and some observations that we have made in Florida make us question the accuracy of these estimates. Some of these observations include:

- Different independent surveys conducted by Gulf states consistently generate substantially lower estimates of effort and catch than those generated from the FES. The Florida Gulf Reef Fish Survey, certified by NOAA Fisheries, and using a mail survey similar to the FES, estimated 1.2 million private/rental boat trips targeting ten reef fish species in the Gulf of Mexico in 2017. The FES generated estimate for **total** private/rental boat trips on Florida's west coast in 2017 was more than 18 million trips. Given the popularity of reef fish as target species off Florida's west coast, it is difficult to believe that only 6% of the boat-based trips in 2017 targeted these reef species on Florida's Gulf coast. Leading us to believe the FES greatly overestimated the number of trips.

- 2.3 million saltwater fishing licenses were sold in 2017 in Florida. Moreover, there may also be up to 40% of our anglers who are exempt. This would mean that we have about 4 million saltwater anglers. The number of trips estimated using the FES in Florida is approximately 80 million, meaning that on average, anglers fish 20 days per year. We do not believe that an average angler takes 20 fishing trips per year.
- FES generated statewide estimates of effort for shoreline anglers are four times as high as those estimated from CHTS. These estimates were seven times higher than those generated by CHTS on the Atlantic coast of Florida. The FES statewide estimates indicate that in 2017, there were **51.4 million shoreline trips** in Florida. This FES generated estimate equates to an **average of 4,000 trips per day** for each of Florida's 35 coastal counties or an **average of 65 trips per day for each mile** of tidal shoreline. We do not believe these estimates reflect reality.
- The 2016 National Survey of Hunting, Fishing, and Wildlife Associated Recreation conducted by the US Fish and Wildlife Service estimated that anglers 16 years old and older completed **61 million** saltwater trips **nationwide**. FES generated effort for 2017 indicates that there were over **80 million** saltwater fishing trips in Florida alone. The extreme lack of corroboration with this independent survey alone is enough to warrant further investigation into the veracity of the FES.

For the period 2000-2017, the estimates from the FES indicate that statewide trips are 2.8 to 3.9 times higher than previous estimates. This dramatic difference in fishing effort results in estimates of harvest that are far greater than what we had been managing for previously. For example, the new statewide estimate of the harvest of red snapper is double what it was for the old estimates. For inshore species, such as common snook, harvest estimates are more than triple those calculated previously.

In summary, we believe that there is ample evidence that the FES may be over-estimating fishing effort. We also believe that there should be a thorough analysis of the effect of these estimates on stock status and allocation before they are used for management of our fish stocks. Utilization of these estimates, that in some cases appear to be non-sensical, will affect management decisions and further erode the public's confidence in a management process that already has lost public confidence. These estimates need to be reviewed thoroughly by a panel of statistical experts to ensure that the FES design is **functioning** as intended. Also, the implications of using these estimates for management should be examined thoroughly through an extensive data workshop process on an individual species level. We plan to send a letter to NOAA to request that they embark on an analysis of potential biases associated with the FES that may be causing unrealistic estimates of effort.

We urge the SAMFC to pause in the use of FES generated estimates for management until the results of the FES can be fully reviewed and important issues are resolved.

Thank you for your considerations. Please feel free to direct any questions or comments to Jim Estes in our Division of Marine Fisheries Management at (850)-617-9622.

Sincerely,



Thomas H. Eason, Ph.D.
Assistant Executive Director



March 1, 2019

Florida Fish and Wildlife Conservation Commission

Commissioners

Robert A. Spottswood
Chairman
Key West

Michael W. Sole
Vice Chairman
Tequesta

Joshua Kellam
Palm Beach Gardens

Gary Lester
Oxford

Gary Nicklaus
Jupiter

Sonya Rood
St. Augustine

Office of the
Executive Director
Eric Sutton
Executive Director

Thomas H. Eason, Ph.D.
Assistant Executive Director

Jennifer Fitzwater
Chief of Staff

850-487-3796
850-921-5786 FAX

*Managing fish and wildlife
resources for their long-term
well-being and the benefit
of people.*

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: 850-488-4676

Hearing/speech-impaired:
800-955-8771 (T)
800 955-8770 (V)

MyFWC.com

Chris Oliver, Assistant Administrator for Fisheries
National Oceanic and Atmospheric Administration
1315 East-West Highway, 14th Floor
Silver Spring, MD 20910

RE: MRIP Recalibration

Dear Chris:

