Marine Recreational Information Program
Fishing Effort Survey Transition
Progress Report

October 28, 2016

The MRIP Fishing Effort Survey (FES) was implemented in January, 2015 to estimate shore and private boat fishing effort for states in the Atlantic and Gulf of Mexico regions. The FES design, which was tested in MA, NY, NC and FL in 2013, has been identified as a more efficient and accurate approach for monitoring recreational fishing effort than the Coastal Household Telephone Survey (Andrews et al., 2014). Testing of the FES suggested that the design is less susceptible to survey errors than the CHTS and demonstrated that FES estimates were considerably larger than CHTS estimates.

Given the magnitude of differences between FES and CHTS effort estimates, NOAA Fisheries developed and executed a Transition Plan to facilitate the transition from the CHTS to the FES. The Transition Plan includes a three-year benchmarking period during which the FES and CHTS will be conducted concurrently in all Atlantic and Gulf coast states. This document describes results from the first full year (wave 1, 2015 – wave 6, 2015) of the benchmarking period.

Response Rates

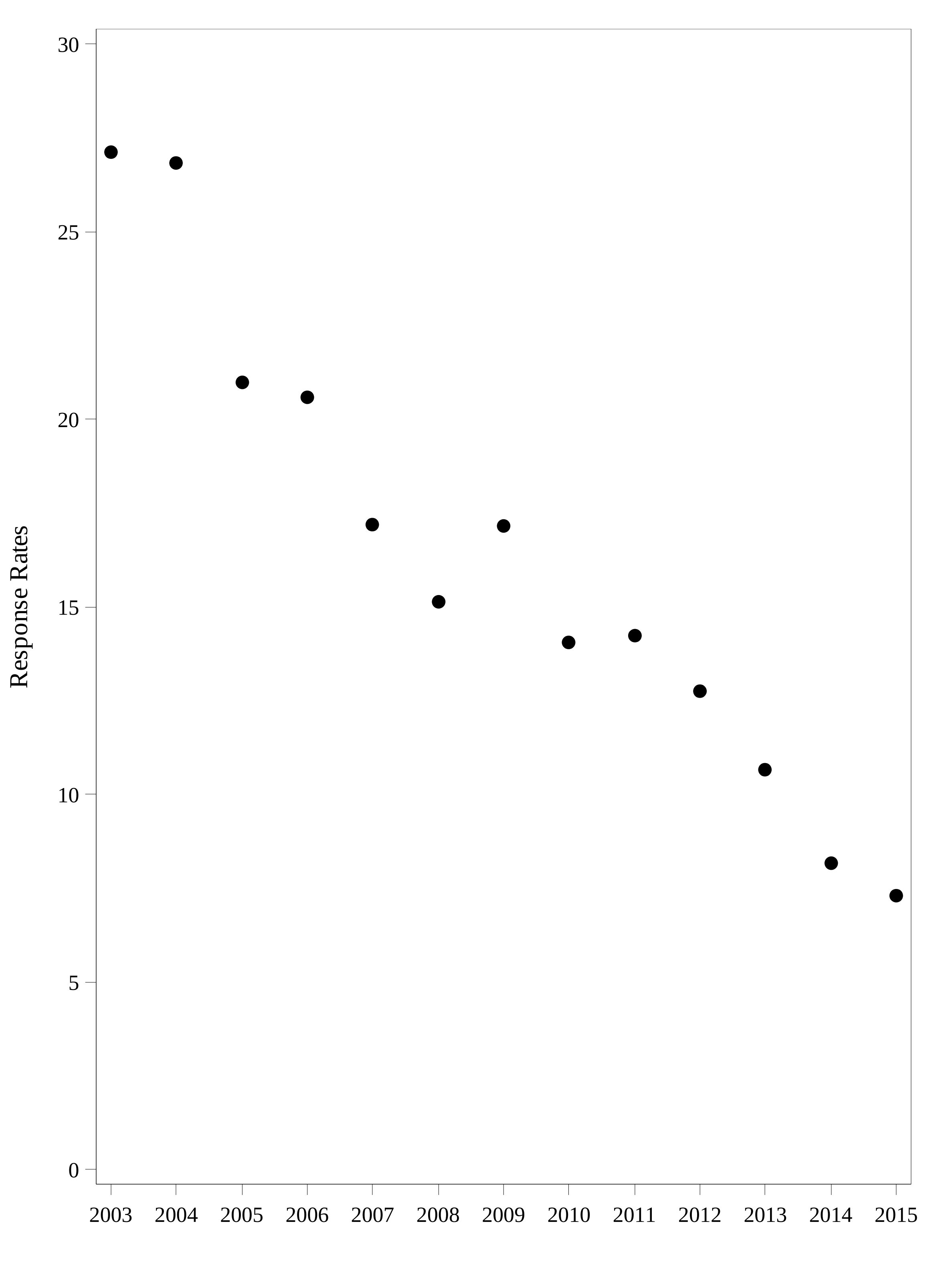
Table 1 provides final response rates for the 2015 CHTS and FES. During 2015, the 2015 FES achieved an overall response rate of 35.1%. Among states, response rates ranged from 32.3% in NJ to 44.7% in ME. In contrast, the CHTS achieved an overall response rate of 7.3%, and response rates ranged from 4.6% in RI to 11.2% in ME. The overall CHTS response rate for 2015 is consistent with the steady decline in response rates that has been observed over the past 10+ years (Figure 1).

Table 1. Weighted response rates overall and by state for the 2015 FES and FES Pilot Study.

State	2015 CHTS	2015 FES
AL	11.0	35.2
CT	8.2	35.0
DE	8.0	37.1
FL	7.5	34.3
GA	9.1	32.6
LA	8.0	32.5
ME	11.2	44.7
MD	4.8	36.6
MA	5.7	37.6
MS	9.1	34.9
NH	8.8	39.1
NJ	7.1	32.3
NY	6.6	33.6
NC	9.2	37.2
RI	4.6	38.1
SC	9.9	38.3
VA	7.6	38.3
Overall	7.3	35.1

Note: American Association for Public Opinion Research Response Rate 2 (AAPOR RR2). Response rate formula excludes ineligible addresses.

Figure 1. Annual CHTS response rates (AAPOR RR2) from the period 2003-2015.



FES/CHTS Estimate Comparisons

Overall, the FES estimate of total shore and private boat fishing effort across all states and waves (waves 1-4, 2015) is 4.7 times larger than the corresponding CHTS estimate (245,000,000 angler trips vs. 52,000,000 angler trips). This result is similar to pilot study results, where the overall FES estimate was 4.1 times larger than the CHTS estimate. We believe that the larger difference between FES and CHTS estimates in 2015 is the result of the expanded coverage of the FES to all Atlantic and Gulf of Mexico states in 2015, as well as the continued deterioration of the CHTS between 2013 and 2015 (i.e. declining response rates and coverage of landline telephone service).

As in the pilot study, overall differences between FES and CHTS estimates are larger for shore fishing (6.2X) than for private boat fishing (3.3X) (Figure 2). Differences between FES and CHTS estimates are larger for shore fishing (Figures 3a-6a) than private boat fishing (Figures 3b-6b) in all states. Differences between FES and CHTS estimates range from a factor of 2.2 for private boat fishing in Louisiana and Alabama to a factor of 11.1 for shore fishing in Georgia.

Figure 2. 2015 FES and CHTS effort estimates and the ratio of FES to CHTS estimates by fishing mode across all states and waves (wave 1-6, 2015).

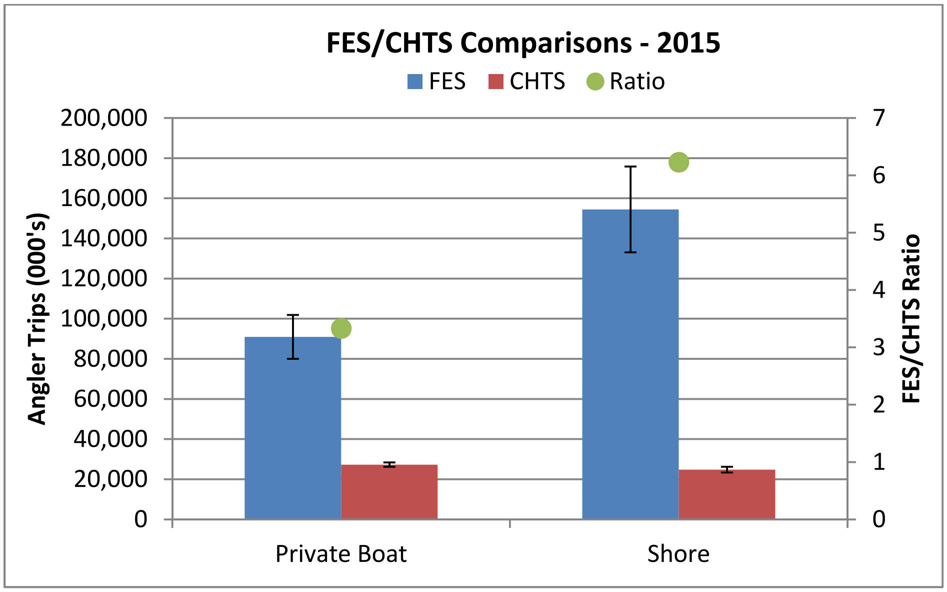


Figure 3a. 2015 FES and CHTS shore fishing effort estimates by state, North Atlantic subregion

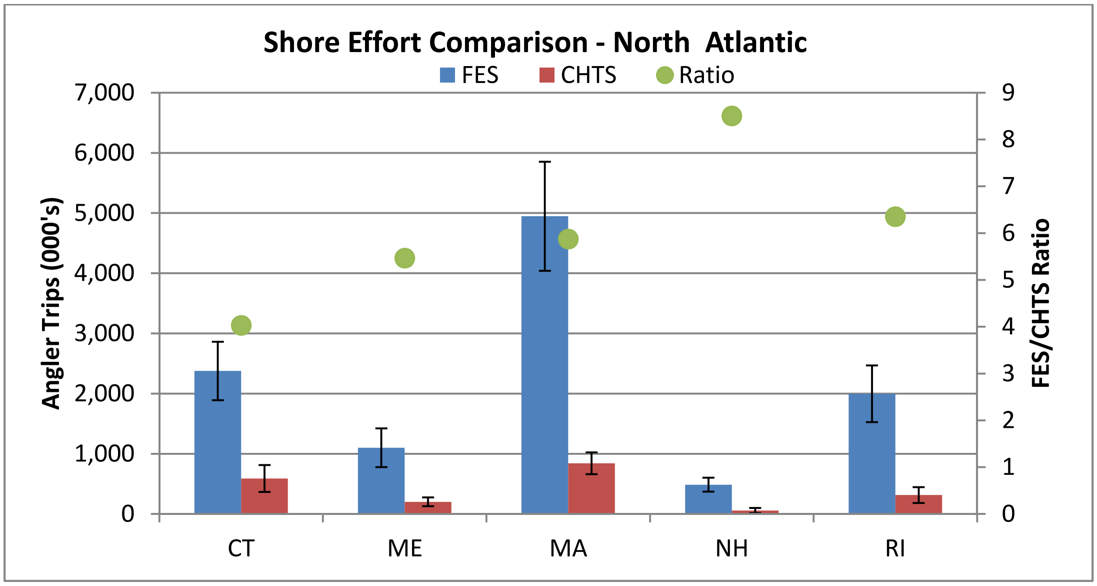


Figure 3a. 2015 FES and private boat fishing effort estimates by state, North Atlantic subregion

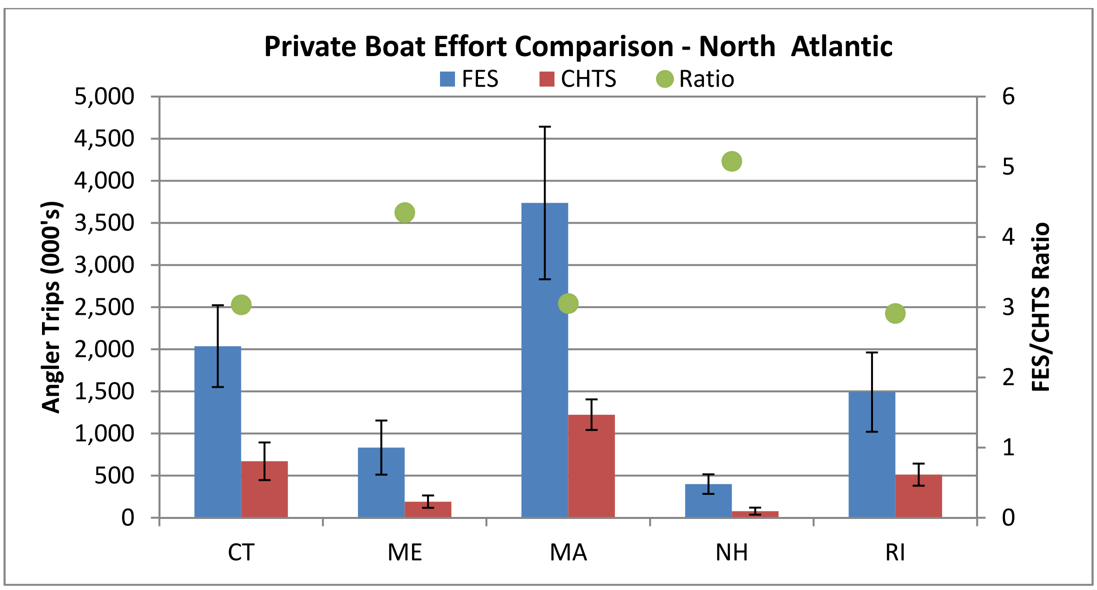


Figure 4a. 2015 FES and CHTS shore fishing effort estimates by state, Mid Atlantic subregion

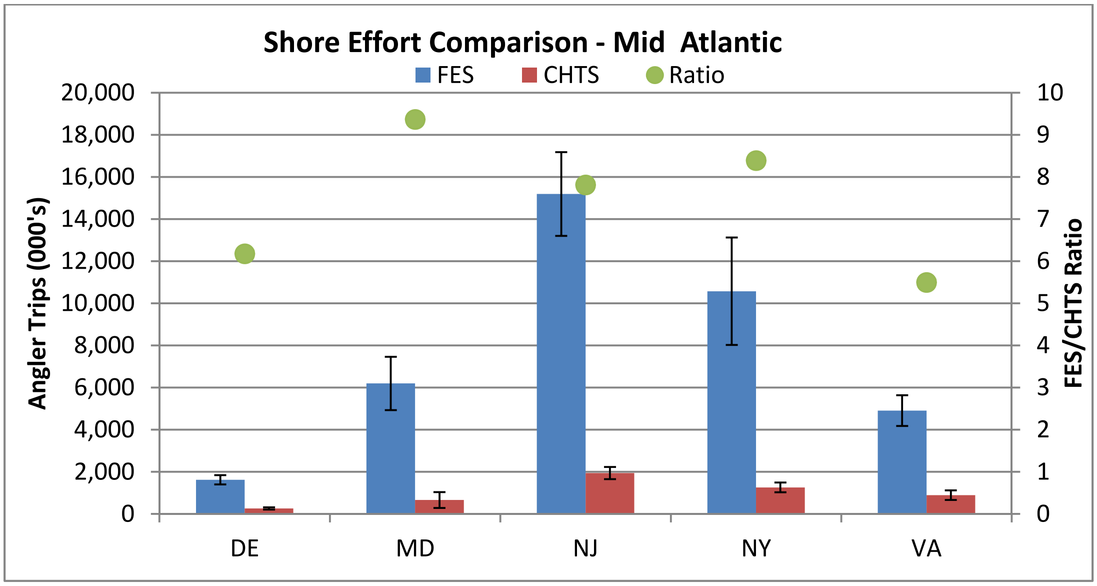


Figure 4b. 2015 FES and private boat fishing effort estimates by state, Mid Atlantic subregion

