# A Descriptive Analysis of the Access Point Angler Intercept Survey 2013 Design Change

Internal Report

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# Contents

# 1. Executive Summary

In 2013, NOAA Fisheries implemented the Access Point Angler Intercept Survey (MRIP APAIS) in all coastal states from Maine through Louisiana. The new intercept survey replaced the intercept survey component of the Marine Recreational Fisheries Statistics Survey (MRFSS APAIS), which had serious deficiencies identified by the National Research Council in 2006.

Concerns were raised about the 2013 recreational landings estimates for a number of federally managed species, particularly those in the Gulf of Mexico sub region. Questions were raised about possible intercept design change effects and the comparability of 2013 catch estimates with prior years, which prompted the MRIP APAIS 2013 Design Change Evaluation Project.

This report describes methods and results from the first phase of the evaluation project, the Descriptive Analysis.

The Descriptive Analysis focused on potential effects, on MRIP estimation components, associated with temporal coverage changes in the switch from MRFSS APAIS to MRIP APAIS in 2013. Comparisons of temporal distributions of angler-trips and four different MRIP estimation components were made for years 2010-2013. The MRIP estimation components included a) area fished proportions, coverage adjustments for the b) Coastal Household Telephone Survey and c) For-Hire Survey, and d) species-specific catch rates.

In general, results showed large differences in estimated temporal distributions of angler trips between 2013 and prior years. In 2013, there were sizeable shifts in trips from late morning-early afternoon (Peak) hours to late afternoon-evening hours and, to a lesser extent, early morning hours. These differences were widespread across sub regions, states, and modes of fishing.

Differences in the MRIP estimation components were much more variable but generally smaller in magnitude compared to the temporal trip distributions. For area fished proportions, there was evidence of a small shift from Inland to offshore areas, EEZ and STS, in the Gulf of Mexico and South Atlantic sub regions, but those findings did not extend to the Mid- and North Atlantic sub regions. Results for both CHTS and FHS coverage adjustments were variable among and within sub regions. Results for species-specific were the most variable of all the analyzed MRIP estimation components. While some larger differences were observed for individual species, results varied considerably both within and across species by sub region, state, mode of fishing, and area fished.

In summary, estimates of temporal distributions of trips were markedly different in 2013 compared to prior years. The changes in temporal distribution had the potential to create systematic differences in the MRIP estimation components calculated from intercept sample data to the extent that trips during Peak hours were systematically different from off-Peak trips. While differences were observed in the MRIP estimation components, they were highly variable but typically much smaller than the differences in temporal distributions. Ultimately, this report cannot reach a definitive conclusion due to the confounding of year and design change effects. However, these findings do provide considerable support for the presence of design change effects related to the change in temporal coverage, in both estimates of temporal distributions of angler-trips and some fraction of the 2013 MRIP estimation components.

## 2. Background

In 2006, the National Research Council (NRC) released a report identifying a number of serious deficiencies in the field intercept component of the Marine Recreational Fisheries Statistics Survey (MRFSS APAIS). These deficiencies fell into two broad categories: gaps in survey coverage and deviations from design-based probability sampling. The NRC report indicated that the deficiencies could introduce bias into recreational catch and effort estimates and strongly recommended changing the MRFSS APAIS design to address the problems.

Motivated in part by the NRC's findings, NOAA Fisheries formed the Marine Recreational Information Program (MRIP) in 2007 with the goal of improving catch and effort information for marine recreational fisheries. A top priority for the new program was redesigning the MRFSS APAIS. An MRIP project team (comprised of NOAA Fisheries staff, state partners, and expert survey design consultants) was formed to develop and test a new intercept survey design. After more than a year of development, the pilot intercept design was fielded alongside the existing MRFSS APAIS in North Carolina for all waves of sampling in 2010.

Overall, results from the North Carolina Pilot Project were encouraging. Differences in estimates between the two intercept survey designs were not significant, in general. It was noted that the new design was considerably less productive (e.g. fewer interviews obtained per assignment) than the MRFSS APAIS. However, the new design had addressed both gaps in temporal survey coverage and deviations from probability sampling. An independent external review of the North Carolina Pilot Project also concluded that the new design was superior to the existing MRFSS APAIS having addressed deficiencies identified in the NRC report. In January 2013, following both internal and external reviews, the new intercept design was certified for use in MRIP by the Assistant Administrator for NOAA Fisheries.

Given the generally favorable results of the North Carolina Pilot, NOAA Fisheries implemented the new Access Point Angler Intercept Survey (MRIP APAIS) beginning in March, 2013. The new MRIP APAIS, modeled directly on the certified design developed in the North Carolina Pilot, replaced the MRFSS APAIS in states along the Atlantic and Gulf of Mexico coasts from Maine through Louisiana. Due to existing budget and field staff constraints, it was not possible to continue the MRFSS APAIS alongside the new MRIP APAIS.

While the transition from MRFSS APAIS to MRIP APAIS went relatively well from a survey operations perspective, concerns began to surface regarding the 2013 catch estimates for some federally managed species, particularly those in the Gulf of Mexico sub region. Typically, concerns were over larger than expected landings estimates for select offshore species. The number and similarity of concerns led to questions about possible intercept design change effects and the comparability of 2013 catch estimates with prior years.

The Fisheries Statistics Division (ST1) of NOAA Fisheries' Office of Science and Technology responded to concerns by conducting extensive reviews of the MRIP APAIS sample data and MRIP estimation programs and organizing a project to investigate potential MRIP APAIS design change effects – the MRIP APAIS Design Change Evaluation Project. Work began on the MRIP APAIS Design Change Evaluation

Project in March, 2014 and was divided into two phases: 1) a short term preliminary Descriptive Analysis (completed) and 2) a longer term Simulation Study (initiated).

The Descriptive Analysis Phase has tried to identify the presence of possible design change effects by first identifying likely differences in temporal distributions of trips between MRFSS APAIS and MRIP APAIS sampling designs and then comparing MRIP estimation components among various temporal domains across years sampled under the different intercept designs. The temporal domains were defined to reflect the differences in temporal coverage between the MRIP APAIS and MRFSS APAIS designs.

The Simulation Study Phase will attempt to both identify and directly quantify design change effects by taking repeated side-by-side samples from the same simulated populations using both the MRIP APAIS and MRFSS APAIS designs. Although it will not be completed until sometime in 2015 (at the earliest), the simulation approach is needed to separate design change effects from year effects. These separate effects were confounded in the descriptive approach due to the lack of actual side-by-side field sampling in 2013.

The sections that follow describe methods and results from the Descriptive Analysis Phase. While assumptions made in the analysis are described below, it must be stated again that potential design change effects cannot be fully separated from true year effects in the current analysis. Even so, information provided here should help inform further work so long as this central limitation is kept in mind.

## 3. Methods

The Descriptive Analysis has focused on evaluating possible effects due to changes in temporal coverage between the MRIP APAIS and MRFSS APAIS designs. As a first step, weighted frequency distributions of return (or end) hours for intercepted angler-trips were generated separately for combinations of sub region, state, mode of fishing, and year. Exact trip return times recorded by field samplers were truncated to whole hours (e.g. 3pm = 3:00pm-3:59pm) prior to generating the distributions. While wave level distributions were also examined, annual distributions were preferred due to the increased stability resulting from much larger sample sizes at the annual level. MRIP APAIS distributions from 2013 were compared to the three most recent MRFSS APAIS years, 2010-2012.

Comparisons between MRIP APAIS and MRFSS APAIS trip return hour distributions were used to define three temporal domains or time blocks: Morning, Peak, and Evening. The Peak time block corresponded to the range of hours for which MRFSS trip proportions, from years 2010-2012, were generally greater than or equal to MRIP APAIS trip proportions in 2013 (Figure 1). The Morning time block was comprised of hours between midnight and the start of the Peak time block. Similarly, the Evening time block ranged from the end of the Peak time block to midnight. The ranges of hours used to define time blocks generally varied by sub region, state, and mode of fishing.