Accurate information about angler effort, harvest and catch rates is necessary for proper management of our fisheries. The sustainability of these stocks is essential to provide for the economic and social benefits that are derived from them. The Florida Fish and Wildlife Conservation Commission (FWC) has concerns about the immediate use of the Marine Recreational Information Program (MRIP) Fishing Effort Survey (FES) effort estimates to calculate catch for the species managed by the Fishery Management Councils. While the survey methodology underlying the FES is clearly an improvement from that used for the Coastal Household Telephone Survey (CHTS), the initial effort estimates based on the FES are dramatically higher than historical estimates and implausible based on our understanding of Florida fisheries. Also, it is important to note that the magnitude of these effort estimates differs dramatically from those generated by NOAA Fisheries certified surveys conducted by the Gulf states. Due to concern over these differences, the Gulf of Mexico Fishery Management Council (GMFMC) and the South Atlantic Fishery Management Council (SAFMC) Scientific and Statistical Committees (SSC) have recommended a cautious approach when utilizing potentially conflicting estimates of harvest in stock assessments until these differences can be reconciled and corrected if necessary.

It is important that fisheries managers use the best available science when making decisions that impact fish stocks and the stakeholders that use these stocks. We believe that this process should include taking the time necessary to ensure that a newly implemented survey approach is generating plausible results free of bias. Although the National Academy of Sciences conducted a critical review of the methods used in the FES, we do not believe that the results of the survey are reliable. Fisheries managers already face a lack of confidence from stakeholders. It is important that the public is confident in the results of our data collection techniques so that managers' credibility is not further eroded. Additionally, the effect of the magnitude of changes of estimates of effort and harvest from the CHTS and FES to stock status and the allowable biological catch is unknown.

The magnitude of differences in new catch estimates generated from FES compared to those generated from the CHTS and some observations that we have made in Florida make us question the accuracy of these estimates. Some of these observations include:

- Different independent surveys conducted by Gulf states consistently generate substantially lower estimates of effort and catch than those generated from the FES. The Florida Gulf Reef Fish Survey, certified by NOAA Fisheries, and using a mail survey similar to the FES, estimated 1.2 million private/rental boat trips targeting ten reef fish species in the Gulf of Mexico in 2017. The FES generated estimate for **total** private/rental boat trips on Florida's west coast in 2017 was more than 18 million trips. Given the popularity of reef fish as target species off Florida's west coast, it is difficult to believe that only 6% of the boat-based trips in 2017 targeted these reef species on Florida's Gulf coast. Leading us to believe the FES greatly overestimated the number of trips.

- 2.3 million saltwater fishing licenses were sold in 2017 in Florida. Moreover, there may also be up to 40% of our anglers who are exempt. This would mean that we have about 4 million saltwater anglers. The number of trips estimated using the FES in Florida is approximately 80 million, meaning that on average, anglers fish 20 days per year. We do not believe that an average angler takes 20 fishing trips per year.
- FES generated statewide estimates of effort for shoreline anglers are four times as high as those estimated from CHTS. These estimates were seven times higher than those generated by CHTS on the Atlantic coast of Florida. The FES statewide estimates indicate that in 2017, there were **51.4 million shoreline trips** in Florida. This FES generated estimate equates to an **average of 4,000 trips per day** for each of Florida's 35 coastal counties or an **average of 65 trips per day for each mile** of tidal shoreline. We do not believe these estimates reflect reality.
- The 2016 National Survey of Hunting, Fishing, and Wildlife Associated Recreation conducted by the US Fish and Wildlife Service estimated that anglers 16 years old and older completed **61 million** saltwater trips **nationwide**. FES generated effort for 2017 indicates that there were over **80 million** saltwater fishing trips in Florida alone. The extreme lack of corroboration with this independent survey alone is enough to warrant further investigation into the veracity of the FES.

For the period 2000-2017, the estimates from the FES indicate that statewide trips are 2.8 to 3.9 times higher than previous estimates. This dramatic difference in fishing effort results in estimates of harvest that are far greater than what we had been managing for previously. For example, the new statewide estimate of the harvest of red snapper is double what it was for the old estimates. For inshore species, such as common snook, harvest estimates are more than triple those calculated previously.

In summary, we believe that there is ample evidence that the FES may be over-estimating fishing effort. We also believe that there should be a thorough analysis of the effect of these estimates on stock status and allocation before they are used for management of our fish stocks. Utilization of these estimates, that in some cases appear to be non-sensical will affect management decisions and further erode the public's confidence in a management process that already has lost public confidence. We are requesting that the FES generated estimates be reviewed thoroughly by a panel of statistical experts to ensure that the FES design is **functioning** as intended.