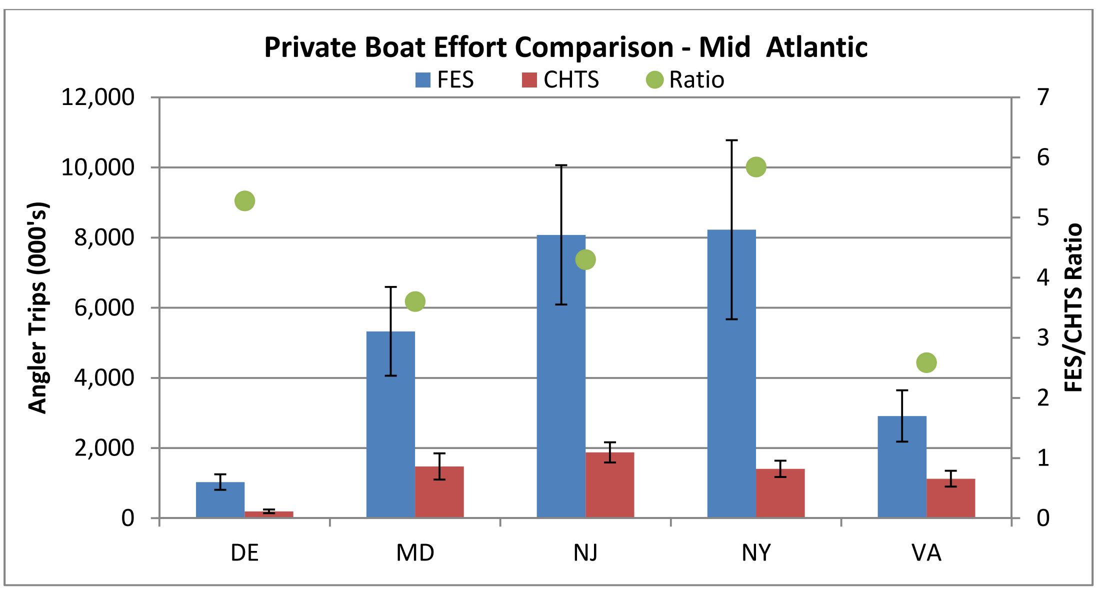


Figure 5a. 2015 FES and CHTS shore fishing effort estimates by state, South Atlantic subregion

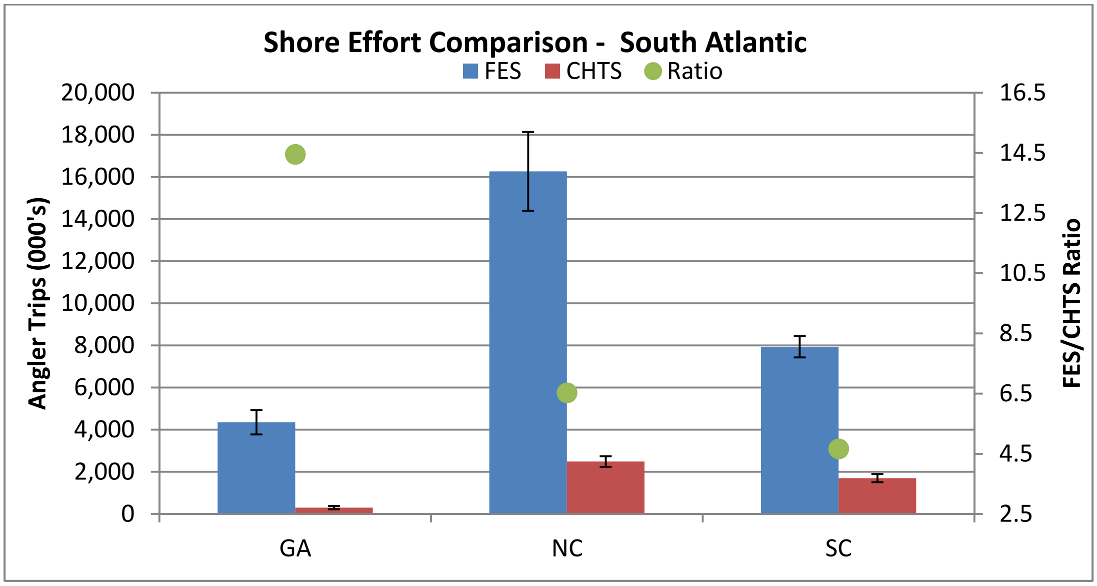


Figure 5b. 2015 FES and private boat fishing effort estimates by state, South Atlantic subregion

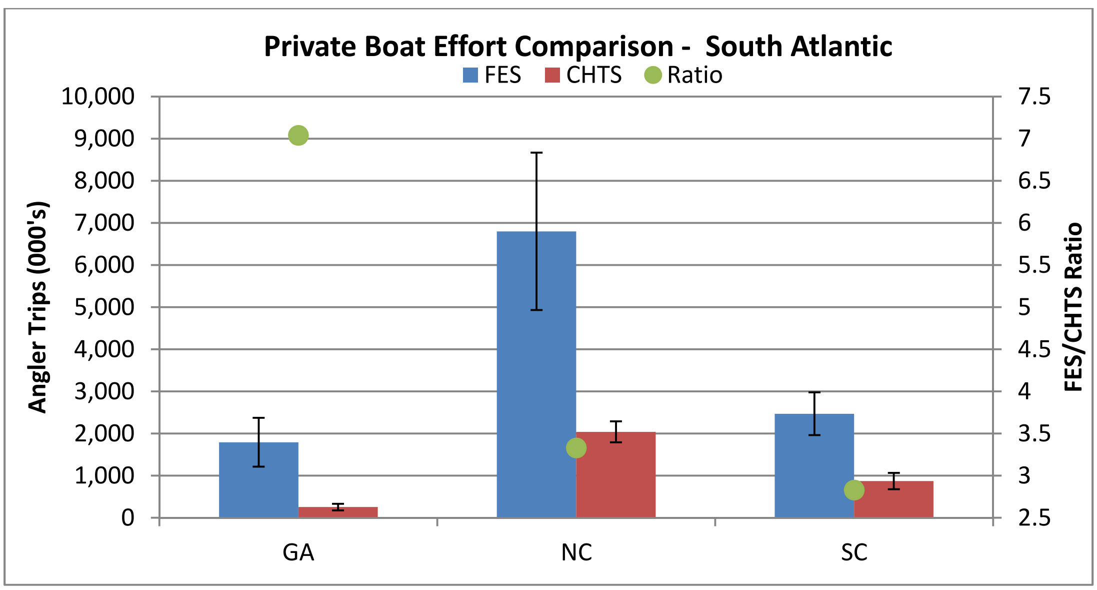


Figure 6a. 2015 FES and CHTS shore fishing effort estimates by state, Gulf of Mexico subregion

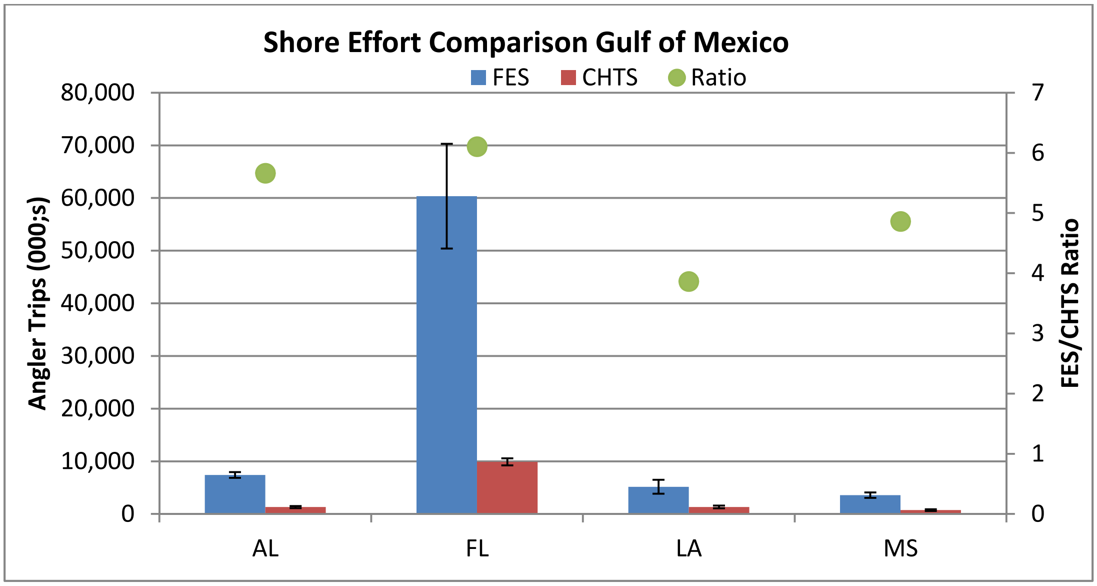
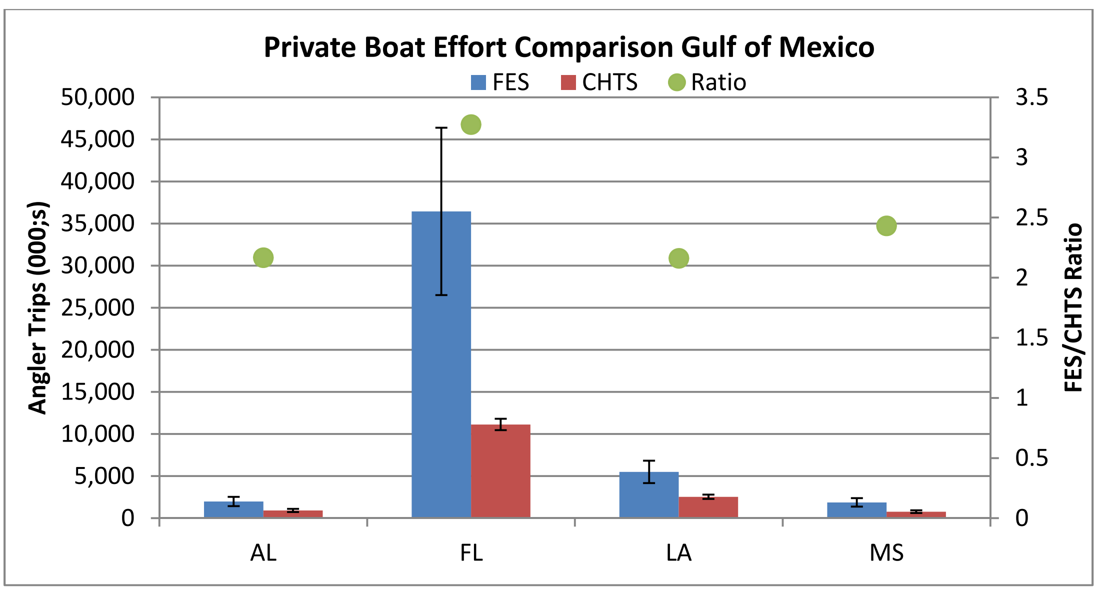


Figure 6b. 2015 FES and private boat fishing effort estimates by state, Gulf of Mexico subregion



References

Andrews, R., J.M. Brick, and N.M. Mathiowetz. 2014. Development and testing of recreational fishing effort surveys, testing a mail survey design. Available: http://www.st.nmfs.noaa.gov/Assets/recreational/pdf/2012-FES_w_review_and_comments_FINAL.pdf.

Possible Effects of Calibration Scenarios on Stock Assessments Planned for the MRIP Fishing Effort Survey Transition

Report prepared by
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Northeast Fisheries Science Center
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For

Marine Recreational Information Program
Transition Team Atlantic and Gulf Subgroup

October 28, 2016

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Purpose

The Marine Recreational Information Program's (MRIP) Transition Plan (Plan) for replacing the current Coastal Household Telephone Survey (CHTS) with the new Fishing Effort Survey (FES) calls for the development of a calibration model that can be used to produce more accurate historical catch statistics more comparable to those obtained using the new FES estimates. NOAA's Northeast and Southeast Fisheries Science Centers (Centers) used **simplified, hypothetical models** to evaluate a range of potential calibration scenarios and their potential impacts on upcoming assessments planned for several key stocks in those two regions. **The results of this exercise will not be used for science or management purposes.**

The objective of this exercise was to identify potential technical complications that would alter the timeline laid out in the Plan. This in turn will help inform the rate at which assessments can be updated and the level of review that may be warranted. It was assumed not all stocks may be updated easily and there would be the need to prioritize assessments and that, depending on the complexity, it could take two years or longer to run assessments. NOAA Fisheries' Office of Science and Technology (ST) is working with independent statistical experts to develop a calibration model that could be ready for use in the second half of 2017.

The Transition Team determined that these evaluations were needed to determine whether it would be best to update as many assessments as resources allow all at once, or to spread them out over a more normal schedule. The Team believed that a sequential implementation of the revised data for the assessments would create some difficulties for managers because different species would be regulated based on the new and old estimates at the same time. The timeline and workload would need to account for both state and federally managed species and could differ among regions.

The Plan suggested that the Centers use relatively simple FES:CHTS calibration scenarios based on known differences between FES and CHTS estimates measured in recent pilot studies, as well as inferred temporal changes in the performance of the CHTS. With this information, the Transition Team Atlantic and Gulf Subgroup (Subgroup) will revise, as necessary, its recommendations on whether or not to conduct as many stock assessment updates as resources will allow in 2017.

Overall, the costs and timing of revised stock assessments will depend on 1) the magnitude of changes and complexity of developing a temporally varying calibration model; 2) technical details of incorporating revised estimates into stock assessment models; 3) availability of resources to focus only on this effort; 4) the number of species to be assessed; and 5) the regional review processes. Additionally, there may be a regional split in the timeline due to differing assessment processes in each region.

There are three potential alternatives for the Subgroup to consider for their recommendations on stock assessment priority:

1) Simple re-run of an assessment with the revised recreational catch estimates (1 month),
2) Official assessment update (3-4 months), or
3) Benchmark assessment (9-18 months).

A prioritized list of stocks can be found in Appendix 2 of the FES Transition Plan.

Background

Preliminary results from the MRIP FES studies suggest that fishing effort estimates of shore and private/rental boat fishing (i.e. fishing mode) collected under the existing CHTS have been underestimated in recent years. FES effort estimates were higher than CHTS effort estimates in the four states included in the 2012-2013 pilot studies. The differences between FES and CHTS estimates of total effort varied among states and by fishing mode. FES effort estimates were on average 2.6 times higher for private boat fishing and 6.1 times higher for shore fishing.

In response to requests from the Centers, staff from ST developed procedures for calculating revised time series of fishing effort that could represent a range of possible results of the upcoming FES:CHTS calibration under different assumptions. Three procedures were developed that allowed for 1) a constant calibration ratio across all years, 2) a calibration ratio that had a linear attenuation from the full value in 2014 down to a value of 1 in 2000 and earlier years, and 3) a calibration ratio that attenuated from the full value in 2014 down to a value of 1 in 2000 and earlier years following a logistic curve (Figure 1).

The year 2000 was chosen as a conservative end point for applying the attenuating calibration ratios based on national reports of wireless only households produced from the National Center for Health Statistics (Blumberg and Luke, 2015). Starting in 2003, these reports indicated that wireless only households comprised less than 5% of total households in the United States. Following 2003, there has been a rapid rise in wireless only households and associated demographic changes in the population still using landline telephones. These demographic changes are seen as potentially important drivers of differences between the CHTS and FES estimates of fishing effort. While we do not have information prior to 2003, it is likely that the percentage of wireless only households would have remained below 5% or declined further in preceding years. In either case, it was felt that the effects of wireless only households and the associated under-coverage in the CHTS would be negligible prior to 2000. ST staff provided values for the constant and 2014 calibration ratios based on results from the FES pilot studies as well as guidance that at least some factors influencing differences between the FES and CHTS estimates would have had attenuating effects, rather than constant effects, going back through time. NOAA Fisheries is developing a final calibration model that assesses all factors assessed in the FES:CHTS benchmark, not just wireless only households, which will be peer reviewed in early 2017 after two full years of benchmarking have been completed. It is quite possible that the calibration model developed for the transition from the CHTS to the FES will include factors that have had relatively constant effects over the time series as well as factors that have had attenuating effects back to 2000.

To evaluate the potential impacts of FES calibration adjustments, the Centers ran calibration scenarios to create revised time series of catches on four stocks in their respective region and compared the results to the base case (no calibration). Results from the most recent stock assessments were used in the scenarios.