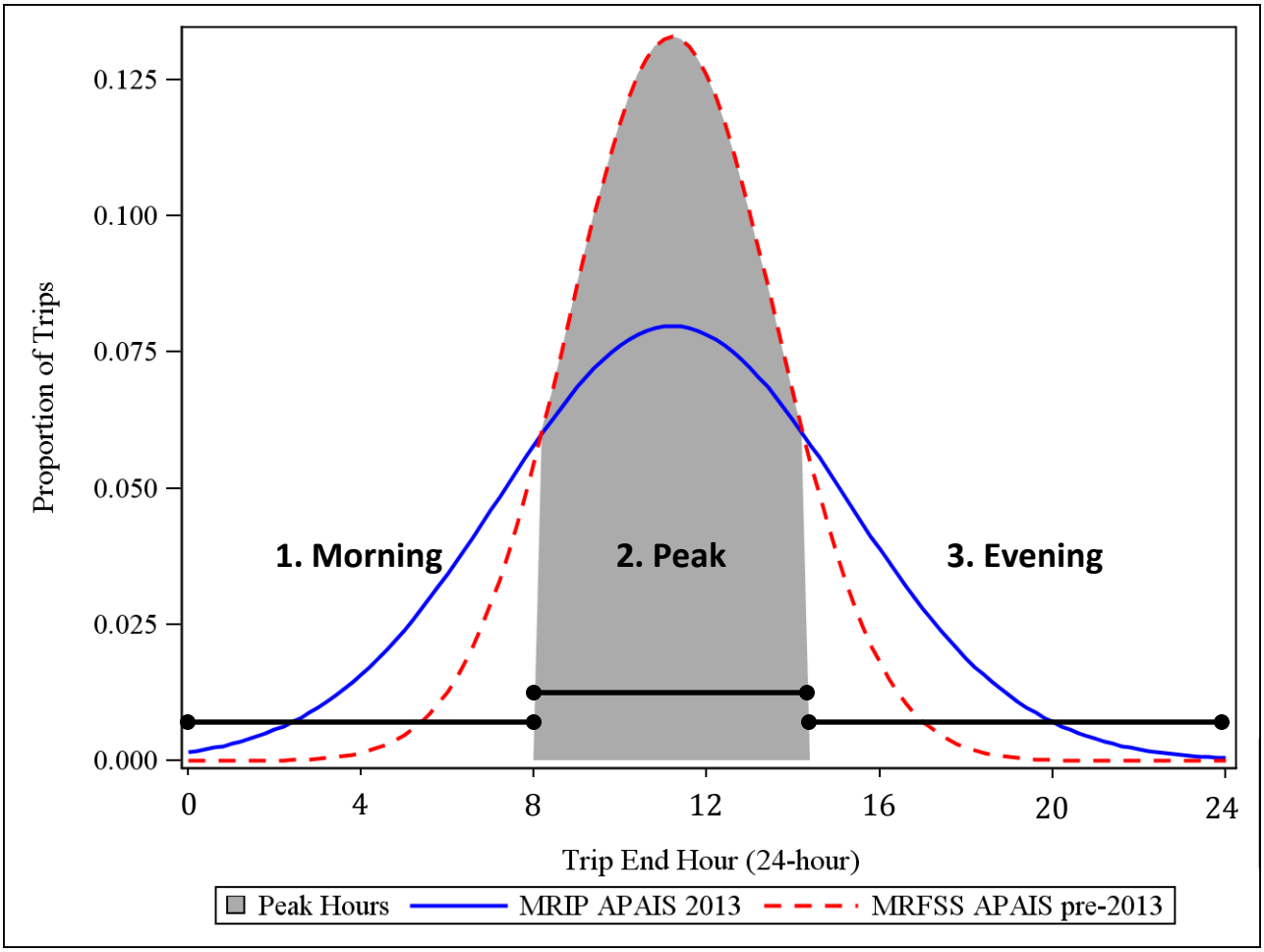


Figure 1. Hypothetical Distributions of Angler-Trip End Hours to illustrate Time Blocks used in Descriptive Analysis. The Peak time block corresponds to the range of hours where trip proportions in MRFSS APAIS years 2010-2012 were generally greater than or equal to the MRIP APAIS proportions in 2013. It was assumed that the MRFSS APAIS design provided full coverage of trips ending (returning) during these hours.

In subsequent steps, the MRIP estimation components, estimated from weighted intercept sample data, were calculated in domains defined by sub region, state, mode of fishing, year and time block. The MRIP weighted estimation components included a) area fished proportions, coverage adjustments for the b) Coastal Household Telephone Survey (CHTS) and c) For-Hire Survey (FHS), and d) species-specific catch rates. The range of years in this part of the analysis was also limited to 2010-2012 for MRFSS APAIS and 2013 for MRIP APAIS.

The first MRIP estimation component evaluated for possible design change effects was the area fished proportions. This component has been used in MRIP estimation to partition total private boat and shore mode effort estimates at the year-sub region-state-wave level into three separate area-specific effort estimates: **Inland waters** (marine or brackish portions of interior bays, sounds, estuaries, or coastal rivers), **State Territorial Seas** (STS, open ocean extending from coastline out to 3 nautical miles in most cases), and the Federal **Exclusive Economic Zone** (EEZ, open ocean extending from STS out to 200 nautical miles from the coastline).

In the current analysis, these proportions were calculated for separate domains defined by sub region, state, mode of fishing, year, and time block using the MRIP public-use datasets and standard estimation methodology for weighted proportions:

$$\hat{p}_k = \frac{\sum_{h=1}^{H}\sum_{i=1}^{n_h}\sum_{j=1}^{m_{hi}} w_{hij} I_{hijk}}{\sum_{h=1}^{H}\sum_{i=1}^{n_h}\sum_{j=1}^{m_{hi}} w_{hij}} \qquad \text{(Eq. 1)}$$

where $\hat{p}_k$ is the estimated proportion of the total in category *k*,
*H* denotes the total number of strata,
$n_h$ denotes the total number of primary stage units (site clusters) sampled in stratum *h*,
$m_{hi}$ denotes the total number of angler-trip stage units sampled in cluster *i*,
$w_{hij}$ is the MRFSS APAIS or MRIP APAIS sample weight for angler-trip *j*,
$I_{hijk}$ is an indicator variable with values 1 if angler-trip j is in *k* and 0 otherwise.

There were no changes to the area fished category definitions or how the information was collected in the transition from MRFSS APAIS to MRIP APAIS. For both MRFSS APAIS and MRIP APAIS sampling, samplers were instructed to record the area where the majority of fishing occurred during the trip.

The second MRIP estimation component evaluated was the CHTS coverage adjustment. This adjustment has been used in MRIP estimation to expand the CHTS private boat and shore mode effort estimates for in-state coastal county residents upwards to cover both coastal and non-coastal county in-state residents as well as out-of-state residents. The actual adjustment used in MRIP estimation has been the weighted total number of angler-trips divided by the weighted total number of coastal county in-state resident angler-trips – the inverse of the proportion of total trips taken by coastal county in-state residents. The weighted proportions themselves were used in this analysis, however. The weighted proportions were calculated following Eq. 1 in separate domains defined by sub region, state, mode of fishing, year, and time block. The information and method of collection used to identify state and county of residence were the same for both MRFSS APAIS and MRIP APAIS.

A related MRIP estimation component was the FHS coverage adjustment. The adjustment has been used in MRIP estimation to expand the FHS charter boat effort estimates to cover effort from both vessels on the FHS frame as well as charter or for-hire vessels not on the frame. Weighted proportions of total intercepted angler-trips from on-frame vessels were calculated following Eq. 1 in separate domains defined by sub region, state, charter mode, year and time block. For both MRFSS APAIS and MRIP APAIS, samplers determined if vessels corresponding to the intercepted angler-trips were on or off the FHS frame using a reference list that matched the FHS frame in the current state, year, and wave of sampling.

The last estimation component evaluated was catch rate, or mean catch per angler-trip, by species. Mean catch per angler-trip was calculated using the standard weighted mean estimator for a multistage stratified design:

$$\hat{\bar{y}}_k = \frac{\sum_{h=1}^{H}\sum_{i=1}^{n_h}\sum_{j=1}^{m_{hi}} w_{hij} y_{hijk}}{\sum_{h=1}^{H}\sum_{i=1}^{n_h}\sum_{j=1}^{m_{hi}} w_{hij}} \qquad \text{(Eq. 2)}$$

where $\hat{\bar{y}}_k$ is the estimated mean catch per trip of species *k*,

*H* denotes the total number of strata,
$n_h$ denotes the total number of primary stage units (site clusters) sampled in stratum *h*,
$m_{hi}$ denotes the total number of angler-trip stage units sampled in cluster *i*,
$w_{hij}$ is the MRFSS APAIS or MRIP APAIS sample weight for angler-trip *j*,
$y_{hijk}$ is the number of species *k* caught on angler-trip j or 0 if species *k* was not caught.

While MRIP provides estimates for several catch dispositions, the current analysis was limited to landed fish only. As such, mean landings per angler-trip was calculated in separate domains defined by sub region, state, mode of fishing, year, time block, and species. Field procedures for identifying and counting fish were consistent between MRFSS APAIS and MRIP APAIS sampling years.

A total of 31 unique species was selected for the catch rate component analysis representing a variety of inland, offshore, rare, and common species. There were 26 species selected for the Atlantic coast including Atlantic cod, Atlantic croaker, black sea bass, bluefish, dolphin, gag, gray snapper, gray triggerfish, greater amberjack, haddock, hogfish, king mackerel, red drum, red grouper, red snapper, scup, sheepshead, Southern flounder, Spanish mackerel, spot, spotted seatrout, striped bass, Summer flounder, tautog, vermilion snapper, and yellowtail snapper. There were 23 species selected for the Gulf of Mexico including almaco jack, Atlantic croaker, banded rudderfish, black sea bass, blacktip shark, dolphin, gag, gray snapper, gray triggerfish, greater amberjack, Gulf flounder, hogfish, king mackerel, red drum, red grouper, red snapper, sand seatrout, sheepshead, Southern flounder, Spanish mackerel, spotted seatrout, vermilion snapper, and yellowtail snapper. Summarized information was provided for all species in aggregate. In the Gulf of Mexico, species specific results were provided for red snapper, king mackerel, and red drum. For the Atlantic coast, species specific results were provided for black sea bass, striped bass, summer flounder, Atlantic cod, and red drum. A separate appendix was prepared with detailed results for all species included in the Descriptive Analysis.

Two sets of comparisons were made for each estimation component. In one set, estimates for the Peak time block domain were compared among years as a proxy method for evaluating true inter-annual differences, the year effects. The assumption made here was that the MRFSS APAIS design provided full temporal coverage during the Peak time block. By design, the MRIP APAIS provided full temporal coverage for all time blocks including Peak. As such, Peak time block estimates should be comparable among years as long as the assumption holds for MRFSS APAIS years. This set of comparisons gave the best available measure of actual changes or differences among years, or at least measures that were far less impacted by differences in temporal coverage between the two intercept survey designs.

In a second set of comparisons, MRIP APAIS 2013 estimates from the Peak time block were compared to MRIP APAIS 2013 estimates for all time blocks combined (the full day). These comparisons were made to approximate the magnitude and direction of possible design change effects, at least those due to changes in temporal coverage. Several assumptions were required in using these comparisons to approximate design change effects: 1) the MRIP APAIS 2013 Peak time block estimates were comparable to corresponding MRFSS APAIS Peak estimates in prior years, 2) MRFSS APAIS Peak estimates were acceptable approximations of the MRFSS full day (all time blocks combined) estimates, 3) the MRIP APAIS 2013 Peak time block estimates were acceptable approximations of hypothetical MRFSS 2013 full day estimates had the MRFSS APAIS been conducted in 2013.

While the validity of assumptions 1 and 3 could not be evaluated, information was available to substantiate assumption 2. In years sampled using the MRFSS APAIS design, the Peak time block comprised a large majority of the intercept data, generally well over 80% of total intercepted trips. As

such, Peak time block estimates were generally very close if not identical to the full day estimates in MRFSS APAIS years, 2010-2012.

# 4. Temporal Distributions

While temporal distributions of angler-trips varied, two key findings were consistent across sub regions, states, and modes of fishing: 1) temporal distributions in years prior to 2013 were very similar with the Peak time block comprising a large majority of trips, and 2) in 2013, the Peak time block proportions of trips were noticeably smaller compared to previous years and Evening and, to a lesser extent, Morning proportions were typically larger.

## 4.1 Gulf of Mexico

For states in the Gulf of Mexico sub region, results were consistent with the general findings. From 2010-2012 (MRFSS APAIS design), the Peak time block accounted for approximately 70-90% of total angler-trips (Table 1). Evening time blocks often made up substantially less that 30% of total trips with Morning time blocks generally under 5%. In 2013 (MRIP APAIS), Peak trip percentages were typically smaller at 40-60% of total trips while Evening percentages increased to 30-50%. Morning time block percentages also increased in 2013 but were often still less than 10%.