Thank you for your considerations. Please feel free to direct any questions or comments to Jessica McCawley in our Division of Marine Fisheries Management at (850)-617-9635.

Sincerely,



Thomas H. Eason, Ph.D.
Assistant Executive Director

MARK WILLIAMS
COMMISSIONER

DOUG HAYMANS
DIRECTOR

April 4, 2019

John Carmichael, Deputy Executive Director for Science & Statistics
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

Dear John:

During the March SAFMC meeting, there was considerable discussion relative to Florida Fish and Wildlife Conservation Commission's March 1, 2019 letters to NOAA and the SAFMC regarding use of the new MRIP Fishing Effort Survey (FES) effort estimates. Georgia shares similar concerns with Florida about the magnitude of estimated angler trips now available from the FES, particularly in the shore fishing mode. While we do not advocate continuing to use estimates from the Coastal Household Telephone Survey (CHTS), the estimates of saltwater fishing trips in Georgia from the FES are difficult to accept. Below are a few observations relative to saltwater angler effort we have noted for Georgia.

In Georgia, anglers must obtain a free Saltwater Information Program permit (SIP permit), in addition to a general recreational fishing license, in order to saltwater fish. Since its creation in 2013, each year approximately 250,000 SIP permits are obtained by anglers. Using the average annual FES estimate from 2014-2018 of approximately four million private/rental (PR) and shore (SH) angler trips, each angler with a SIP permit would take an average of 16 trips per year in Georgia.

For the time period of 2013-2017, the average annual FES estimate of PR and SH angler trips is six times higher than the CHTS estimate. When broken down by fishing mode, the FES SH estimate is eight times higher than the CHTS estimate, and four times higher for the PR mode. As indicated in the MRIP FES transition final progress report, for 2015-2017, the magnitude of difference in the two estimates for Georgia was the highest of all Atlantic and Gulf states for SH mode, and second highest for PR mode.

Unlike in the Gulf States, Georgia does not have an alternate MRIP certified effort survey to compare to FES estimates. However, we do have estimates of average angler effort based on observation at each public access site. These are available in the MRIP Site Register (SR), and were used as the basis to calculate average predicted PR and SH angler effort estimates at the public access sites in Georgia (please see Appendix A for details). This calculation is limited in its utility, and is presented only as a measure of observed predicted effort at public access sites in Georgia.

- 2018 Site Register (SR) estimates PR = 296,490 SH = 137,900 Total = 434,390
- Average FES estimates 2014-2018 PR = 1,407,273 SH = 2,665,607 Total = 4,072,880
- Ratio of Ave 2014-2018 FES to 2018 SR PR = 4.7 SH = 19.3 Total = 9.4

The FES does not provide data on proportion of angler trips estimated as occurring from public vs. private access sites. Similarly, we cannot estimate what additional proportion of trips should be added to the Site Register estimate to account for those from private access locations. However, based on knowledge of recreational fishing in coastal Georgia, we do not believe the proportion of private to public access fishing fully accounts for the differences noted here. Additionally, the SR estimate indicates higher fishing effort in the PR mode (2 PR: 1 SH), and matches what our samplers routinely observe at our public access sites in coastal Georgia. The FES estimate, which includes fishing from both public and private access sites, indicates the opposite, with 1 PR: 2 SH trips. Our observations as both residents of and researchers in coastal Georgia do not support the FES ratio of PR to SH angler trips.

We strongly agree with Florida's comment, "there should be a thorough analysis of the effect of these estimates on stock status and allocation before they are used for management of our fish stocks." We look forward to the opportunity to meet at the proposed workshop to include SSC members, NMFS staff, and state representatives.

Sincerely,



Doug Haymans

Cc: Kathy Knowlton
Carolyn Belcher
Julie Califf

Appendix A

The 2018 Site Register (SR) estimate is based on observed average SH & PR angler trips by month expected at Georgia public access sites as listed in the MRIP site register.

Ratios listed below: average FES estimate 2014-2018 to 2018 SR estimate; for 2013-2017, average FES estimate to average CHTS estimate.