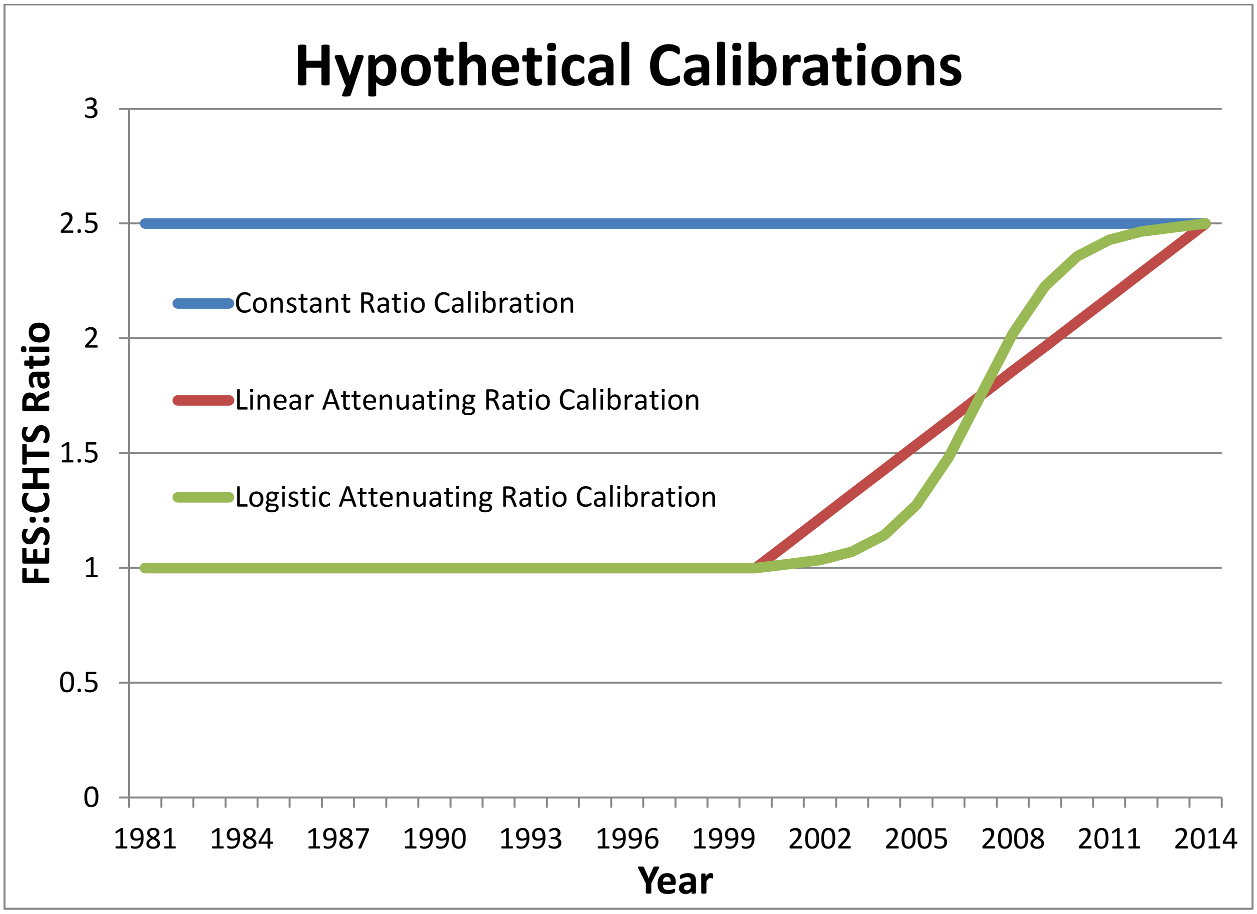


Figure 1. Simplified, hypothetical calibrations considered for revising catch statistics for recreational private boat fishing between 1981 and 2014.

Results

The main objective of this exercise was to identify potential technical complications that might require extension of the timeline outlined in the Plan for stock assessment updates in 2017, setting of management reference points for 2018, and full implementation of the FES in 2018. The results indicate that a change in the timeline is not necessary and we can move forward as planned.

It was determined that changes in catch histories based on a constant ratio model (throughout the entire time series) would be the most easily accommodated by the existing assessment models for different key stocks. Therefore, this particular hypothetical calibration was not tested. However, graphs are provided to show how historical landings would change with this calibration (see Figures 2a-d and 3a-d).

Changes in Recreational Landings and Total Landings

The constant ratio calibration and the attenuating ratio calibration have very different cumulative effects on the recreational landings and total landings for each of the key stocks (see Tables 1a-b and 2a-b). The constant ratio calibration shows the greatest changes in recreational landings, total landings, and the proportion of total landings that are recreational. However, the attenuating ratio calibrations also show rather significant changes over the last 14 years (see Figures 2a-d and 3a-d).

Performance of Models

Hypothetical attenuating ratio calibrations were tested, and the performance of the stock assessment models did not change substantially with the incorporation of revised catch histories based on those calibrations. Model performance is judged regarding the degree to which the model fits other data (e.g. fish abundance surveys, age composition, etc.). Both Centers evaluated model performance on overall model fit, and the NE also evaluated changes in the retrospective pattern.

Status Change

Based on the attenuating ratio calibrations, only one species (bluefish) out of the eight tested showed a change in the assessment model result with respect to stock status. Given that the calibration model we develop may include both constant and attenuating effects, this example could represent one of the most extreme cases of a range of possible outcomes.

Northeast Fisheries Science Center

Lead: Mark Terceiro

The NE Center ran stock assessment scenarios on four species: bluefish, Gulf of Maine Atlantic cod, scup, and summer flounder. The NE elected to test Procedure 2 (above), a calibration ratio that had a simple linear attenuation from the full value in 2014 down to a value of 1 for 2000 and earlier years. Overall for these four stocks, the increases in total catch were expected based on preliminary FES:CHTS benchmarking and the 2013 FES pilot study results.

Based on the results of the scenarios, it was determined that benchmark assessments would not be needed for these key stocks. Given that this is a subsample of stocks with high recreational proportion of the catch, it is assumed that other northeast stocks will not require benchmark assessments in order to incorporate the FES:CHTS change. There may be changes in stock status once a final calibration method is determined. This is reflected in the results presented below.

Table 1a. Results from the hypothetical calibration analysis using the constant ratio model. Percentages are calculated in terms of average weight landed from 2001 to 2014.

Species	Rec. Landings Proportion (before calibration)	Rec. Landings Proportion (after calibration)	Total Landings Increase – Constant Ratio	Model Performance
Bluefish	71%	90%	196%	Unchanged
Gulf of Maine Atlantic Cod	25%	40%	24%	Unchanged
Scup	32%	59%	66%	Unchanged
Summer Flounder	39%	62%	59%	Unchanged

Table 1b. Results from the hypothetical calibration analysis using the simplified linear model. Percentages are calculated in terms of average weight landed from 2001 to 2014.

Species	Rec. Landings Proportion (before calibration)	Rec. Landings Proportion (after calibration)	Total Landings Increase – Linear Attenuating Ratio	Model Performance	Change in Status
Bluefish	71%	86%	105%	Unchanged	Yes (degraded)
Gulf of Maine Atlantic Cod	25%	32%	11%	Unchanged	No
Scup	32%	49%	33%	Unchanged	No
Summer Flounder	39%	53%	28%	Unchanged	Yes (slightly degraded)

Figure 2a. Graph showing total commercial and recreational landings of Atlantic bluefish in metric tons without any calibration (original), with application of the constant ratio calibration, and with application of the linear attenuating ratio calibration.

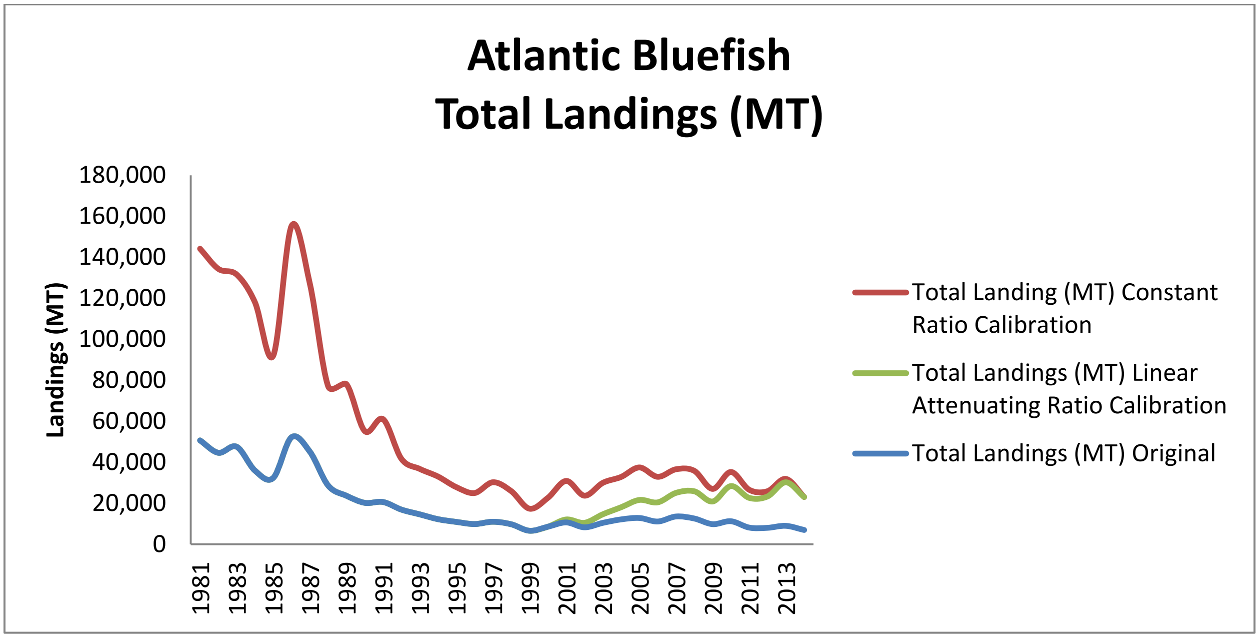


Figure 2b. Graph showing total commercial and recreational landings of Gulf of Maine cod in metric tons without any calibration (original), with application of the constant ratio calibration, and with application of the linear attenuating ratio calibration.

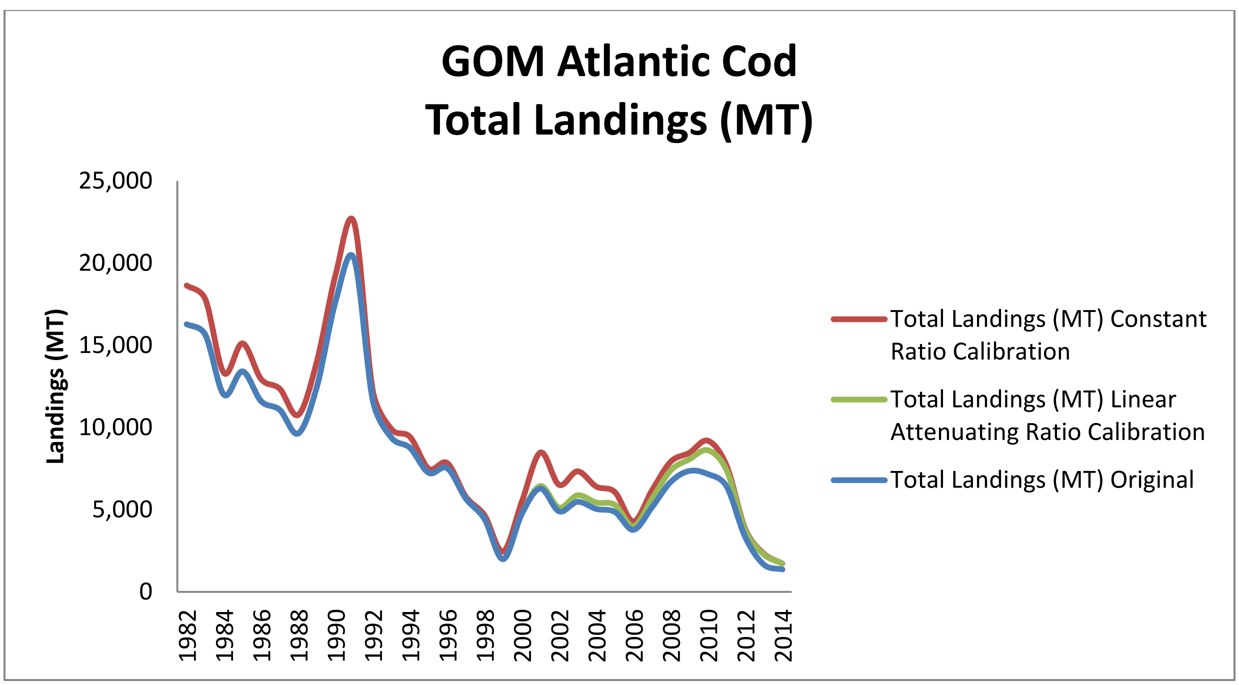


Figure 2c. Graph showing total commercial and recreational landings of scup in metric tons without any calibration (original), with application of the constant ratio calibration, and with application of the linear attenuating ratio calibration.

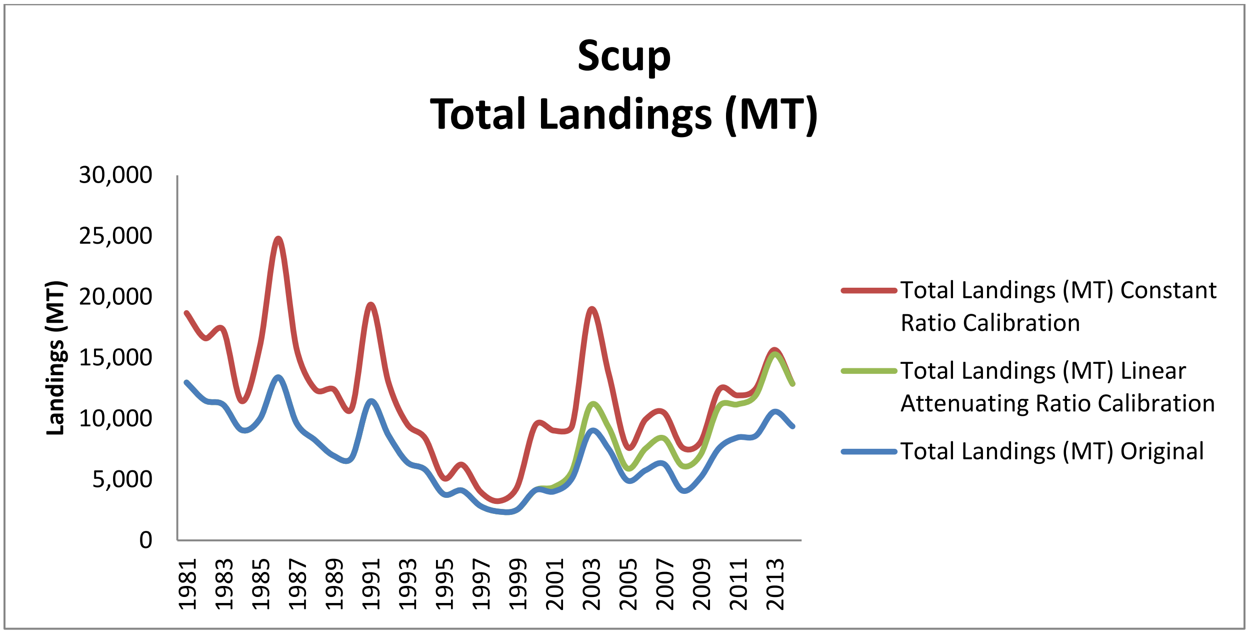
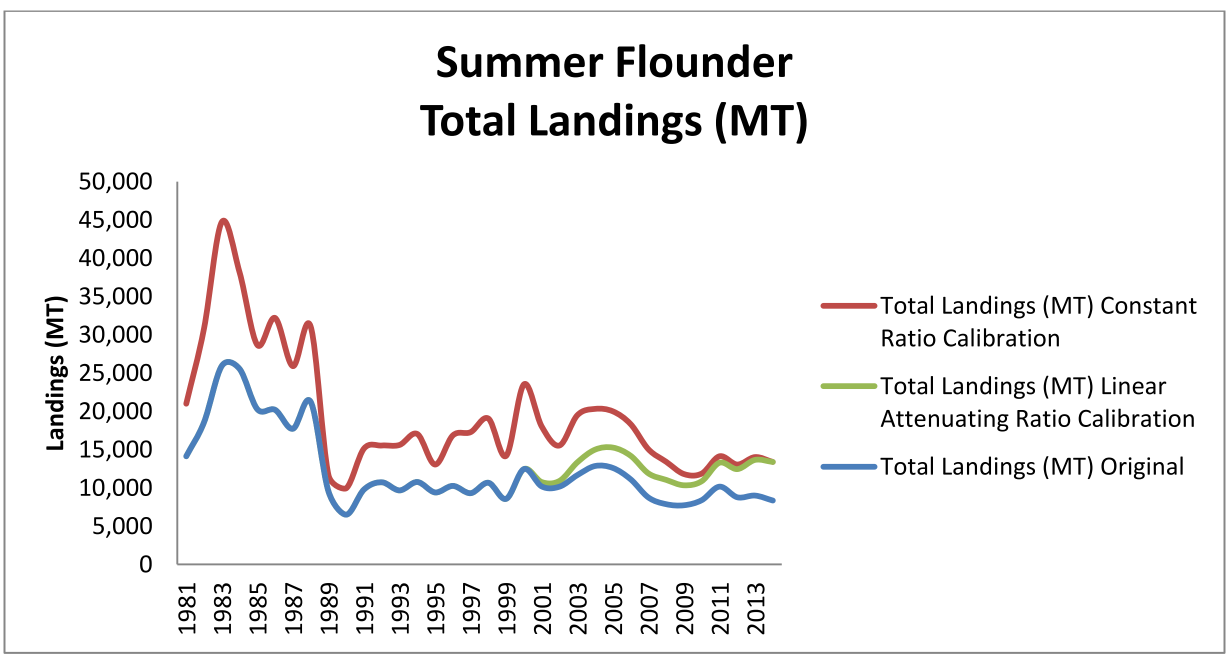


Figure 2d. Graph showing total commercial and recreational landings of summer flounder in metric tons without any calibration (original), with application of the constant ratio calibration, and with application of the linear attenuating ratio calibration.