Time blocks were somewhat variable among Gulf states and modes. Peak time blocks frequently ranged from 10am-2pm for Private boat and Shore modes. For Charter boat mode, Peak blocks were slightly later in the day, typically starting at 11am. In all modes, Florida (West coast) Peak time blocks ended at least one hour later than in other states.

Results for Florida (West) Charter boat mode were somewhat different from the other cases. The Peak time block, 11am-5pm, was several hours longer than most other Peak blocks. Differences in temporal distributions between 2013 and prior years were also considerably smaller in this case. The Peak time block accounted for 88% of total trips in 2013, substantially larger than any other Peak time block in 2013.

Table 1. Weighted Proportions of Angler-Trips by State, Mode of Fishing, and Time Block Domain for Years 2010-2013.

| State | Mode | Time Block | | Angler-Trip Proportions by Year | | | |
|---|---|---|---|---|---|---|---|
| | | | | 2010 | 2011 | 2012 | 2013 |
| LA | PR Boat | Morning | <10am | 0.02 | 0.02 | 0.02 | 0.05 |
| | | Peak | 10am-2pm | 0.92 | 0.91 | 0.93 | 0.62 |
| | | Evening | >=3pm | 0.06 | 0.07 | 0.05 | 0.32 |
| | CH Boat | Morning | <11am | 0.05 | 0.06 | 0.10 | 0.20 |
| | | Peak | 11am-3pm | 0.91 | 0.89 | 0.86 | 0.67 |
| | | Evening | >=4pm | 0.03 | 0.05 | 0.05 | 0.13 |
| | Shore | Morning | <9am | 0 | 0.01 | 0 | 0.01 |
| | | Peak | 9am-2pm | 0.86 | 0.85 | 0.87 | 0.49 |
| | | Evening | >=3pm | 0.14 | 0.14 | 0.13 | 0.51 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS | PR Boat | Morning | <10am | 0.04 | 0.02 | 0.03 | 0.09 |
| | | Peak | 10am-2pm | 0.84 | 0.85 | 0.83 | 0.47 |
| | | Evening | >=3pm | 0.12 | 0.12 | 0.14 | 0.44 |
| | CH Boat | Morning | <12pm | 0.59 | 0.20 | 0.06 | 0.23 |
| | | Peak | 12pm-2pm | 0.35 | 0.77 | 0.91 | 0.53 |
| | | Evening | >=3pm | 0.06 | 0.03 | 0.03 | 0.24 |
| | Shore | Morning | <10am | 0.01 | 0.04 | 0.05 | 0.14 |
| | | Peak | 10am-2pm | 0.70 | 0.60 | 0.70 | 0.39 |
| | | Evening | >=3pm | 0.30 | 0.36 | 0.25 | 0.47 |
| AL | PR Boat | Morning | <10am | 0.05 | 0.02 | 0.04 | 0.09 |
| | | Peak | 10am-2pm | 0.88 | 0.94 | 0.93 | 0.56 |
| | | Evening | >=3pm | 0.06 | 0.04 | 0.03 | 0.35 |
| | CH Boat | Morning | <11am | 0.10 | 0.03 | 0.16 | 0.05 |
| | | Peak | 11am-2pm | 0.71 | 0.84 | 0.77 | 0.51 |
| | | Evening | >=3pm | 0.19 | 0.13 | 0.07 | 0.44 |
| | Shore | Morning | <10am | 0.06 | 0.06 | 0.05 | 0.10 |
| | | Peak | 10am-2pm | 0.89 | 0.90 | 0.93 | 0.49 |
| | | Evening | >=3pm | 0.05 | 0.03 | 0.02 | 0.41 |
| FLw | PR Boat | Morning | <10am | 0.01 | 0.01 | 0.01 | 0.01 |
| | | Peak | 10am-3pm | 0.75 | 0.77 | 0.75 | 0.59 |
| | | Evening | >=4pm | 0.24 | 0.23 | 0.24 | 0.40 |
| | CH Boat | Morning | <11am | 0.03 | 0.02 | 0.04 | 0.05 |
| | | Peak | 11am-5pm | 0.96 | 0.95 | 0.94 | 0.88 |
| | | Evening | >=6pm | 0.02 | 0.03 | 0.02 | 0.07 |
| | Shore | Morning | <10am | 0.02 | 0.03 | 0.04 | 0.09 |
| | | Peak | 10am-4pm | 0.83 | 0.85 | 0.86 | 0.61 |
| | | Evening | >=5pm | 0.14 | 0.12 | 0.10 | 0.30 |

## 4.2 Atlantic

In general, temporal distribution results were consistent across the Atlantic coast (Tables 2-4). Peak time blocks typically accounted for 70-85% of total trips from 2010-2012 and 40-60% in 2013. The 2013 decreases in Peak block percentages usually equated to increases in the corresponding Evening time blocks. From 2010-2012, the Evening block percentages frequently ranged from 10-30% increasing to 30-50% in 2013. With several exceptions (noted below), the Morning time block percentages were small (generally <10%) in all years and differences between 2010-2012 and 2013 were minimal compared to the other time blocks.

In roughly 11 cases, decreases in the 2013 Peak time block percentages were associated with substantial increases in the Morning percentages. For Charter boat mode, there were Morning block increases in North Carolina, Delaware, New York, Rhode Island, and New Hampshire. Increases in Private boat mode occurred in Virginia, Delaware, New Jersey, and New Hampshire. Finally, New York and New Hampshire both saw increases in the Morning for Shore mode.

Peak time blocks tended to be somewhat later in the Atlantic states compared to the Gulf. Peak blocks typically ran from 11am to 3pm or 4pm (Tables 2-4), with many Peak blocks in Mid-Atlantic states not starting until 12pm or later. However, some Peak blocks started earlier including Shore mode in New Jersey, Connecticut, Massachusetts, and Maine.

There were several cases in Atlantic coast states were Charter mode distributions in 2013 were still similar to previous years. In Florida (East coast) and Virginia, 2013 trip percentages for all time blocks were almost identical to those in 2010-2012. In New Jersey, the Evening time block percentage was consistent from 2010-2012 to 2013 while there was a small increase in the Peak time block percentage in 2013 with a similar decrease in the Morning percentage.

Table 2. Weighted Proportions of Angler-Trips by State, Mode of Fishing, and Time Block Domain for Years 2010-2013 in South Atlantic.

| | | | | Angler-Trip Proportions by Year | | | |
|---|---|---|---|---|---|---|---|
| State | Mode | Time Block | | 2010 | 2011 | 2012 | 2013 |
| NC | PR Boat | Morning | <12pm | 0.06 | 0.06 | 0.05 | 0.12 |
| | | Peak | 12pm-3pm | 0.71 | 0.72 | 0.72 | 0.42 |
| | | Evening | >=4pm | 0.24 | 0.22 | 0.24 | 0.46 |
| | CH Boat | Morning | <1pm | 0.22 | 0.16 | 0.19 | 0.32 |
| | | Peak | 1pm-5pm | 0.67 | 0.79 | 0.76 | 0.58 |
| | | Evening | >=6pm | 0.11 | 0.05 | 0.06 | 0.10 |
| | Beach/Bank | Morning | <11am | 0.08 | 0.08 | 0.04 | 0.10 |
| | | Peak | 11am-3pm | 0.66 | 0.84 | 0.82 | 0.51 |
| | | Evening | >=4pm | 0.26 | 0.09 | 0.14 | 0.40 |
| | Man-made | Morning | <11am | 0.08 | 0.08 | 0.07 | 0.16 |
| | | Peak | 11am-3pm | 0.79 | 0.78 | 0.82 | 0.43 |
| | | Evening | >=4pm | 0.13 | 0.15 | 0.10 | 0.41 |
| SC | PR Boat | Morning | <11am | 0.01 | 0.02 | 0.01 | 0.06 |
| | | Peak | 11am-5pm | 0.81 | 0.75 | 0.75 | 0.63 |
| | | Evening | >=6pm | 0.18 | 0.23 | 0.24 | 0.31 |
| | CH Boat | Morning | <11am | 0 | <.01 | <.01 | 0 |
| | | Peak | 11am-2pm | 0.72 | 0.79 | 0.78 | 0.40 |
| | | Evening | >=3pm | 0.28 | 0.21 | 0.22 | 0.60 |
| | Shore | Morning | <10am | 0.02 | 0.02 | <.01 | 0.03 |
| | | Peak | 10am-4pm | 0.74 | 0.75 | 0.82 | 0.68 |
| | | Evening | >=5pm | 0.25 | 0.24 | 0.18 | 0.30 |
| GA | PR Boat | Morning | <11am | 0 | <.01 | 0.01 | 0.04 |
| | | Peak | 11am-3pm | 0.70 | 0.77 | 0.72 | 0.48 |
| | | Evening | >=4pm | 0.30 | 0.23 | 0.27 | 0.48 |
| | CH Boat | Morning | <10am | 0 | 0 | 0 | 0 |
| | | Peak | 10am-3pm | 0.82 | 0.79 | 0.88 | 0.48 |
| | | Evening | >=4pm | 0.18 | 0.21 | 0.12 | 0.52 |
| | Shore | Morning | <11am | 0 | 0.01 | 0.03 | 0.05 |
| | | Peak | 11am-3pm | 0.71 | 0.76 | 0.86 | 0.36 |
| | | Evening | >=4pm | 0.29 | 0.23 | 0.11 | 0.59 |
| FLe | PR Boat | Morning | <10am | <.01 | <.01 | <.01 | 0.04 |
| | | Peak | 10am-2pm | 0.80 | 0.76 | 0.74 | 0.51 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Evening | >=3pm | 0.20 | 0.24 | 0.26 | 0.45 |
| CH Boat | Morning | <10am | 0 | 0 | 0 | 0 |
| | Peak | 10am-5pm | 0.97 | 0.97 | 0.92 | 0.96 |
| | Evening | >=6pm | 0.03 | 0.03 | 0.08 | 0.04 |
| Shore | Morning | <10am | 0.06 | 0.04 | 0.04 | 0.08 |
| | Peak | 10am-2pm | 0.73 | 0.72 | 0.70 | 0.43 |
| | Evening | >=3pm | 0.21 | 0.24 | 0.25 | 0.49 |

Table 3. Weighted Proportions of Angler-Trips by State, Mode of Fishing, and Time Block Domain for Years 2010-2013 in Mid Atlantic.