Month	# PR Trips	# SH Trips	Total Trips
JAN	15,120	8,560	23,680
FEB	15,360	8,560	23,920
MAR	17,210	8,150	25,360
APR	19,410	9,210	28,620
MAY	22,050	10,290	32,340
JUN	31,950	15,690	47,640
JUL	35,740	17,130	52,870
AUG	35,900	17,130	53,030
SEP	36,530	14,090	50,620
OCT	29,050	12,930	41,980
NOV	21,130	9,240	30,370
DEC	17,040	6,920	23,960
2018 Site Register (SR) estimates	296,490	137,900	434,390
Average FES estimates 2014-2018	1,407,273	2,665,607	4,072,880
Ratio: Ave 2014-2018 FES/2018 SR	4.7	19.3	9.4
Average CHTS estimates 2013-2017	335,158	318,854	654,011
Average FES estimates 2013-2017	1,358,958	2,547,230	3,906,188
Ratio: 2013-2017 Ave FES/Ave CHTS	4.1	8.0	6.0

Caveats for estimates based on Georgia public access sites listed in the MRIP Site Register:

- Estimates are based on average angler effort observed at each site. Actual effort varies based on weather conditions, holidays, etc. At minimum, all Georgia sites are observed once per calendar year.
- For each public access site with a SH and/or PR angler pressure category, the upper value within the range of expected number of angler trips was summed across each month, day type, and fishing mode combination during the peak time interval (11AM-5PM). That estimate was then doubled to account for expected angler trips during the three-hour time blocks previous to (8AM-11AM) and following (5PM-8PM) the peak interval. For example, if a site's SH or PR pressure category for a specific month/day type/time interval represented 9-12 anglers expected to complete their fishing trip during that time interval, a value of "12" angler trips was used in the estimate.
- Estimates do not include trips leaving from private access sites.



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

STEPHEN W. MURPHEY
Director

April 5, 2019

Mr. John Carmichael
Deputy Executive Director for Science & Statistics
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

Dear John,

The North Carolina Division of Marine Fisheries appreciates the opportunity to provide input to the South Atlantic Fisheries Management Council's Science and Statistical Committee (SSC) on the use of the Fishing Effort Survey (FES) data in management decisions. North Carolina has one of the most robust recreational data collection programs for catch and effort information in the country and a long history of cooperating with the National Oceanic and Atmospheric Administration (NOAA) in survey design, improvement, and implementation. The Division acknowledges the need for the new effort estimation methodology given the inherent issues identified in the Coastal Household Telephone Survey (CHTS) and agrees with the National Academy of Sciences review of the new methodology and the SSC's determination that the FES is the Best Scientific Information Available. However, the increase in estimated effort, and subsequent estimates of catch from the Marine Recreational Information Program (MRIP) from private vessel and shore modes, are considerably higher than previous estimates and has proven difficult for fishery managers and the angling public to comprehend within the context of our fisheries.

The Division requests that NOAA Fisheries provide further information on the effort survey methodology and expansion procedures used for estimating effort to better understand the new estimates. Attached is a comparison of the old CHTS method and the FES to pier reporting logs from all coastal fishing piers in North Carolina to highlight inconsistencies in effort estimates, specifically for the shore mode. Prior to the transition to the FES, shore effort and landings in North Carolina were further divided into beach/bank and manmade structure modes to better partition the effort from shore for species like king mackerel and cobia, which are more accessible from piers as opposed to surf and bank fisherman. This distinction characterizes the fisheries for these species and decreases the uncertainty in effort and catch estimates. In the new FES calibrated MRIP estimates, these two modes have been collapsed into the broader shore mode and it appears that effort from the beach/bank component has been expanded to catch estimates of these species. This is evident in the almost 7-fold increase in catch for king

mackerel from the shore derived from the new FES calibrated catch estimates, which is substantially higher effort estimate than what was generated for the shore mode across the board.

Also of concern are the back calibrated effort estimates generated from the FES/CHTS calibration model. The trends in the recalibrated effort estimates appear to not reflect perceived changes in effort during the economic downturn of the late 2000s and annual effects from significant hurricanes and other environmental events. We are concerned about the effect that mischaracterization of historic landings may have on annual catch estimates and rates of fishing mortality generated from assessments. This could affect overfished and overfishing status determinations which may result in flawed management decisions. We request that NOAA Fisheries and the SSC review the calibration model's consideration of major influences on effort that occurred intermittently across the timeline of CHTS but not during the period when both CHTS and FES were running in parallel to ensure that trends in real effort are reflected in the new estimates.

We acknowledge that recreational effort, especially shore mode, was underestimated with the CHTS with approximately 40-50% unlicensed angler effort identified during the FES pilot work in North Carolina. Nonetheless, this does not fully account for the apparent increase in angler effort from private vessel and shore modes. We would appreciate further explanation for these new trends in angler effort and catch with further discussion of the specific issues raised and accompanying documentation so we may better convey to our stakeholders the improved data collection methods and confidence in recreational catch estimates.