Southeast Fisheries Science Center

Lead: Clay Porch

The SE Center examined hypothetical calibration scenarios on four species in the Gulf of Mexico: red snapper, red grouper, gray triggerfish, and vermillion snapper. The SE decided to test a hypothetical calibration ratio that attenuated from the full value in 2014 down to an unchanged value in 2000 following a logistic curve. Overall for these four stocks, the increase in total catch was expected based on preliminary FES:CHTS benchmarking and the 2013 FES pilot study results.

Based on the results of the scenarios, it was determined that benchmark assessments would not be needed for these key stocks. Given that this is a subsample of stocks with high recreational proportion of the catch, it is assumed that other southeast stocks will not require benchmark assessments. There may be changes in stock status once a final calibration method is determined.

For the constant calibration ratio and the logistic attenuating calibration ratio model, all four species had significant increases in total catch (see Figures 3a-3d). The model used allowed for internal recalculation of the stock status reference points, therefore the change in the stock shown here (Appendix A) is relative to the recalculated reference points.

Table 2a. Results from the hypothetical calibration analysis using the constant ratio model. Percentages are calculated in terms of average numbers of fish landed from 2001 to 2014.

Species (Gulf of Mexico)	Rec. Catch Proportion (before calibration)	Rec. Proportion (after calibration)	Total Landings Increase - Logistic	Model Performance
Red Snapper	43%	58%	37%	Unchanged
Red Grouper	32%	49%	34%	Unchanged
Gray Triggerfish	91%	95%	85%	Unchanged
Vermilion Snapper	25%	32%	10%	Unchanged

Table 2b. Results from the hypothetical calibration analysis using the simplified logistic model. Percentages are calculated in terms of average numbers of fish landed from 2001 to 2014.

Species (Gulf of Mexico)	Rec. Catch Proportion (before calibration)	Rec. Proportion (after calibration)	Total Landings Increase - Logistic	Model Performance	Change in Stock Status
Red Snapper	43%	54%	21%	Unchanged	No
Red Grouper	32%	41%	15%	Unchanged	No
Gray Triggerfish	91%	93%	29%	Unchanged	No
Vermilion Snapper	25%	29%	6%	Unchanged	No

Figure 3a. Graph showing total commercial and recreational landings in numbers of Gulf of Mexico red snapper without any calibration (original), with application of the constant ratio calibration, and with application of the logistic attenuating ratio calibration.

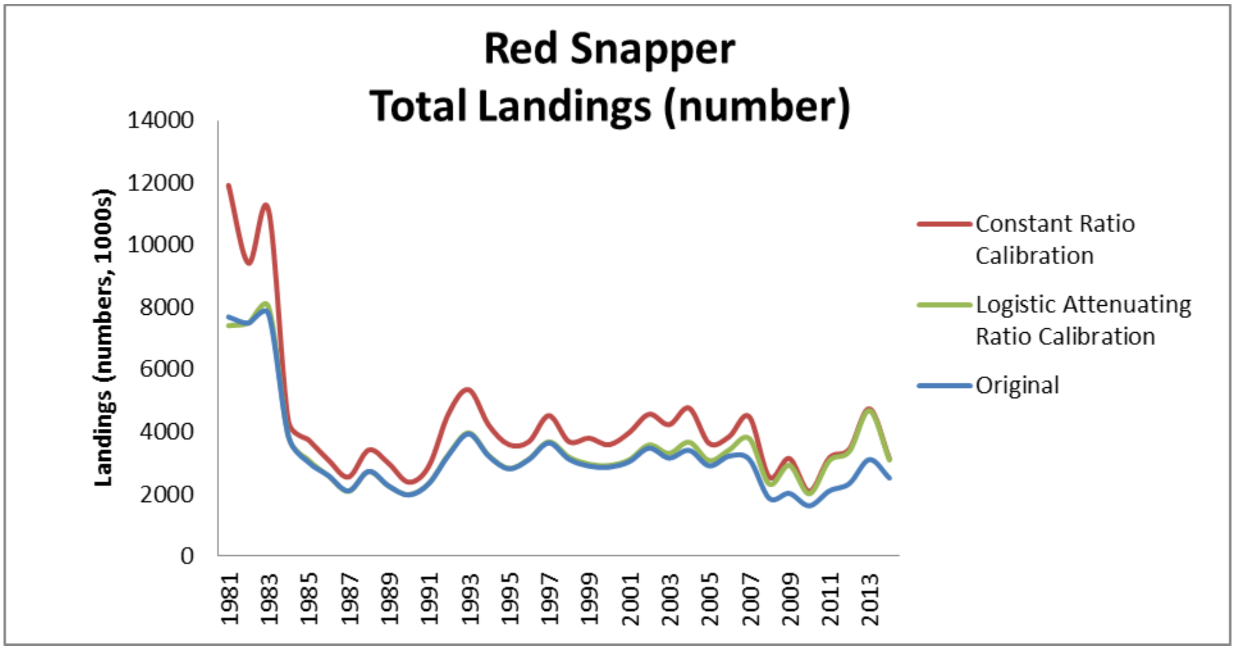


Figure 3b. Graph showing total commercial and recreational landings in numbers of Gulf of Mexico vermillion snapper without any calibration (original), with application of the constant ratio calibration, and with application of the logistic attenuating ratio calibration.

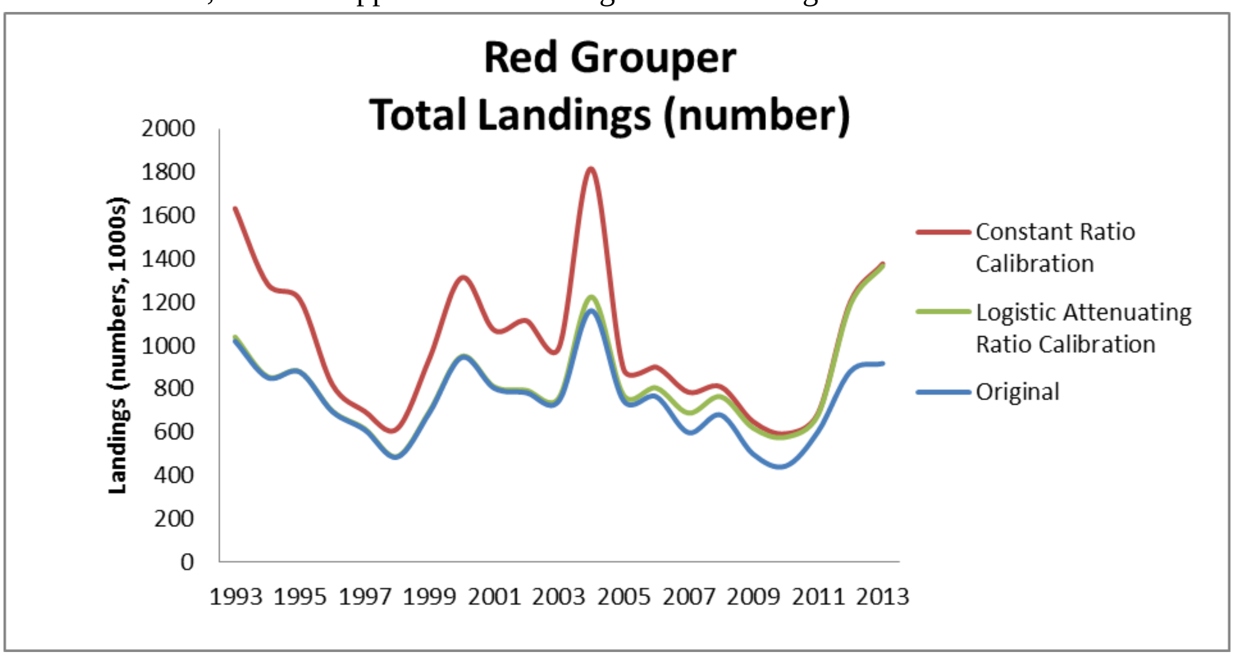


Figure 3c. Graph showing total commercial and recreational landings in numbers of Gulf of Mexico vermillion snapper without any calibration (original), with application of the constant ratio calibration, and with application of the logistic attenuating ratio calibration.

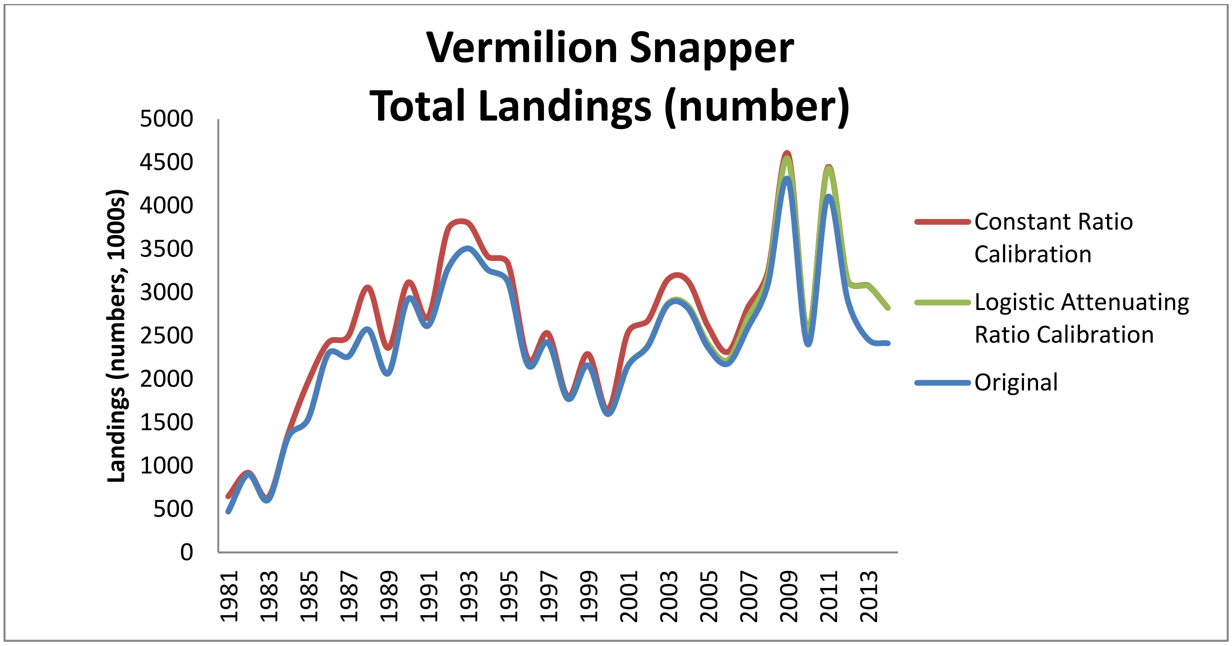
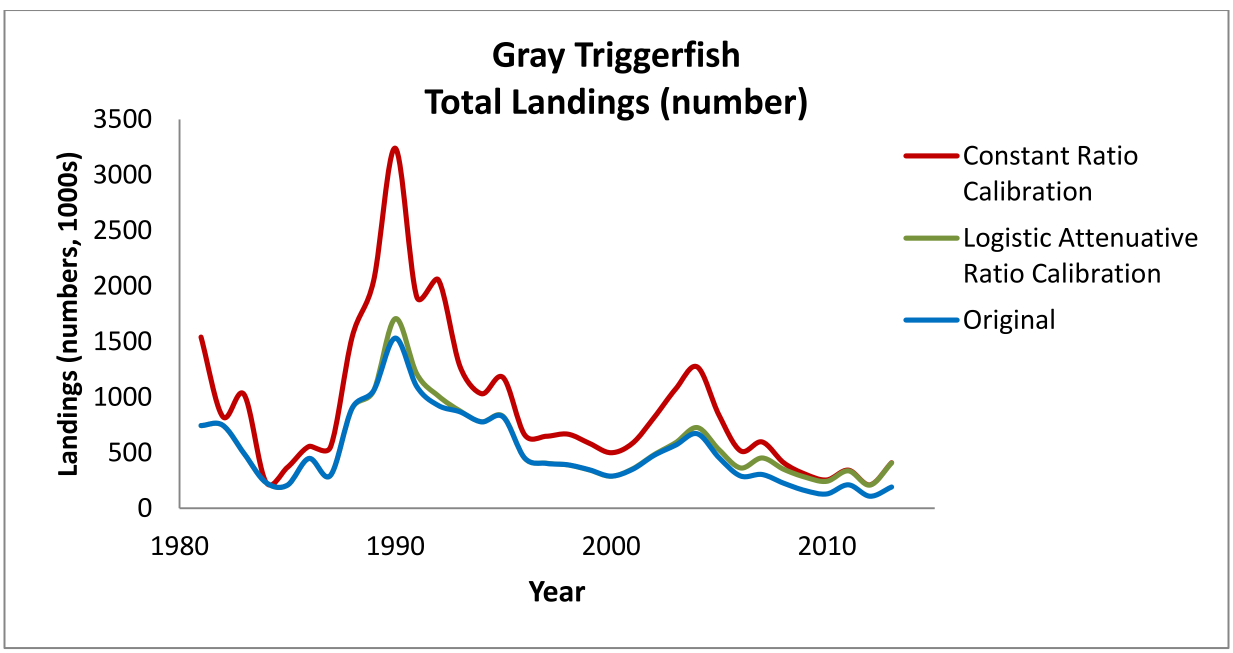


Figure 3d. Graph showing total commercial and recreational landings in numbers of Gulf of Mexico gray triggerfish without any calibration (original), with application of the constant ratio calibration, and with application of the logistic attenuating ratio calibration.