| | | | | Angler-Trip Proportions by Year | | | |
|---|---|---|---|---|---|---|---|
| State | Mode | Time Block | | 2010 | 2011 | 2012 | 2013 |
| VA | PR Boat | Morning | <1pm | 0.14 | 0.14 | 0.18 | 0.28 |
| | | Peak | 1pm-5pm | 0.76 | 0.74 | 0.75 | 0.53 |
| | | Evening | >=6pm | 0.10 | 0.12 | 0.07 | 0.19 |
| | CH Boat | Morning | <11am | <.01 | 0 | 0 | 0 |
| | | Peak | 11am-4pm | 0.82 | 0.89 | 0.84 | 0.88 |
| | | Evening | >=5pm | 0.18 | 0.11 | 0.16 | 0.12 |
| | Shore | Morning | <10am | 0.01 | <.01 | 0.04 | 0.03 |
| | | Peak | 10am-3pm | 0.79 | 0.75 | 0.72 | 0.39 |
| | | Evening | >=4pm | 0.20 | 0.25 | 0.23 | 0.58 |
| MD | PR Boat | Morning | <12pm | 0.10 | 0.14 | 0.05 | 0.17 |
| | | Peak | 12pm-4pm | 0.74 | 0.69 | 0.80 | 0.52 |
| | | Evening | >=5pm | 0.15 | 0.16 | 0.16 | 0.31 |
| | CH Boat | Morning | <11am | 0.01 | 0.02 | 0.07 | 0.01 |
| | | Peak | 11am-3pm | 0.87 | 0.89 | 0.84 | 0.73 |
| | | Evening | >=4pm | 0.12 | 0.09 | 0.10 | 0.27 |
| | Shore | Morning | <12pm | 0.10 | 0.18 | 0.05 | 0.24 |
| | | Peak | 12pm-5pm | 0.86 | 0.75 | 0.88 | 0.48 |
| | | Evening | >=6pm | 0.05 | 0.08 | 0.07 | 0.28 |
| DE | PR Boat | Morning | <1pm | 0.17 | 0.13 | 0.13 | 0.27 |
| | | Peak | 1pm-5pm | 0.76 | 0.81 | 0.78 | 0.59 |
| | | Evening | >=6pm | 0.07 | 0.07 | 0.09 | 0.14 |
| | CH Boat | Morning | <1pm | 0.04 | 0.05 | 0.03 | 0.14 |
| | | Peak | 1pm-4pm | 0.89 | 0.91 | 0.83 | 0.75 |
| | | Evening | >=5pm | 0.07 | 0.05 | 0.15 | 0.11 |
| | Shore | Morning | <12pm | 0.04 | 0.05 | 0.08 | 0.13 |
| | | Peak | 12pm-4pm | 0.79 | 0.74 | 0.78 | 0.54 |
| | | Evening | >=5pm | 0.17 | 0.21 | 0.14 | 0.33 |
| NJ | PR Boat | Morning | <12pm | 0.09 | 0.09 | 0.06 | 0.15 |
| | | Peak | 12pm-4pm | 0.82 | 0.85 | 0.88 | 0.66 |
| | | Evening | >=5pm | 0.10 | 0.06 | 0.06 | 0.19 |
| | CH Boat | Morning | <1pm | 0.09 | 0.02 | 0.08 | 0 |
| | | Peak | 1pm-4pm | 0.80 | 0.85 | 0.84 | 0.89 |
| | | Evening | >=5pm | 0.11 | 0.13 | 0.08 | 0.11 |
| | Shore | Morning | <8am | 0.05 | <.01 | 0.05 | <.01 |
| | | Peak | 8am-3pm | 0.84 | 0.85 | 0.83 | 0.58 |
| | | Evening | >=4pm | 0.12 | 0.15 | 0.12 | 0.42 |
| NY | PR Boat | Morning | <11am | 0.03 | 0.05 | 0.07 | 0.08 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Peak | 11am-4pm | 0.84 | 0.88 | 0.87 | 0.61 |
| | | Evening | >=5pm | 0.13 | 0.07 | 0.06 | 0.31 |
| | CH Boat | Morning | <12pm | 0.23 | 0.10 | 0.21 | 0.66 |
| | | Peak | 12pm-5pm | 0.76 | 0.90 | 0.61 | 0.31 |
| | | Evening | >=6pm | 0.01 | 0 | 0.18 | 0.03 |
| | Shore | Morning | <11am | 0.12 | 0.07 | 0.17 | 0.24 |
| | | Peak | 11am-5pm | 0.83 | 0.87 | 0.82 | 0.53 |
| | | Evening | >=6pm | 0.05 | 0.06 | 0.01 | 0.23 |

Table 4. Weighted Proportions of Angler-Trips by State, Mode of Fishing, and Time Block Domain for Years 2010-2013 in North Atlantic.

| | | | | Angler-Trip Proportions by Year | | | |
|---|---|---|---|---|---|---|---|
| State | Mode | Time Block | | 2010 | 2011 | 2012 | 2013 |
| CT | PR Boat | Morning | <10am | 0.01 | 0.01 | 0 | 0.06 |
| | | Peak | 10am-1pm | 0.82 | 0.91 | 0.94 | 0.27 |
| | | Evening | >=2pm | 0.16 | 0.09 | 0.06 | 0.67 |
| | CH Boat | Morning | <11am | 0.23 | 0.07 | 0.22 | 0 |
| | | Peak | 11am-3pm | 0.76 | 0.93 | 0.77 | 0.74 |
| | | Evening | >=4pm | 0.01 | 0 | 0.01 | 0.26 |
| | Shore | Morning | <9am | 0 | 0 | 0 | 0.01 |
| | | Peak | 9am-1pm | 0.85 | 0.94 | 0.90 | 0.41 |
| | | Evening | >=2pm | 0.15 | 0.06 | 0.10 | 0.58 |
| RI | PR Boat | Morning | <11am | 0.03 | 0.02 | 0.04 | 0.08 |
| | | Peak | 11am-6pm | 0.94 | 0.98 | 0.95 | 0.78 |
| | | Evening | >=7pm | 0.03 | 0 | 0.01 | 0.14 |
| | CH Boat | Morning | <12pm | 0.03 | 0.03 | 0.04 | 0.34 |
| | | Peak | 12pm-4pm | 0.90 | 0.96 | 0.92 | 0.53 |
| | | Evening | >=5pm | 0.06 | 0.01 | 0.04 | 0.13 |
| | Shore | Morning | <10am | 0.03 | 0.02 | 0.02 | 0.06 |
| | | Peak | 10am-4pm | 0.89 | 0.89 | 0.82 | 0.50 |
| | | Evening | >=5pm | 0.08 | 0.09 | 0.16 | 0.44 |
| MA | PR Boat | Morning | <10am | 0.13 | 0.04 | 0.05 | 0.08 |
| | | Peak | 10am-4pm | 0.79 | 0.86 | 0.75 | 0.66 |
| | | Evening | >=5pm | 0.08 | 0.10 | 0.10 | 0.26 |
| | CH Boat | Morning | <10am | 0 | 0 | 0.02 | 0 |
| | | Peak | 10am-3pm | 0.77 | 0.78 | 0.75 | 0.57 |
| | | Evening | >=4pm | 0.23 | 0.22 | 0.24 | 0.43 |
| | Shore | Morning | <6am | 0.01 | 0 | 0 | <.01 |
| | | Peak | 6am-3pm | 0.92 | 0.89 | 0.88 | 0.57 |
| | | Evening | >=4pm | 0.08 | 0.11 | 0.12 | 0.43 |
| NH | PR Boat | Morning | <1pm | 0.20 | 0.05 | 0.10 | 0.20 |
| | | Peak | 1pm-6pm | 0.71 | 0.86 | 0.86 | 0.64 |
| | | Evening | >=7pm | 0.09 | 0.09 | 0.05 | 0.16 |
| | CH Boat | Morning | <1pm | 0.03 | 0. | 0 | 0.26 |
| | | Peak | 1pm-5pm | 0.93 | 0.94 | >.99 | 0.67 |
| | | Evening | >=6pm | 0.04 | 0.06 | <.01 | 0.07 |
| | Shore | Morning | <1pm | 0.20 | 0.15 | 0.05 | 0.34 |
| | | Peak | 1pm-8pm | 0.77 | 0.79 | 0.89 | 0.65 |
| | | Evening | >=9pm | 0.03 | 0.06 | 0.05 | 0.01 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ME | PR Boat | Morning | <10am | 0 | <.01 | <.01 | 0.05 |
| | | Peak | 10am-2pm | 0.77 | 0.65 | 0.79 | 0.35 |
| | | Evening | >=3pm | 0.23 | 0.35 | 0.21 | 0.60 |
| | Shore | Morning | <9am | 0 | 0 | 0 | 0.01 |
| | | Peak | 9am-2pm | 0.71 | 0.75 | 0.80 | 0.38 |
| | | Evening | >=3pm | 0.29 | 0.25 | 0.20 | 0.60 |

Note: Maine CH Boat was excluded from the Descriptive Analysis as sampling in this stratum used a separate vessel-based design that was consistent across years 2010-2013.

# 5. Area Fished Proportions

While results for area fished proportions varied among sub regions, states and modes of fishing, there were a few consistent findings. First, differences in area fished proportions between 2013 and prior years were generally much smaller than differences in temporal distributions. Also, differences in area fished proportions between the 2013 Peak time block and full day domains were small, less than 10 percentage points, in the majority of cases.

## 5.1 Gulf of Mexico

In the Gulf of Mexico, area fished proportions were fairly consistent among MRFSS APAIS years, 2010-2012, but some differences were observed among states, modes, and between 2013 and prior years. In most cases, Inland trips accounted for the majority of trips followed by STS and EEZ (Table 5). Inland proportions were generally near or above 0.9 for both Private boat and Shore modes in Louisiana and Mississippi. In Alabama and Florida (West), Inland proportions were lower, ranging from 0.6 to 0.8 for Private boat mode and from less than 0.4 to about 0.7 in Shore mode.

For Private boat mode, Peak Inland proportions were somewhat lower in 2013 than in prior years suggesting that there may have been some true shift (year effect) from Inland to offshore fishing in 2013 (Figure 2). However, the full day Inland proportions were lower than Peak in 2013, by approximately 3 percentage points, indicating that there may have been design change effects in the same direction, and somewhat larger in magnitude, as the year effects (Figure 3). The reductions in Inland trip proportions were associated with increases in primarily EEZ proportions and STS proportions to a lesser extent.