Sincerely,



Stephen W. Murphey

SM/sp

Cc: Steve Poland
Dee Lupton
Chris Batsavage
Stephanie McNerny

Attachment

Comparing Pier Reporting Logs with Coastal Household Telephone Survey (CHTS) and Fishing Effort Survey (FES) Estimates

The 2007 implementation of a Coastal Recreational Fishing License (CRFL) exemption for anglers using ocean fishing piers prompted the adoption of a mandatory logbook of angler participation in 2012 to accurately assess effort from these sites. Concurrent data collection streams included North Carolina's partnership with the National Oceanic and Atmospheric Administration (NOAA) conducting the Marine Recreational Information Program (MRIP). Specifically, MRIP's effort component, the Coastal Household Telephone Survey (CHTS). The CHTS randomly contacts coastal households (defined as within 100 miles of the coast) and inquires about the number of fishing trips as well as the mode of fishing (i.e. manmade structure, beach/bank, private/rental boat). The identification of severe deficiencies within the CHTS methodology including: recall bias, gatekeeper effects, low response rates (~9%), incomplete sampling frames, and the diminishing prevalence of landlines caused NOAA to explore alternate methods to collect effort data from the saltwater angling community. Thus, in 2014 the FES mail survey was piloted in concurrence with the CHTS for three years. The results of this investigation revealed that the FES was a substantial improvement over the CHTS as evidenced by increased response rates (~35%). Beginning in 2018 FES replaced CHTS as the effort component of MRIP.

The FES estimates of effort exerted a tremendous increase in total and mode specific effort as well as catch relative to the CHTS. For example, total effort in 2017 increased from ~5 million trips under CHTS to ~20 million trips under FES. Additionally, mode specific differentials were detected the most apparent of which included shore based angler effort increasing by 4 to 6x. Importantly, the FES survey template differed from the CHTS in that manmade and beach/bank modes of fishing were collapsed into a singular "shore" mode. The collection of manmade and beach/bank modes from CHTS facilitated a coarse "ground truthing" of effort with NCDMF pier logbooks. However, manmade effort estimates from the CHTS include structures other than piers (e.g. jetties) and comparisons with pier logs are not necessarily comparable. CHTS estimates of manmade effort were 2.8x larger than reported from pier logs and implies an over-estimation. Unfortunately, the elimination of a manmade fishing mode in the FES methodology inflates angler effort by transferring from the collapsed shore mode into the manmade mode before domain estimates can be calculated. This front end increase in shore mode effort from FES has a direct impact on domain level catch estimate calculations by distributing catch rates from shore mode into constituent domains (manmade structure and beach/bank). Conversely, the calculation of shore based effort displaces species harvest from manmade structures and generates a distorted narrative of catch. This is particularly evident for species such as Spanish and king mackerel and cobia. Unfortunately, due to these limitations it is not possible to directly compare NCDMF pier logs with FES mode specific effort.

To effectively evaluate the validity of FES effort estimates it will be critical to understand how the underlying sampling strata influence the expansion of mode specific effort. The sampling frame used by FES is extremely robust and includes in state licensed anglers who match valid postal service addresses as well as non-licensed individuals who also have valid mailing addresses. Additionally, the FES includes all North Carolina counties as well as an out-

of-state adjustment metric. Of particular relevance are mode specific compliance rates. FES pilot work estimated North Carolina unlicensed anglers at 40-50% across both shore and private/rental boat modes. This high level of non-compliance in North Carolina suggests that the size of the saltwater angling population was substantially underestimated using only the license frame. These levels of non-compliance support the FES doubling of effort from private/rental boat mode but do not explain the 4-6x increase in effort from shore mode. It would be beneficial to compare non-compliance rates from NCDMF Marine Patrol with those obtained from FES.

Table 1. Comparison of NCDMF Pier Log with CHTS and FES Effort Estimates

Year	FES	CHTS	X-fold Increase FES/CHTS	DMF PIER LOG	X-fold Increase FES/DMF	X-fold Increase CHTS/DMF
2012	4,538,527	1,080,297	4.2	320,298	14.2	3.4
2013	5,805,637	1,275,410	4.6	358,925	16.2	3.6
2014	4,903,730	1,168,853	4.2	373,599	13.1	3.1
2015	5,008,885	887,001	5.6	361,794	13.8	2.5
2016	3,747,003	926,969	4.0	357,658	10.5	2.6
2017	6,121,176	867,822	7.1	314,847	19.4	2.8