References

Blumberg, SJ and Luke, JV. 2015. Wireless substitution: Early release of estimates from the National Health Interview Survey, January-June, 2015. http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201512.pdf

APPENDIX A – Northeast Calibration Scenario Figures

Northeast Fisheries Science Center
Lead: Mark Terceiro

Approach - The NE Center examined FES calibration scenarios using a linear increase in the private recreational catch for four stocks: summer flounder, scup, Gulf of Maine Atlantic cod, and bluefish. In general, the calibration included both the 1 to 2.5x increase in private recreational catch, and the 1 to 6x increase in shore catch for stocks with significant catch by that mode.

Summer Flounder

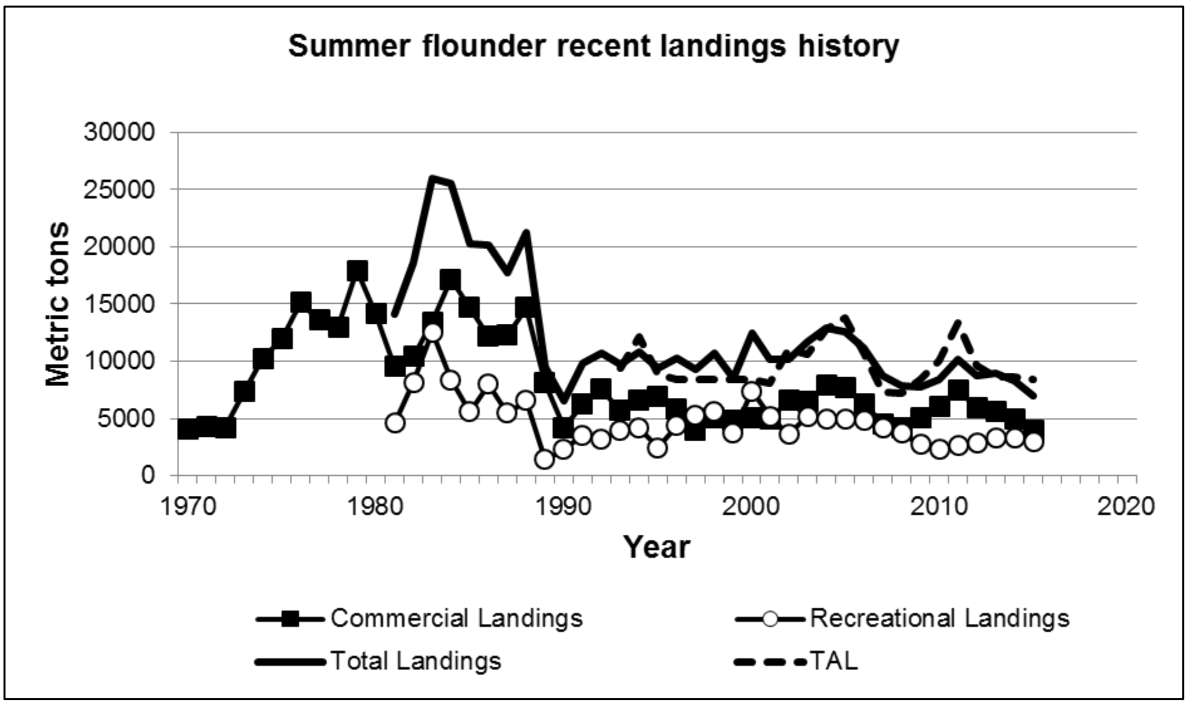


Figure 2. Summer flounder landings history for 1970-2016 based on current recreational catch data using the CHTS.

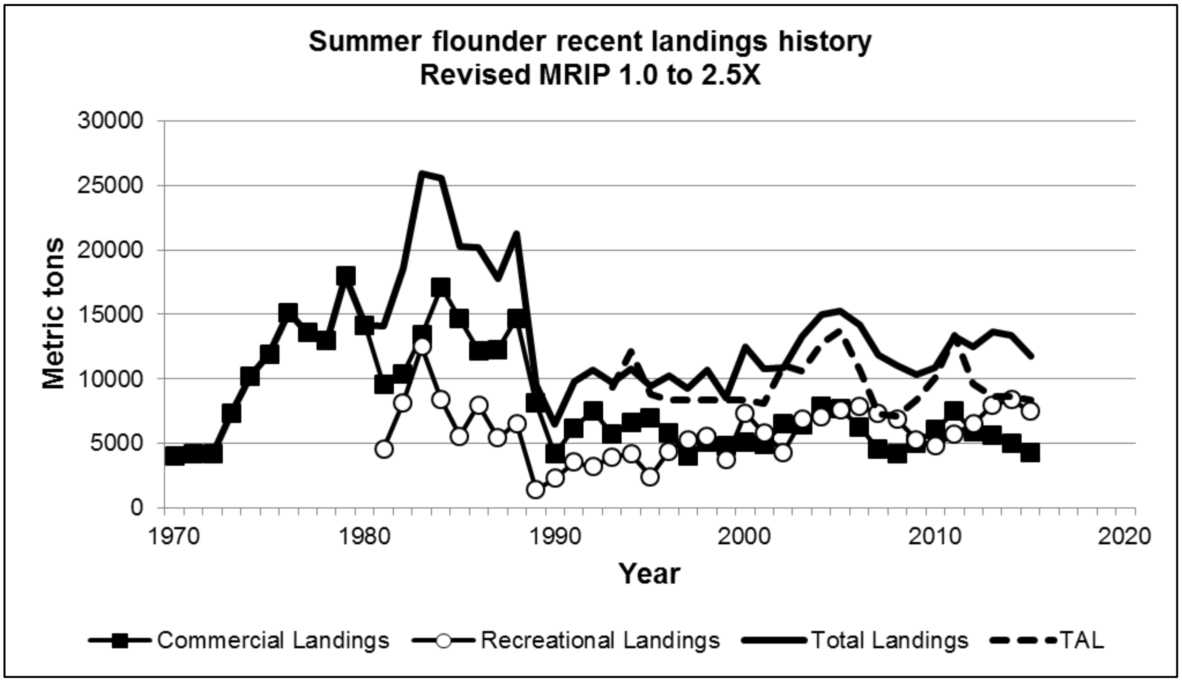


Figure 3. Summer flounder landings history for 1970-2016 using a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch.

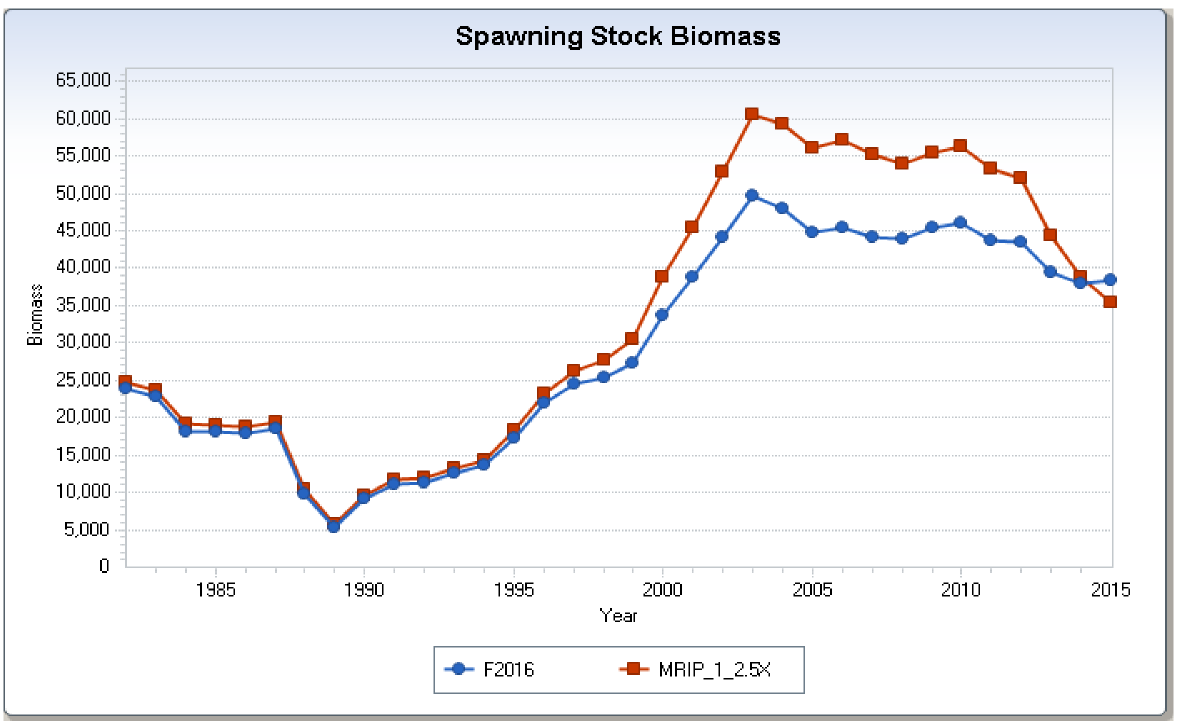


Figure 4. Summer flounder spawning stock biomass for 1982-2015 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

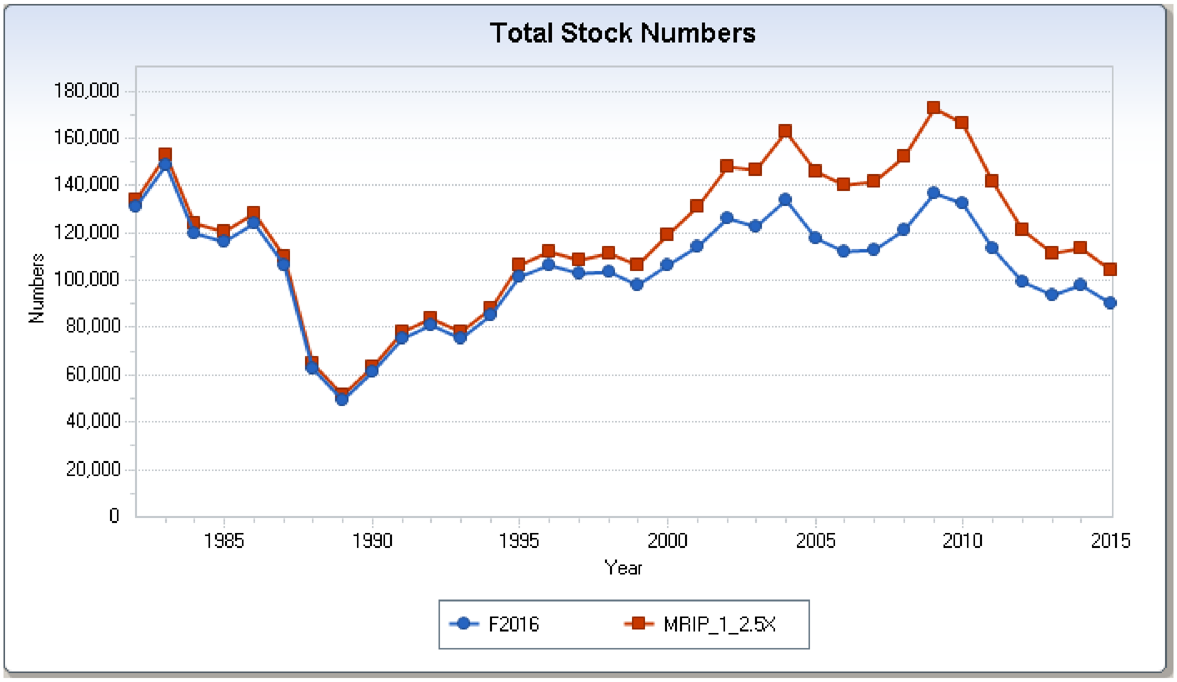


Figure 5. Summer flounder total stock numbers for 1982-2015 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

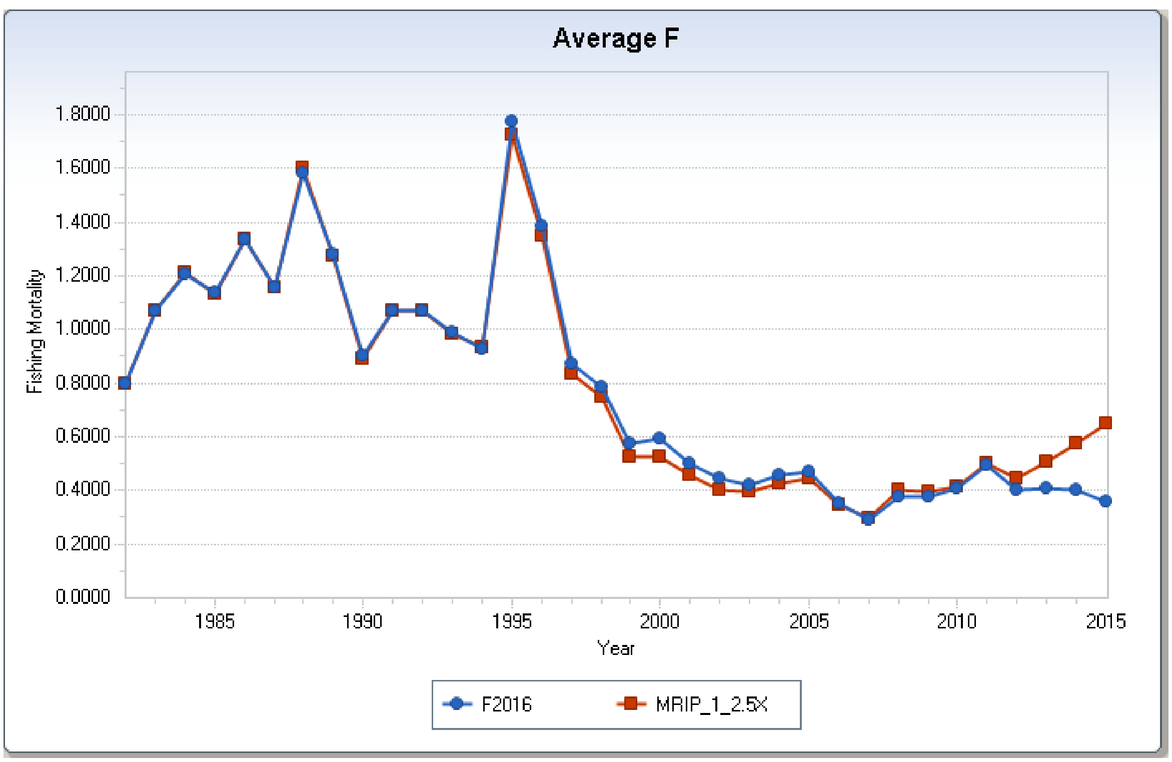


Figure 6. Summer flounder fishing mortality for 1982-2015 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

Scup

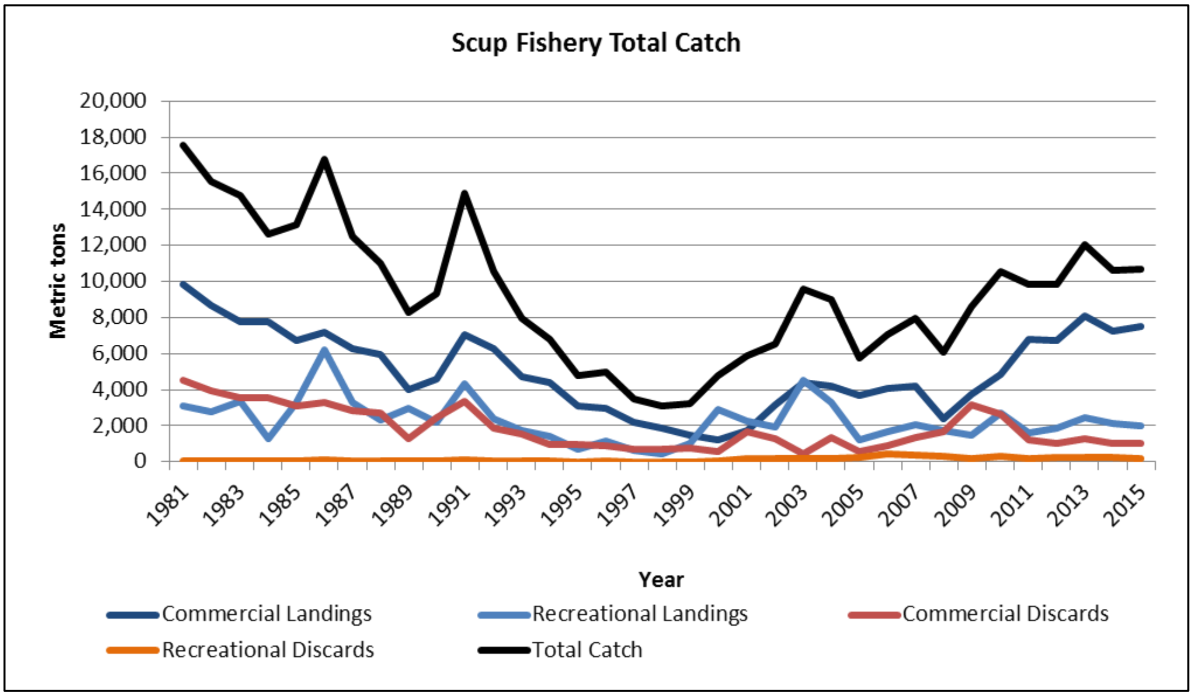


Figure 7. Scup landings history for 1981-2015 based on current recreational catch data using the CHTS.