In Shore mode, Peak Inland proportions were also lower in 2013 than in prior years which supports a true shift (year effect) from Inland to STS fishing in 2013 (Figure 2). Driven largely by Alabama and Florida, Shore differences among Peak Inland proportions were somewhat larger than Private boat. In contrast to Private boat mode, the full day Inland proportions were generally greater than Peak in 2013. In this case, possible design change effects were acting in the opposite direction from year effects and were typically smaller in magnitude (Figure 3). The net result for Shore mode was still a decrease in Inland trip proportions with a corresponding increase in STS proportions.

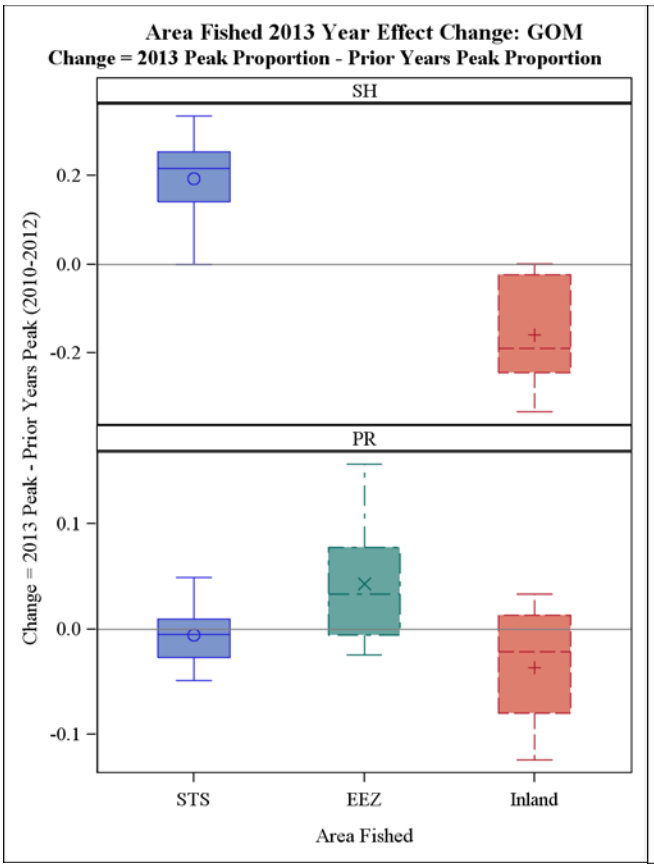


**Figure 2**. Differences in Peak Time Block Area Fished Proportions between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Louisiana, Mississippi, Alabama, and Florida (West coast).

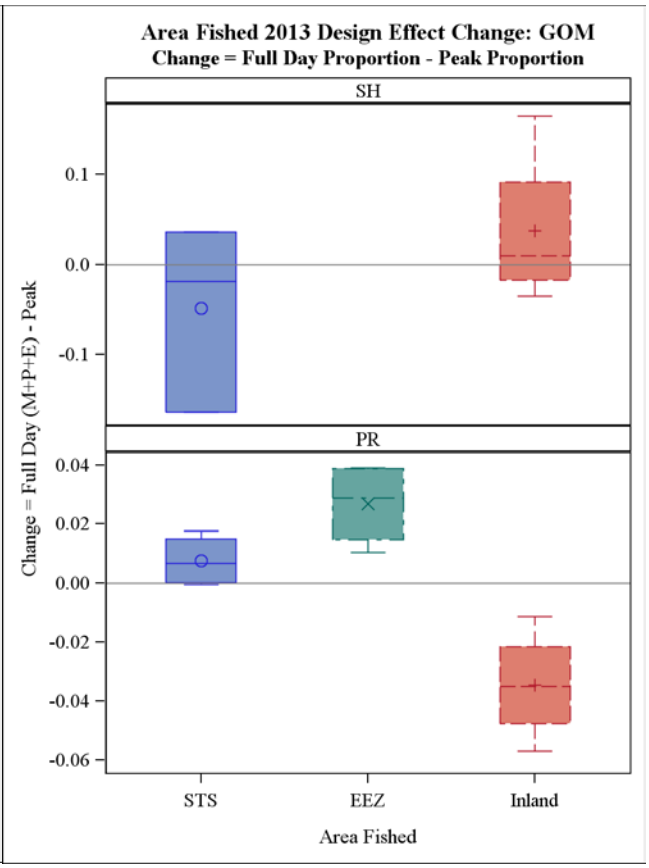


**Figure 3**. Differences in 2013 Area Fished Proportions between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Louisiana, Mississippi, Alabama, and Florida (West coast).

Table 5. Weighted Proportions of Angler-Trips by State, Mode of Fishing, and Area Fished for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|---|
| State | Mode | Area Fished | P | T | P | T | P | T | P | T |
| LA | PR Boat | Inland | 0.98 | 0.98 | 0.96 | 0.95 | 0.93 | 0.93 | 0.96 | 0.95 |
| | | STS | 0.02 | 0.2 | 0.02 | 0.02 | 0.04 | 0.04 | 0.03 | 0.03 |
| | | EEZ | <.01 | <.01 | 0.02 | 0.02 | 0.03 | 0.03 | 0.01 | 0.02 |
| | Shore | Inland | 0.99 | 0.98 | 0.95 | 0.96 | 0.89 | 0.87 | 0.65 | 0.82 |
| | | STS | 0.01 | 0.02 | 0.05 | 0.04 | 0.11 | 0.13 | 0.35 | 0.18 |
| MS | PR Boat | Inland | 0.98 | 0.97 | 0.96 | 0.96 | 0.96 | 0.95 | 0.98 | 0.94 |
| | | STS | 0.02 | 0.02 | 0.03 | 0.02 | <.01 | 0.01 | 0.01 | 0.01 |
| | | EEZ | 0 | 0.01 | 0.01 | 0.02 | 0.04 | 0.04 | 0.02 | 0.05 |
| | Shore | Inland | 1 | 1 | 1 | 1 | >.99 | >.99 | 1 | 1 |
| | | STS | 0 | 0 | 0 | 0 | <.01 | <.01 | 0 | 0 |
| AL | PR Boat | Inland | 0.78 | 0.78 | 0.69 | 0.68 | 0.74 | 0.74 | 0.66 | 0.60 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | STS | 0.13 | 0.14 | 0.15 | 0.16 | 0.14 | 0.13 | 0.10 | 0.12 |
| | | EEZ | 0.08 | 0.08 | 0.16 | 0.16 | 0.13 | 0.13 | 0.24 | 0.28 |
| | Shore | Inland | 0.47 | 0.45 | 0.51 | 0.50 | 0.37 | 0.38 | 0.33 | 0.29 |
| | | STS | 0.53 | 0.55 | 0.49 | 0.50 | 0.63 | 0.62 | 0.67 | 0.71 |
| FLw | PR Boat | Inland | 0.67 | 0.64 | 0.71 | 0.68 | 0.66 | 0.64 | 0.59 | 0.55 |
| | | STS | 0.28 | 0.28 | 0.25 | 0.25 | 0.27 | 0.27 | 0.30 | 0.31 |
| | | EEZ | 0.05 | 0.08 | 0.04 | 0.07 | 0.07 | 0.10 | 0.12 | 0.14 |
| | Shore | Inland | 0.69 | 0.71 | 0.68 | 0.66 | 0.64 | 0.65 | 0.44 | 0.46 |
| | | STS | 0.31 | 0.29 | 0.32 | 0.34 | 0.36 | 0.35 | 0.56 | 0.54 |

## 5.2 Atlantic

Results for area fished proportions varied considerably across the Atlantic sub regions in terms of both potential year and design change effects. However, the magnitude of potential year effects tended to be smaller than in the Gulf of Mexico, particularly for Shore mode. Possible design change effects were generally in the same range (roughly +/- 5 percentage points) as in the Gulf states.

In the South Atlantic, year effects went in opposite directions by mode of fishing. Peak Inland proportions for Private boat mode tended to be up in 2013 compared to prior years and down in 2013 for Shore mode (Figure 4). The corresponding change was primarily in STS as the EEZ proportions (Private boat mode only) were largely unchanged in 2013.

Possible design change effects were somewhat similar across modes in the South Atlantic. For both Private boat and Shore, Peak Inland proportions were usually larger than full day proportions in 2013 but only by about 1 percentage point (Figure 5). However, the 2013 Private boat EEZ full day proportions were larger than Peak proportions by about 2 percentage points.

Net effects in the South Atlantic also varied by mode. For Shore mode, design change and year effects were generally in the same direction with year effects being somewhat larger than design change effects. Even so, the combined effect was a relatively minor shift in angler-trips from Inland to STS areas in 2013. In contrast, year effects were typically in the opposite direction from design change effects for Private boat mode. In these cases, year effects resulted in small increases in Inland trip proportions and decreases in STS trips with design change effects undoing much of those changes. As a result, 2013 full day area fished proportions were generally similar to prior years.

Differences were somewhat larger for Shore mode in Georgia and Private boat mode in Florida (East coast). In Georgia, the 2013 Shore mode Inland proportion of trips was down by roughly 10 to 25 percentage points compared to prior years, a considerably larger change compared to other states (Table 6). Peak Inland trips were up for Private boat mode in Florida by over 10 percentage points in 2013, which was a sizeable difference from other states. This increase was partly offset by possible design change effects, which reduced the difference to about 6 percentage points.

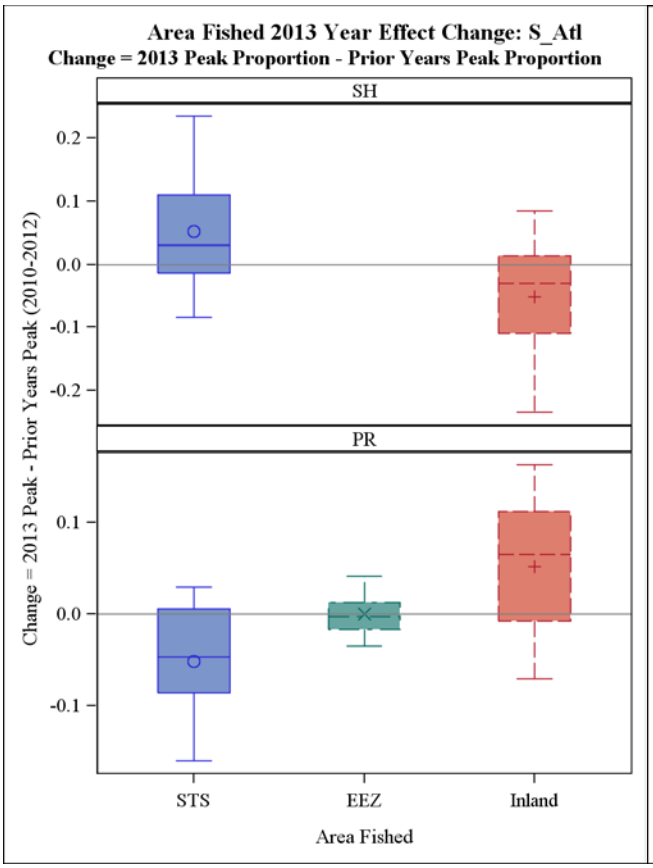


**Figure 4**. Differences in Peak Time Block Area Fished Proportions between 2013 and prior years, 2010-2012, in the South Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include North Carolina, South Carolina, Georgia, and Florida (East coast).

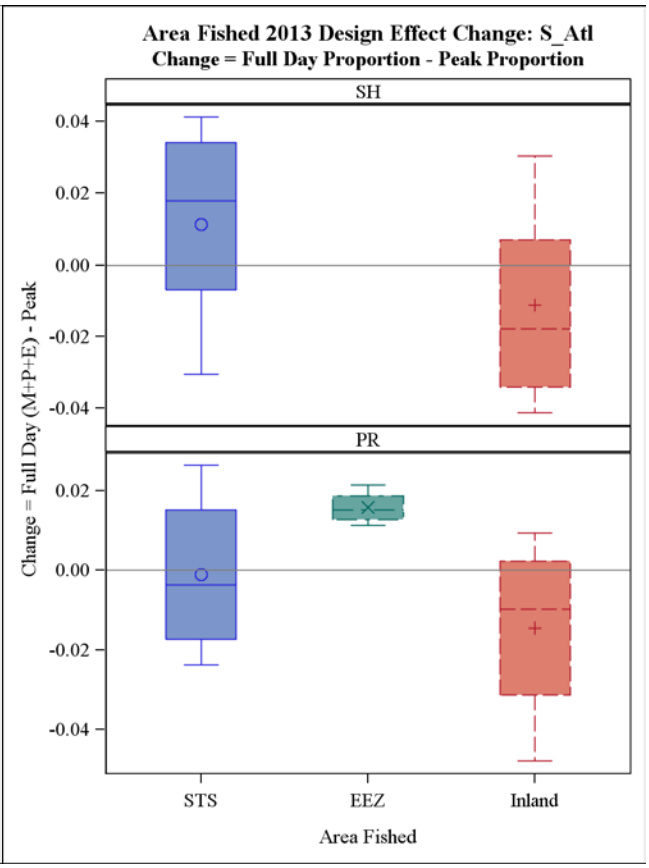


**Figure 5**. Differences in 2013 Area Fished Proportions between Full Day and Peak time block in the South Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include North Carolina, South Carolina, Georgia, and Florida (East coast).

Table 6. Weighted Proportions of South Atlantic Angler-Trips by State, Mode of Fishing, and Area Fished for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|---|
| State | Mode | Area Fished | P | T | P | T | P | T | P | T |
| NC | PR Boat | Inland | 0.68 | 0.66 | 0.71 | 0.69 | 0.77 | 0.76 | 0.77 | 0.77 |
| | | STS | 0.23 | 0.23 | 0.21 | 0.21 | 0.15 | 0.14 | 0.15 | 0.14 |
| | | EEZ | 0.09 | 0.11 | 0.08 | 0.10 | 0.09 | 0.10 | 0.08 | 0.10 |
| | Beach/Bank | Inland | 0.13 | 0.11 | 0.16 | 0.17 | 0.16 | 0.17 | 0.16 | 0.19 |
| | | STS | 0.87 | 0.89 | 0.84 | 0.83 | 0.84 | 0.83 | 0.84 | 0.81 |
| | Man-made | Inland | 0.18 | 0.18 | 0.16 | 0.16 | 0.20 | 0.21 | 0.14 | 0.15 |
| | | STS | 0.82 | 0.82 | 0.84 | 0.84 | 0.80 | 0.79 | 0.86 | 0.85 |
| SC | PR Boat | Inland | 0.77 | 0.76 | 0.87 | 0.88 | 0.82 | 0.78 | 0.89 | 0.87 |
| | | STS | 0.16 | 0.16 | 0.10 | 0.09 | 0.10 | 0.12 | 0.07 | 0.08 |
| | | EEZ | 0.07 | 0.08 | 0.02 | 0.03 | 0.07 | 0.10 | 0.04 | 0.05 |
| | Shore | Inland | 0.28 | 0.21 | 0.38 | 0.40 | 0.24 | 0.26 | 0.25 | 0.21 |
| | | STS | 0.72 | 0.79 | 0.62 | 0.60 | 0.76 | 0.74 | 0.75 | 0.79 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GA | PR Boat | Inland | 0.95 | 0.91 | 0.91 | 0.90 | 0.96 | 0.95 | 0.89 | 0.90 |
| | | STS | 0.03 | 0.03 | 0.05 | 0.04 | 0.03 | 0.03 | 0.06 | 0.03 |
| | | EEZ | 0.02 | 0.06 | 0.04 | 0.06 | 0.01 | 0.02 | 0.06 | 0.07 |
| | Shore | Inland | 0.77 | 0.77 | 0.77 | 0.76 | 0.65 | 0.61 | 0.54 | 0.50 |
| | | STS | 0.23 | 0.23 | 0.23 | 0.24 | 0.35 | 0.39 | 0.46 | 0.50 |
| FLe | PR Boat | Inland | 0.55 | 0.57 | 0.53 | 0.57 | 0.59 | 0.60 | 0.69 | 0.64 |
| | | STS | 0.30 | 0.27 | 0.30 | 0.27 | 0.22 | 0.20 | 0.14 | 0.17 |
| | | EEZ | 0.15 | 0.15 | 0.17 | 0.16 | 0.19 | 0.19 | 0.16 | 0.19 |
| | Shore | Inland | 0.21 | 0.38 | 0.51 | 0.53 | 0.43 | 0.46 | 0.45 | 0.43 |
| | | STS | 0.79 | 0.62 | 0.49 | 0.47 | 0.57 | 0.54 | 0.55 | 0.57 |

In the Mid-Atlantic, year effects were similar in direction across modes of fishing. Peak Inland proportions for both Private boat and Shore modes tended to be down in 2013 compared to prior years (Figure 6, Table 7). Corresponding increases occurred in both STS and EEZ (Private boat mode only) proportions.

Possible design change effects were also similar across modes in the Mid-Atlantic. For both Private boat and Shore, full day proportions for Inland were usually larger than Peak proportions in 2013 by approximately 2 percentage points (Figure 7). Corresponding decreases from design change (full day smaller than Peak) were generally present in both STS and EEZ areas.

Net effects in the Mid-Atlantic were generally similar across modes. For Shore and Private boat modes, design change and year effects were generally in opposite directions with year effects being somewhat larger than design change effects. In Private boat mode, the combined effect resulted in typically less than a 10 percentage point shift of angler-trips from Inland to STS and EEZ areas in 2013. For Shore mode, combined effects resulted in 2013 proportions that were generally similar to prior years.

Results for New York Shore mode and Virginia Private boat mode differed from the rest of the Mid-Atlantic. In these cases, year and design change effects were in the same direction. For New York Shore, the combined effect was a reduction of the Inland trip proportion by over 10 percentage points in 2013 compared to most prior years. The 2013 reduction in Inland trips was closer to 5 percentage points in the case of Virginia Private boat mode.

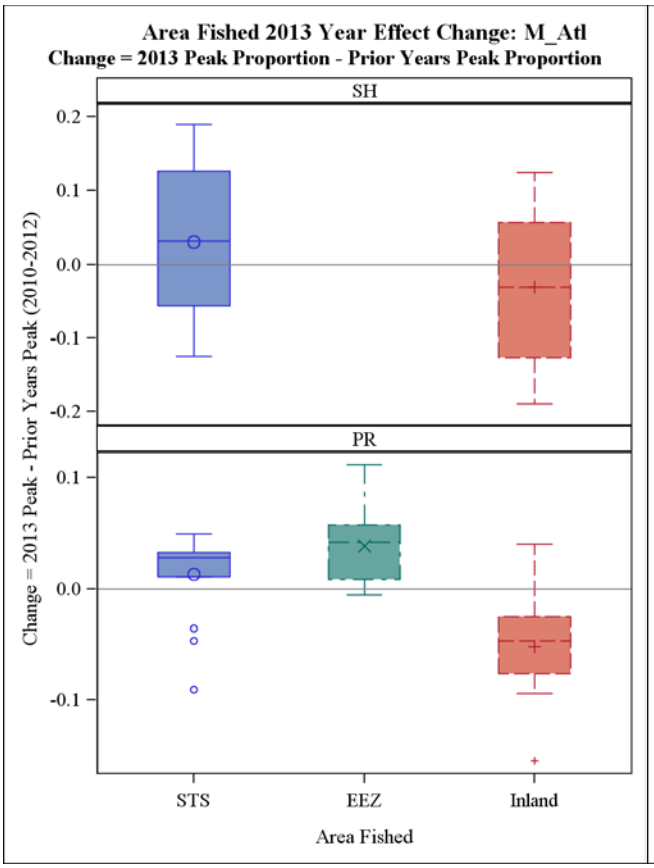


**Figure 6**. Differences in Peak Time Block Area Fished Proportions between 2013 and prior years, 2010-2012, in the Mid-Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Virginia, Maryland, Delaware, New Jersey, and New York.

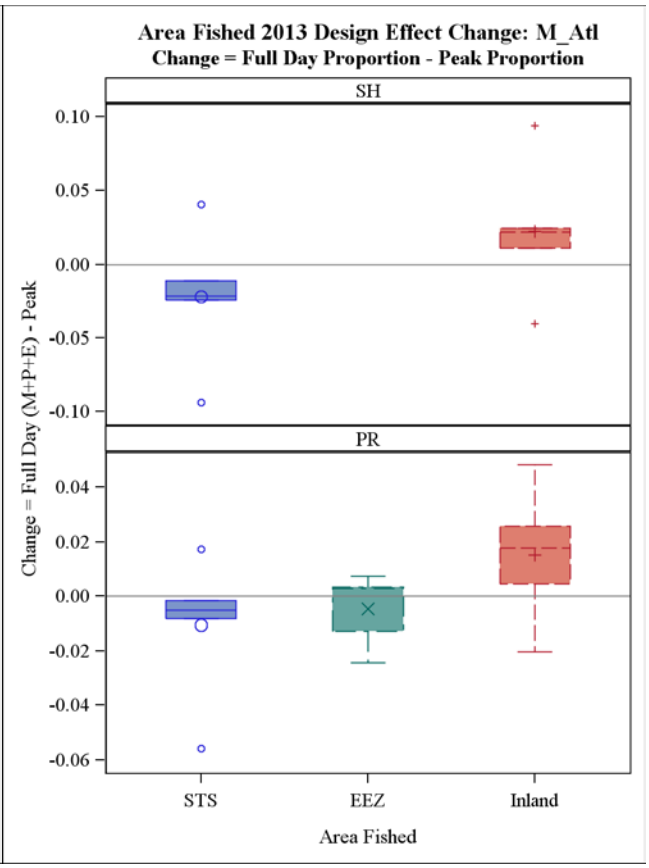


**Figure 7**. Differences in 2013 Area Fished Proportions between Full Day and Peak time block in the Mid-Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Virginia, Maryland, Delaware, New Jersey, and New York.