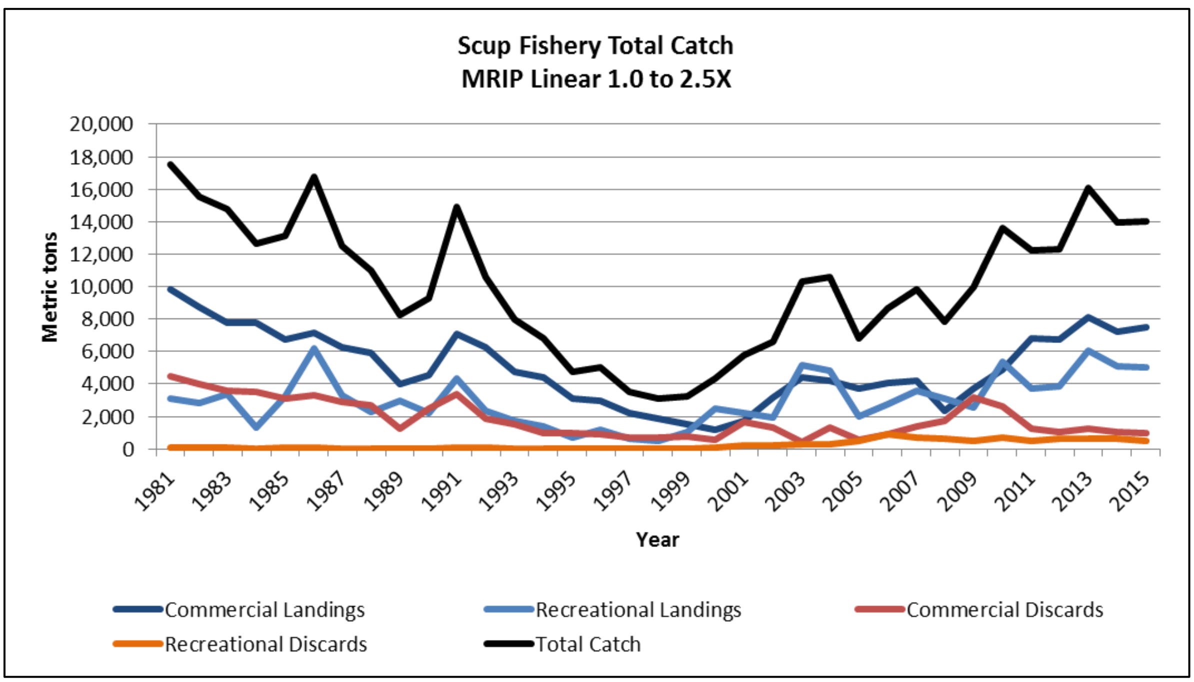


Figure 8. Scup landings history for 1981-2015 using a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch.

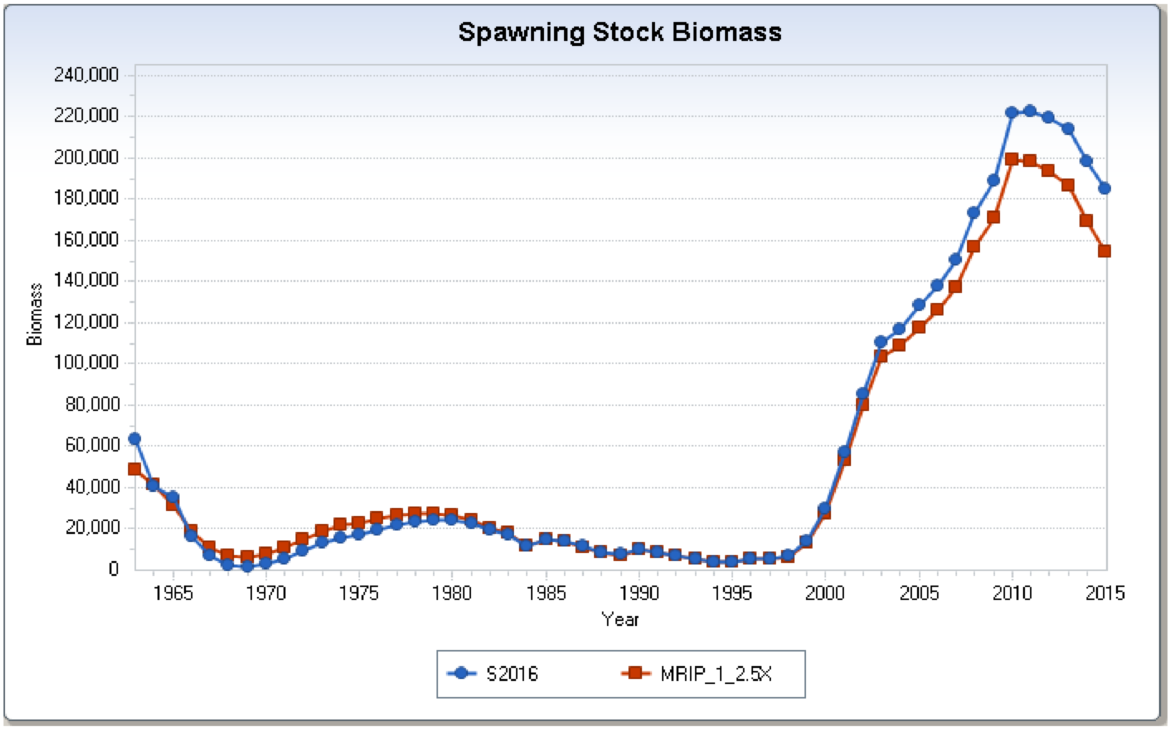


Figure 9. Scup spawning stock biomass for 1964-2015 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

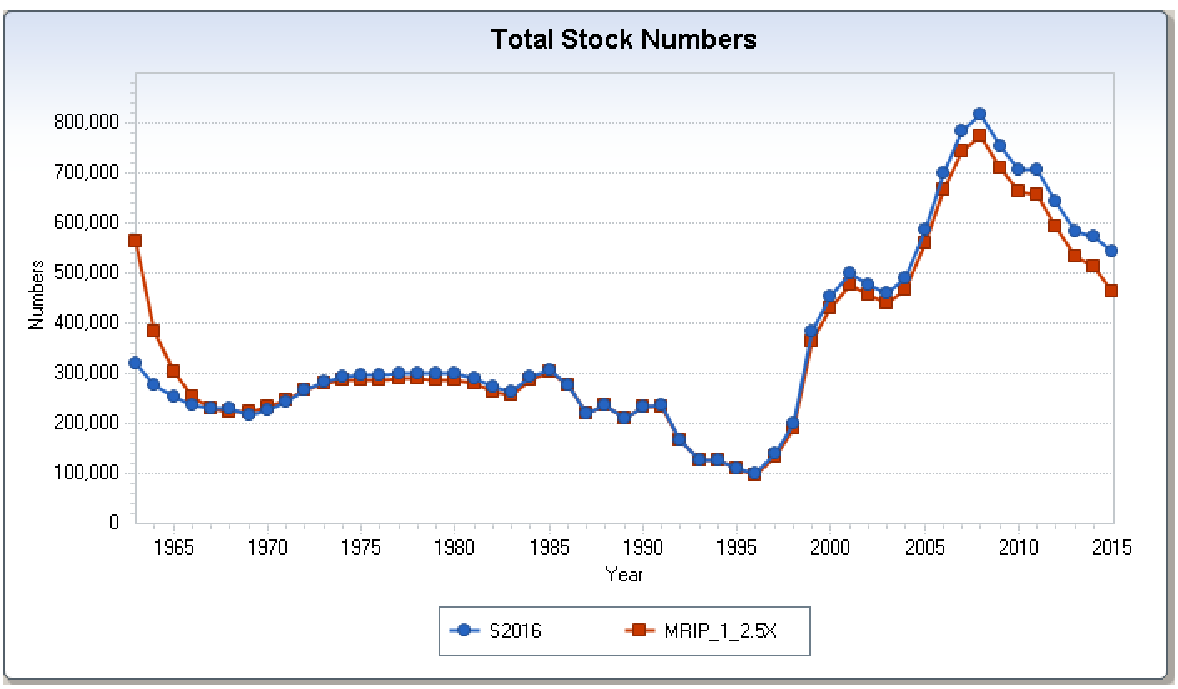


Figure 10. Scup total stock numbers for 1964-2015 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

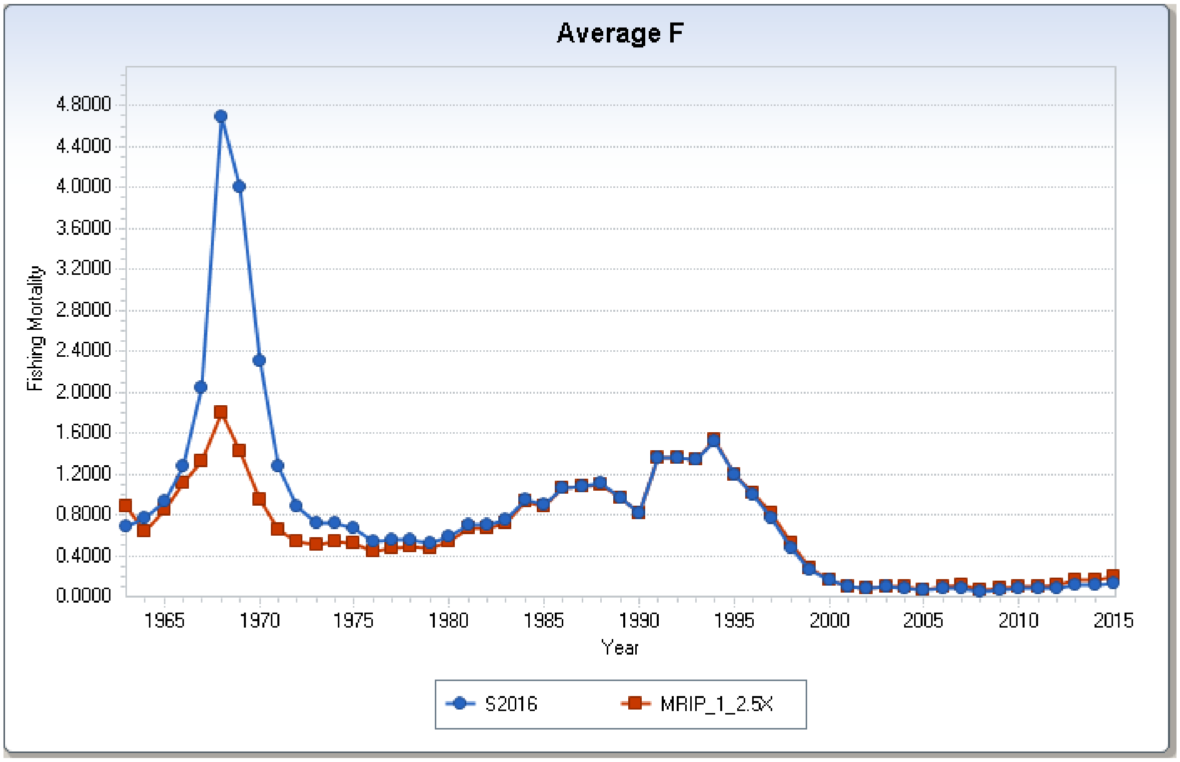


Figure 11. Scup fishing mortality for 1964-2015 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red). Note that large F early in the series is an artifact of starting conditions in the S2016 that appears in some model configurations, and can be ignored.

Atlantic Cod - Gulf of Maine

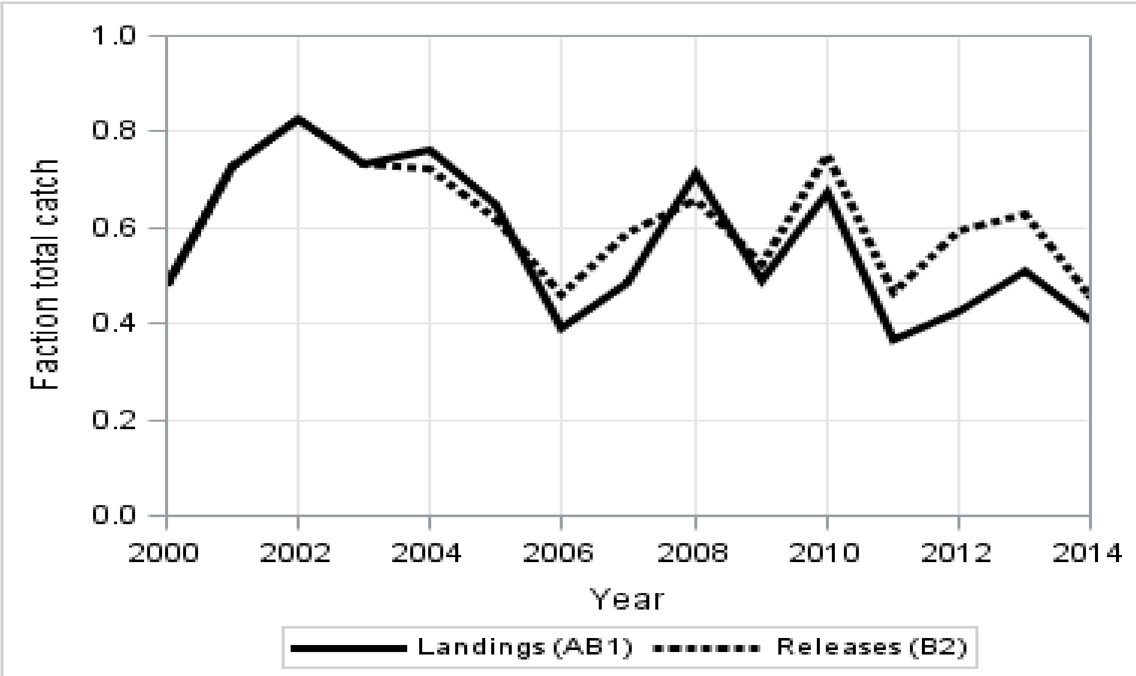


Figure 12. Gulf of Maine Atlantic cod recreational catch caught by shore and private/recreational boat fishing for 2000-2014. Note that fractions prior to 2004 were obtained using Table A.31 in SARC 55 report which is based on the total recreational catch (landed and discarded) and not differentiated by disposition (discards were estimated under an assumption of 30% mortality).