Table 7. Weighted Proportions of Mid Atlantic Angler-Trips by State, Mode of Fishing, and Area Fished for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|---|
| State | Mode | Area Fished | P | T | P | T | P | T | P | T |
| VA | PR Boat | Inland | 0.95 | 0.96 | 0.95 | 0.93 | 0.98 | 0.97 | 0.92 | 0.90 |
| | | STS | 0.02 | 0.02 | 0.03 | 0.04 | 0.01 | 0.01 | 0.06 | 0.08 |
| | | EEZ | 0.03 | 0.02 | 0.02 | 0.03 | 0.01 | 0.02 | 0.02 | 0.02 |
| | Shore | Inland | 0.72 | 0.74 | 0.85 | 0.86 | 0.88 | 0.90 | 0.69 | 0.70 |
| | | STS | 0.28 | 0.26 | 0.15 | 0.14 | 0.12 | 0.10 | 0.31 | 0.30 |
| MD | PR Boat | Inland | 0.98 | 0.98 | 0.98 | 0.99 | 0.99 | 0.99 | 0.94 | 0.95 |
| | | STS | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | 0.03 | 0.02 |
| | | EEZ | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.03 | 0.03 |
| | Shore | Inland | 0.91 | 0.91 | 0.88 | 0.88 | 0.98 | 0.98 | 0.95 | 0.97 |
| | | STS | 0.09 | 0.09 | 0.12 | 0.12 | 0.02 | 0.02 | 0.05 | 0.03 |
| DE | PR Boat | Inland | 0.94 | 0.94 | 0.92 | 0.93 | 0.91 | 0.92 | 0.85 | 0.87 |
| | | STS | 0.03 | 0.03 | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.04 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | EEZ | 0.04 | 0.04 | 0.07 | 0.06 | 0.07 | 0.06 | 0.11 | 0.09 |
| | Shore | Inland | 0.57 | 0.62 | 0.78 | 0.77 | 0.55 | 0.56 | 0.62 | 0.72 |
| | | STS | 0.43 | 0.38 | 0.22 | 0.23 | 0.45 | 0.44 | 0.38 | 0.28 |
| NJ | PR Boat | Inland | 0.56 | 0.56 | 0.69 | 0.69 | 0.63 | 0.63 | 0.53 | 0.58 |
| | | STS | 0.33 | 0.32 | 0.25 | 0.25 | 0.26 | 0.26 | 0.29 | 0.23 |
| | | EEZ | 0.12 | 0.12 | 0.06 | 0.06 | 0.11 | 0.11 | 0.18 | 0.18 |
| | Shore | Inland | 0.37 | 0.34 | 0.44 | 0.44 | 0.51 | 0.47 | 0.50 | 0.52 |
| | | STS | 0.63 | 0.66 | 0.56 | 0.56 | 0.49 | 0.53 | 0.50 | 0.48 |
| NY | PR Boat | Inland | 0.72 | 0.72 | 0.61 | 0.60 | 0.66 | 0.64 | 0.65 | 0.67 |
| | | STS | 0.25 | 0.26 | 0.38 | 0.38 | 0.33 | 0.35 | 0.29 | 0.28 |
| | | EEZ | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.06 | 0.05 |
| | Shore | Inland | 0.89 | 0.88 | 0.84 | 0.82 | 0.91 | 0.86 | 0.78 | 0.74 |
| | | STS | 0.11 | 0.12 | 0.16 | 0.18 | 0.09 | 0.14 | 0.22 | 0.26 |

In the North Atlantic, year effects were similar in direction across modes of fishing. Peak Inland proportions for Private boat and Shore modes tended to be down in 2013 compared to prior years with large Shore mode decreases in Rhode Island and Maine (Figure 8, Table 8).

Possible design change effects differed somewhat across modes in the North Atlantic. For Shore mode, full day proportions for Inland were usually smaller than Peak proportions in 2013 by approximately 2 percentage points (Figure 9). In Private boat mode, Peak and full day proportions were generally similar suggesting limited if any design change effects in those cases.

Net effects in the North Atlantic were somewhat similar across modes. For Shore and Private boat modes, design change and year effects were generally in the same directions when possible design changes were apparent. In general, year effects were somewhat larger than design change effects. In both modes, the combined effect resulted in typically less than a 10 percentage point shift of angler-trips from Inland to STS or EEZ areas in 2013.

Results for some states were noticeably different from the rest of the North Atlantic. There was a much larger design change effect in Connecticut Private boat mode resulting in a roughly 15 percentage point drop from the Peak to full day 2013 Inland trip proportion. In Rhode Island, design change and year effects both resulted in 2013 Private boat Inland trip proportions that were 10 to 15 percentage points higher than in prior years. Lastly, the Maine Shore mode year effect was considerably larger than in other states and resulted in a 10 to 20 point drop in the Peak Inland proportion of trips.

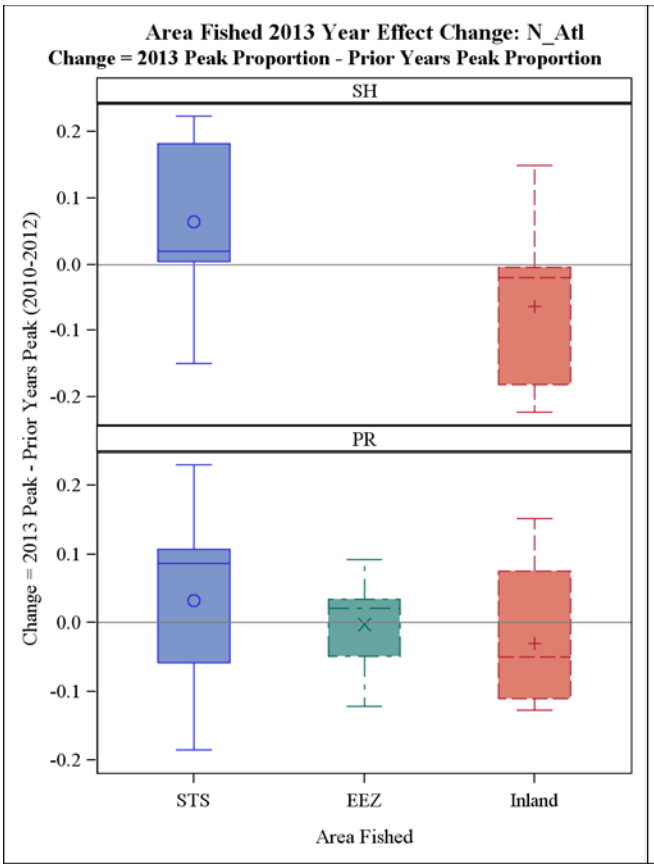


**Figure 8**. Differences in Peak Time Block Area Fished Proportions between 2013 and prior years, 2010-2012, in the North Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

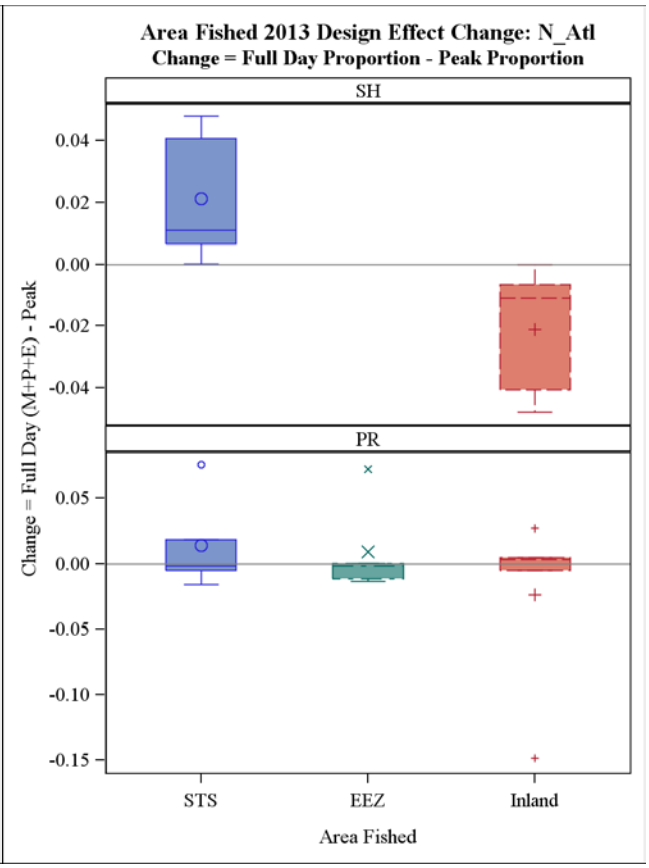


**Figure 9**. Differences in 2013 Area Fished Proportions between Full Day and Peak time block in the North Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