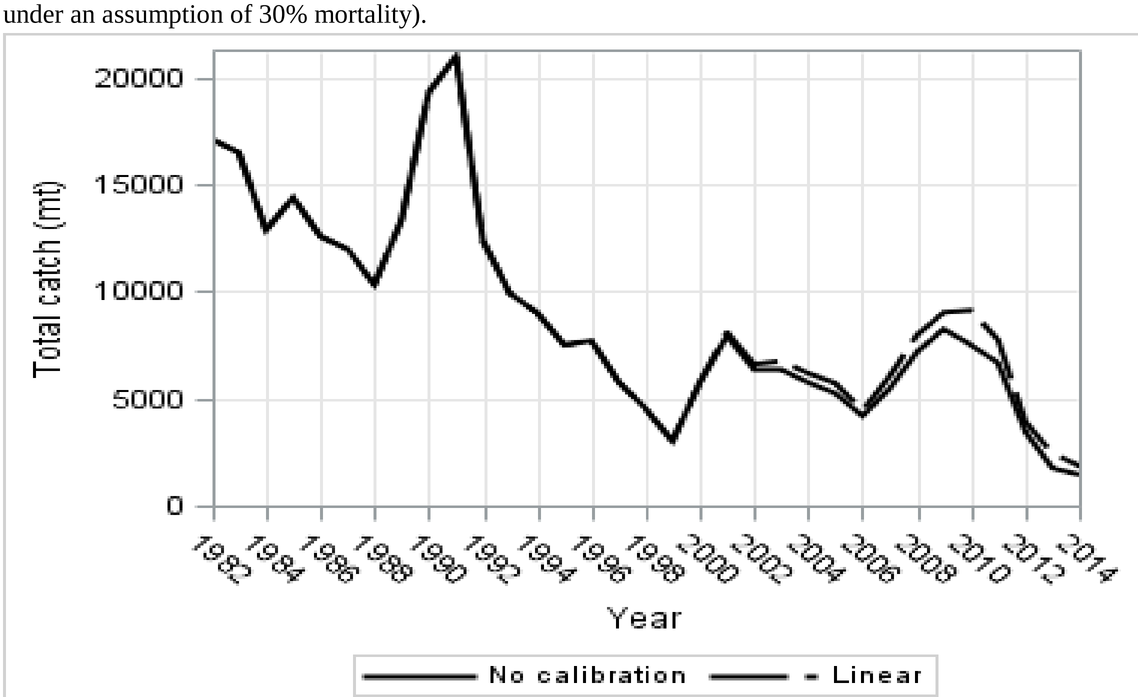


Figure 13. Comparison of Gulf of Maine Atlantic cod total catch estimates for 1982-2014 using current recreational catch data using the CHTS (no calibration) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (linear). Total catch includes recreational discards and landings plus commercial discards and landings.

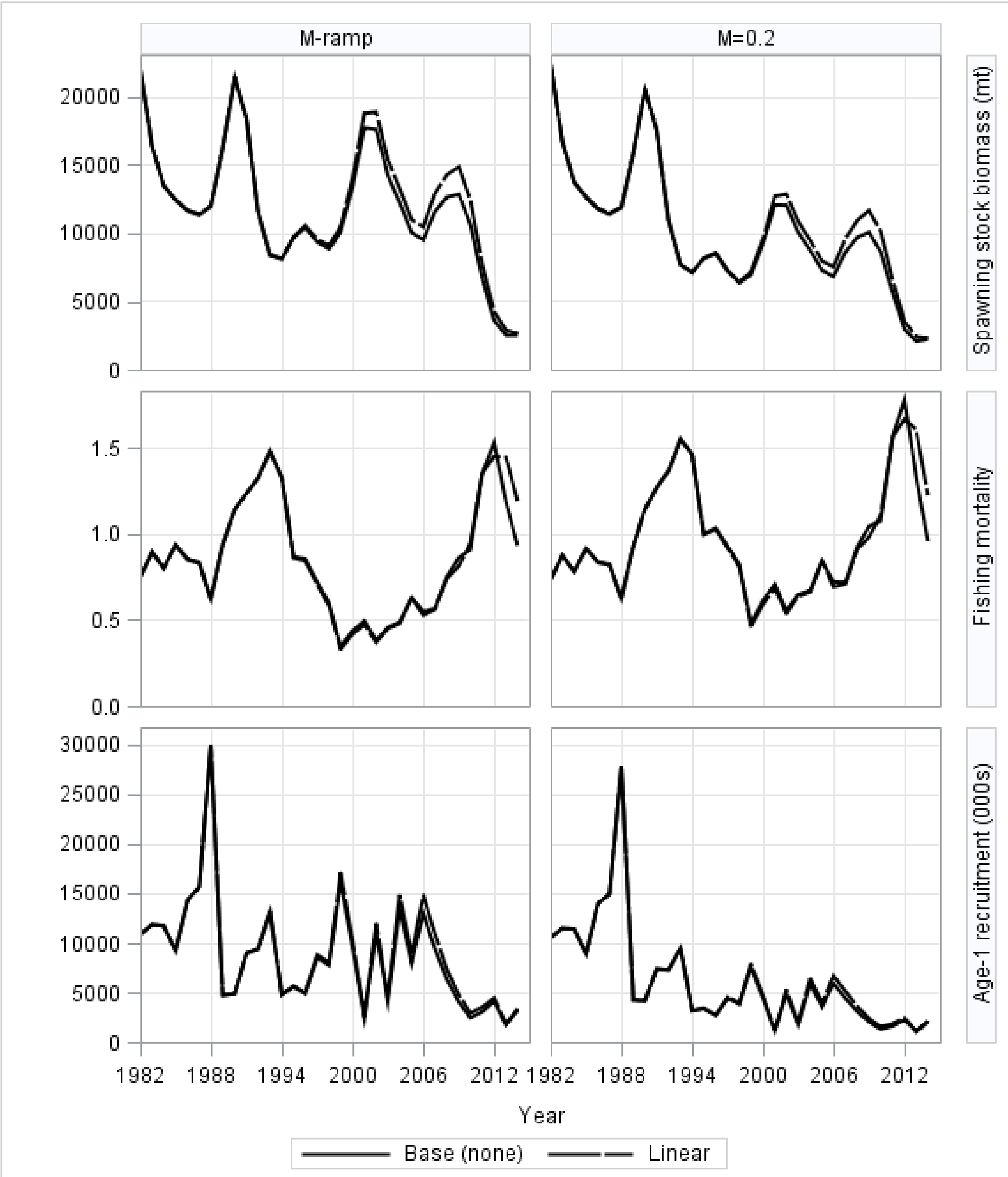


Figure 14. Comparison of Gulf of Maine Atlantic cod stock assessment results for 1982-2012 by model, M=0.2 (natural mortality = 0.2) vs. M-ramp (M ramps from 0.2 to 0.4 over time), using current recreational catch data using the CHTS (base) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (linear).

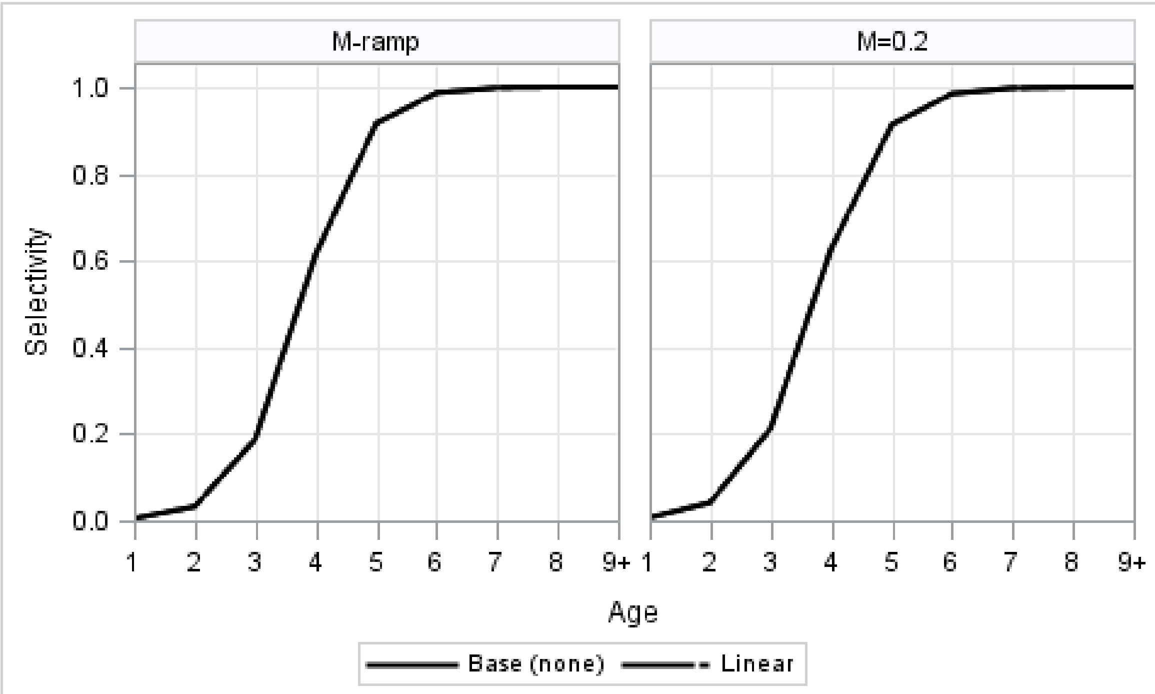


Figure 15. Comparison of Gulf of Maine Atlantic cod stock assessment estimated selectivity by model M=0.2 (natural mortality = 0.2) vs. M-ramp (M ramps from 0.2 to 0.4 over time), using current recreational catch data using the CHTS (base) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (linear).

Bluefish

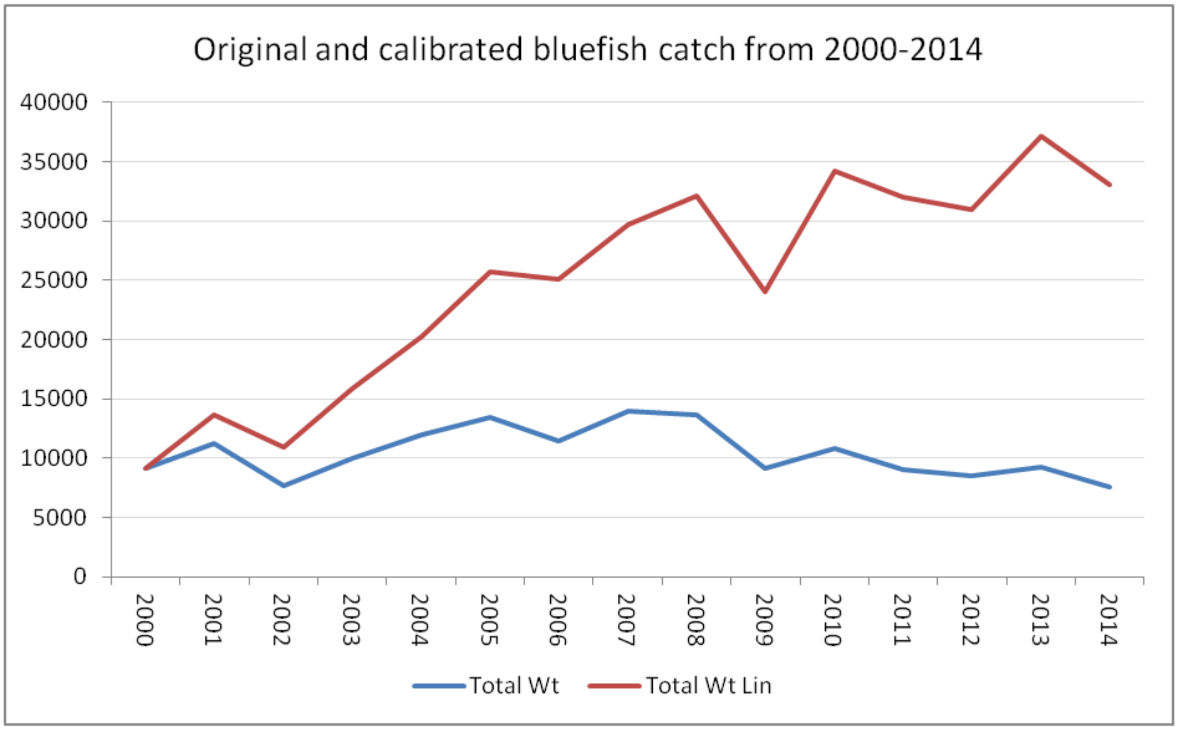


Figure 16. Total bluefish catch (weight in metric tonnes) for 2000-2014 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

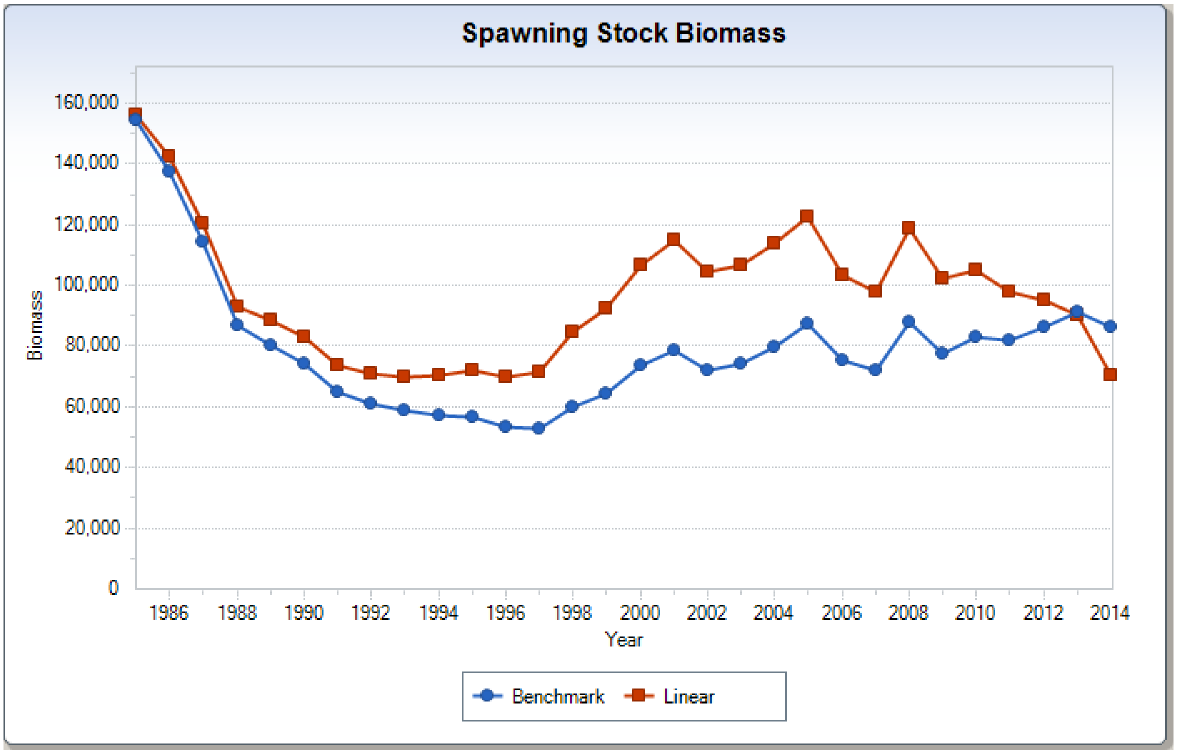


Figure 17. Bluefish spawning stock biomass for 1985-2014 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

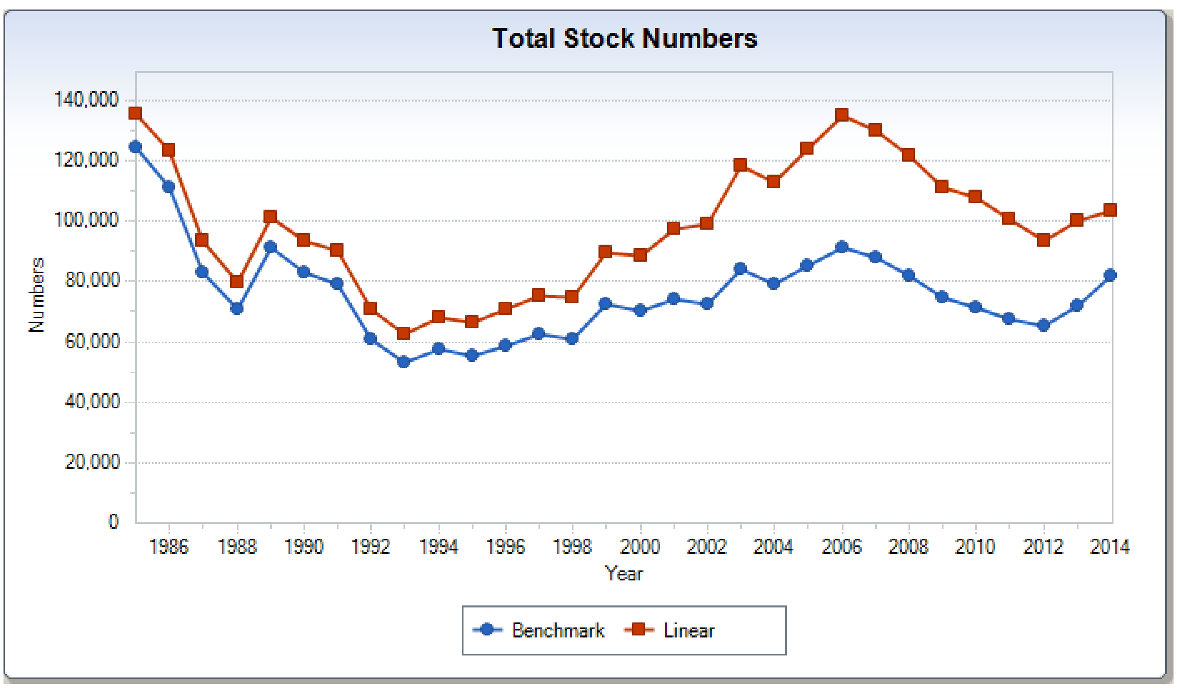


Figure 18. Bluefish total stock numbers for 1985-2014 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red).

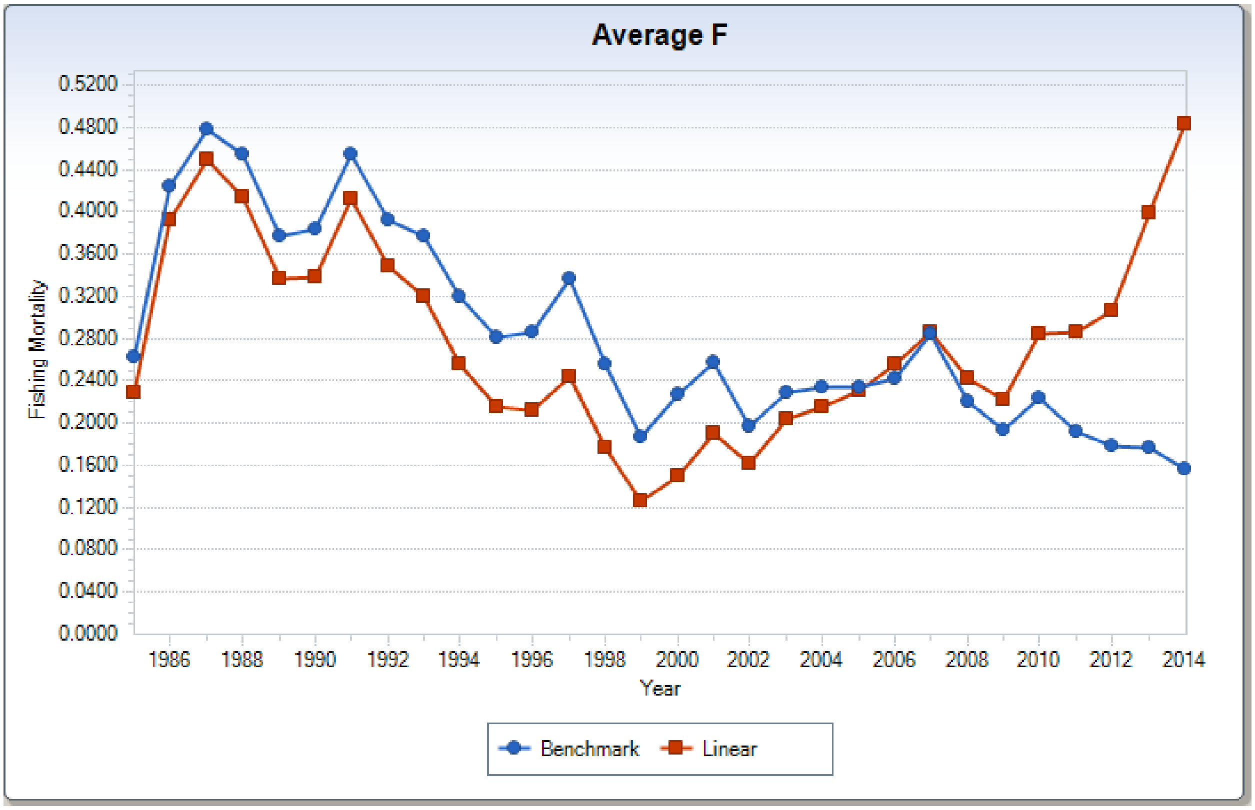


Figure 19. Bluefish fishing mortality for 1985-2014 using current recreational catch data using the CHTS (blue) and a linear increasing calibration factor (1.0 to 2.5x) for private recreational catch (red). Note that large F early in the series is an artifact of starting conditions in the S2016 that appears in some model configurations, and can be ignored.

APPENDIX B – Southeast Calibration Scenario Figures

Southeast Fisheries Science Center
Lead: Clay Porch

Approach - The SE Center examined the potential effect of the FES calibration under the assumption that the degree of underestimation with the CHTS (relative to the FES) increased logistically with time (as discussed above). Four stocks from the Gulf of Mexico were examined: red snapper, red grouper, gray triggerfish, and vermilion snapper. The temporal trends in stock status are shown in the figures below.

Red Snapper – Gulf of Mexico

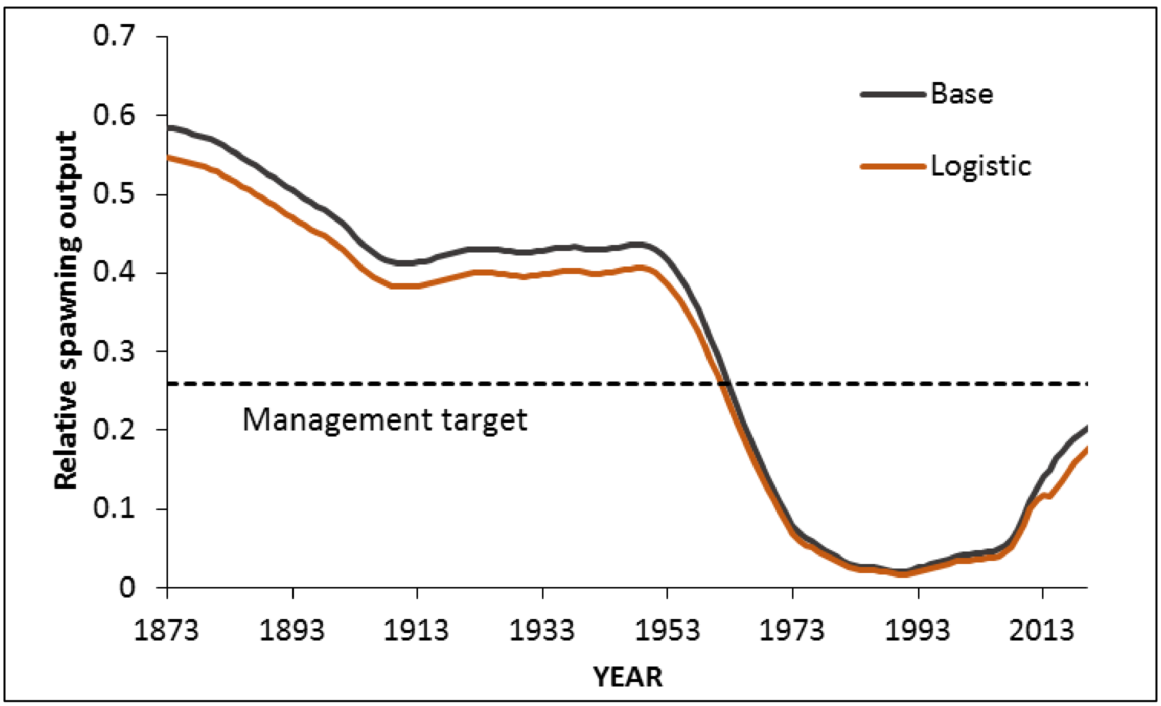


Figure 20. Red snapper relative spawning output for 1873-2015 using current recreational catch data using the CHTS (base) and logistic calibration factor (1.0 to 2.5x) for recreational catch (logistic).

Red Grouper – Gulf of Mexico

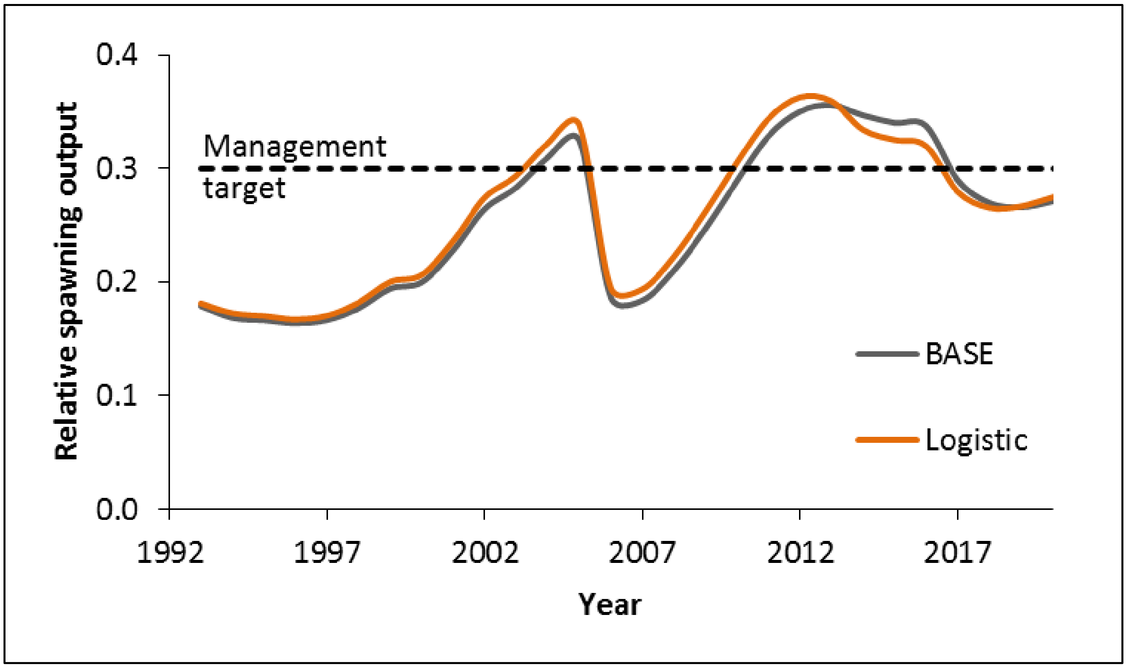


Figure 21. Red grouper relative spawning output for 1993-2019 using current recreational catch data using the CHTS (base) and a linear increasing calibration factor (1.0 to 2.5x) for recreational catch (logistic).

Gray Triggerfish – Gulf of Mexico

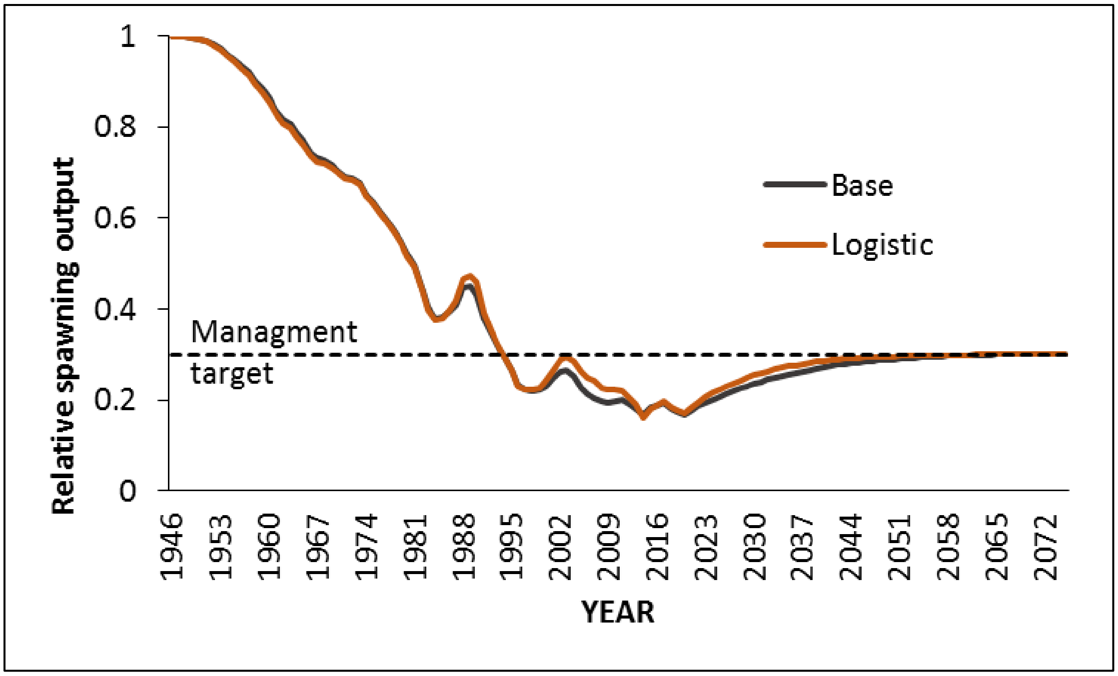


Figure 22. Gray triggerfish relative spawning output for 1946-2072 using current recreational catch data using the CHTS (base) and a logistic calibration factor (1.0 to 2.5x) for recreational catch (logistic).

Vermilion Snapper – Gulf of Mexico

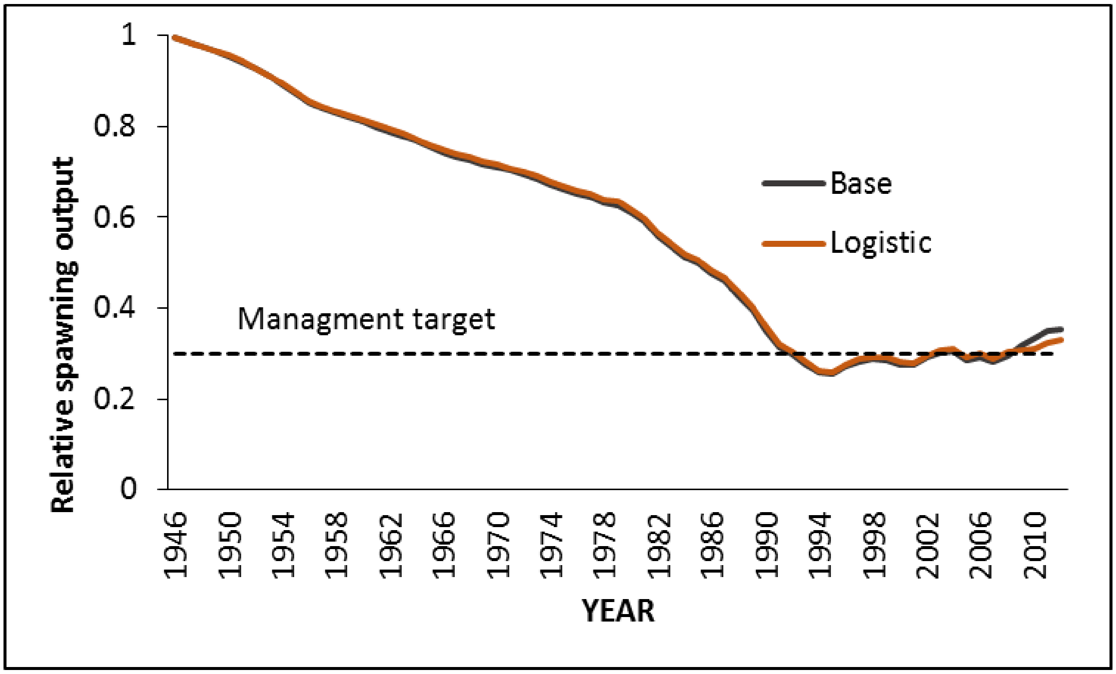


Figure 23. Vermillion snapper relative spawning output for 1950-2017 using current recreational catch data using the CHTS (base) and a logistic calibration factor (1.0 to 2.5x) for private recreational catch (logistic).