Table 8. Weighted Proportions of North Atlantic Angler-Trips by State, Mode of Fishing, and Area Fished for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|---|
| State | Mode | Area Fished | P | T | P | T | P | T | P | T |
| CT | PR Boat | Inland | 1 | 1 | 1 | 1 | 1 | 1 | 0.87 | 0.72 |
| | | STS | 0 | 0 | 0 | 0 | 0 | 0 | 0.11 | 0.18 |
| | | EEZ | 0 | 0 | 0 | 0 | 0 | 0 | 0.02 | 0.09 |
| | Shore | Inland | 1 | 1 | 1 | 1 | 1 | 1 | >.99 | 0.99 |
| | | STS | 0 | 0 | 0 | 0 | 0 | 0 | <.01 | 0.01 |
| RI | PR Boat | Inland | 0.53 | 0.55 | 0.49 | 0.50 | 0.57 | 0.58 | 0.64 | 0.67 |
| | | STS | 0.34 | 0.33 | 0.47 | 0.46 | 0.41 | 0.40 | 0.28 | 0.27 |
| | | EEZ | 0.13 | 0.12 | 0.04 | 0.04 | 0.02 | 0.02 | 0.08 | 0.07 |
| | Shore | Inland | 0.79 | 0.76 | 0.77 | 0.77 | 0.75 | 0.73 | 0.57 | 0.52 |
| | | STS | 0.21 | 0.24 | 0.23 | 0.23 | 0.25 | 0.27 | 0.43 | 0.48 |
| MA | PR Boat | Inland | 0.70 | 0.74 | 0.83 | 0.66 | 0.77 | 0.77 | 0.66 | 0.67 |
| | | STS | 0.17 | 0.15 | 0.17 | 0.22 | 0.17 | 0.18 | 0.26 | 0.25 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | EEZ | 0.13 | 0.11 | 0 | 0.11 | 0.05 | 0.05 | 0.08 | 0.08 |
| | Shore | Inland | 0.82 | 0.82 | 0.87 | 0.87 | 0.85 | 0.84 | 0.85 | 0.85 |
| | | STS | 0.18 | 0.18 | 0.13 | 0.13 | 0.15 | 0.16 | 0.15 | 0.15 |
| NH | PR Boat | Inland | 0.30 | 0.33 | 0.25 | 0.26 | 0.27 | 0.28 | 0.20 | 0.19 |
| | | STS | 0.33 | 0.35 | 0.42 | 0.43 | 0.44 | 0.46 | 0.56 | 0.57 |
| | | EEZ | 0.37 | 0.32 | 0.34 | 0.31 | 0.30 | 0.26 | 0.25 | 0.23 |
| | Shore | Inland | 0.43 | 0.44 | 0.52 | 0.61 | 0.56 | 0.57 | 0.58 | 0.54 |
| | | STS | 0.57 | 0.56 | 0.48 | 0.39 | 0.44 | 0.43 | 0.42 | 0.46 |
| ME | PR Boat | Inland | 0.48 | 0.50 | 0.45 | 0.46 | 0.31 | 0.32 | 0.41 | 0.41 |
| | | STS | 0.48 | 0.46 | 0.48 | 0.42 | 0.60 | 0.58 | 0.46 | 0.46 |
| | | EEZ | 0.04 | 0.04 | 0.07 | 0.12 | 0.10 | 0.10 | 0.13 | 0.13 |
| | Shore | Inland | 0.33 | 0.42 | 0.24 | 0.21 | 0.31 | 0.31 | 0.13 | 0.12 |
| | | STS | 0.67 | 0.58 | 0.76 | 0.79 | 0.69 | 0.69 | 0.87 | 0.88 |

# 6. Coastal Household Telephone Survey Coverage Adjustment

Results for in-state coastal resident trip proportions (proxy for the CHTS coverage adjustment) also varied across sub regions, states and modes of fishing, with consistent findings similar to area fished proportions. Coastal resident trip proportions were much closer between 2013 and prior years than were the temporal distributions. Differences between the 2013 Peak time block and full day domains were also small, less than 5 percentage points in most cases and less than 10 points in all but one case.

## 6.1 Gulf of Mexico

In-state coastal county resident trip proportions were generally consistent under the MRFSS APAIS design. Proportions from 2010 to 2012 were generally at or above 0.8 except for Shore mode in Alabama and Florida (West Coast) where values ranged from approximately 0.5-0.7 (Table 9). Peak and full day proportions were also very close in almost every case.

Some differences were observed between 2013 and prior years. Peak time block proportions of coastal county resident trips were generally down in 2013 for both Shore and Private boat modes (Figure 10) suggesting the presence of year effects. Peak differences were particularly large for Shore mode in Alabama and Florida (West). Differences between Peak and full day proportions were typically larger in 2013, compared to differences in prior years, indicating potential design change effects as well. In Private boat mode, full day proportions were approximately 2 to 4 percentage points smaller than Peak proportions (Figure 11). For Shore mode, differences were in the opposite direction with full day proportions generally several percentage points larger than Peak.

The net effects of both year and design change varied considerably across the modes and states. Differences were minimal for Private boat mode in Louisiana and Alabama and for Shore mode in Mississippi. More noticeably differences were present for Private boat mode in Mississippi and Florida (West) and Louisiana Shore. The largest differences, ranging from 5 to 10 percentage points were observed in Alabama Shore mode and Florida Private boat mode.

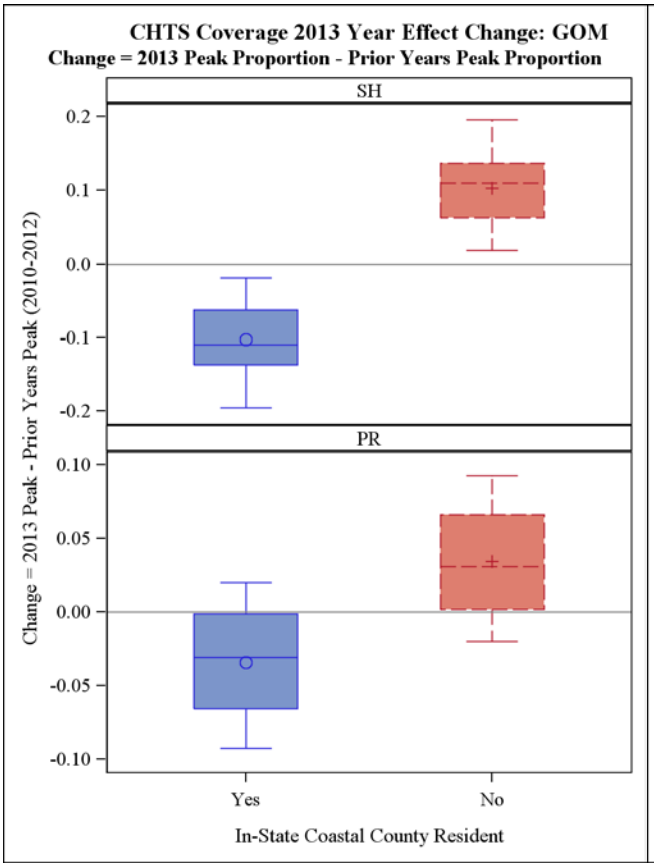


**Figure 10**. Differences in Peak Time Block In-state Coastal County Resident Trip Proportions between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

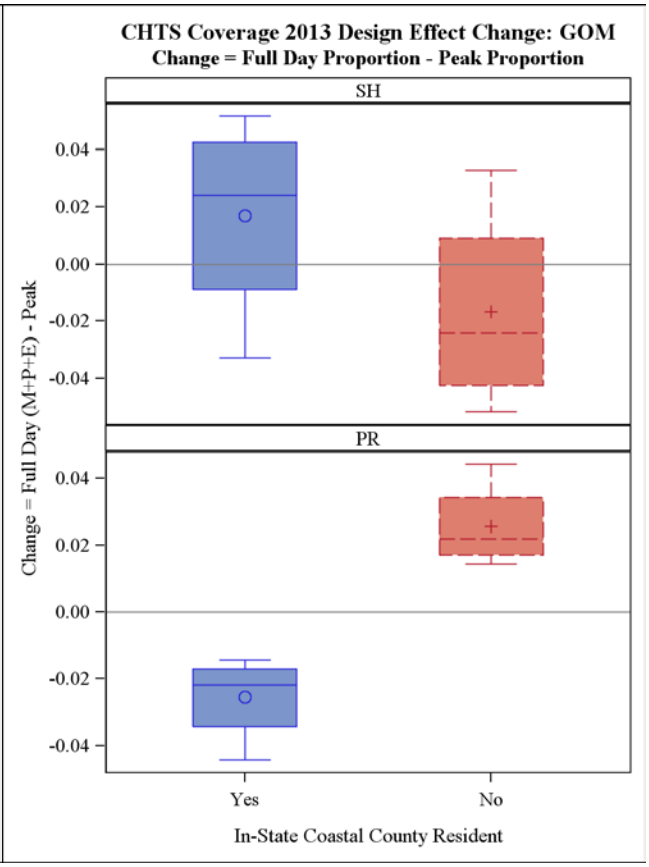


**Figure 11.** Differences in 2013 In-state Coastal County Resident Trip Proportions between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

Table 9. Gulf of Mexico Weighted Proportions of Total Angler-Trips taken by In-state Residents of Coastal Counties, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|
| State | Mode | P | T | P | T | P | T | P | T |
| LA | PR Boat | 0.87 | 0.86 | 0.86 | 0.86 | 0.87 | 0.87 | 0.87 | 0.85 |
| | Shore | 0.90 | 0.89 | 0.84 | 0.85 | 0.82 | 0.81 | 0.76 | 0.72 |
| MS | PR Boat | 0.92 | 0.92 | 0.92 | 0.90 | 0.85 | 0.85 | 0.83 | 0.78 |
| | Shore | 0.91 | 0.84 | 0.86 | 0.86 | 0.88 | 0.86 | 0.84 | 0.86 |
| AL | PR Boat | 0.82 | 0.83 | 0.77 | 0.77 | 0.79 | 0.79 | 0.79 | 0.76 |
| | Shore | 0.57 | 0.57 | 0.51 | 0.53 | 0.52 | 0.52 | 0.37 | 0.41 |
| FLw | PR Boat | 0.87 | 0.84 | 0.87 | 0.85 | 0.85 | 0.81 | 0.80 | 0.78 |
| | Shore | 0.71 | 0.72 | 0.72 | 0.72 | 0.69 | 0.69 | 0.59 | 0.64 |

## 6.2 Atlantic

While the overall range of proportions varied considerably across states and modes in the Atlantic sub regions, differences between in-state coastal county resident trip proportions among years were generally small and somewhat less systematic compared to the Gulf of Mexico.

In the South Atlantic, differences in Peak time blocks varied somewhat by mode and state. For Private boat mode, Peak proportions in 2013 were very similar to prior years in all states suggesting minimal, if any, year effects (Figure 11). Results were similar for Shore mode in Georgia and Florida (East coast), but differences were noticeably larger in South Carolina and North Carolina (Man-made) indicating possible year effects there.

Comparisons between 2013 Peak and full day time blocks generally found small differences in the South Atlantic. In all cases, differences between Peak and full day were less than 5 percentage points (Table 10). In addition to being small, differences varied in direction across states. Given the results, it did not appear that design change effects were present for this estimation component in the South Atlantic – at least no effects related to changes in temporal coverage.

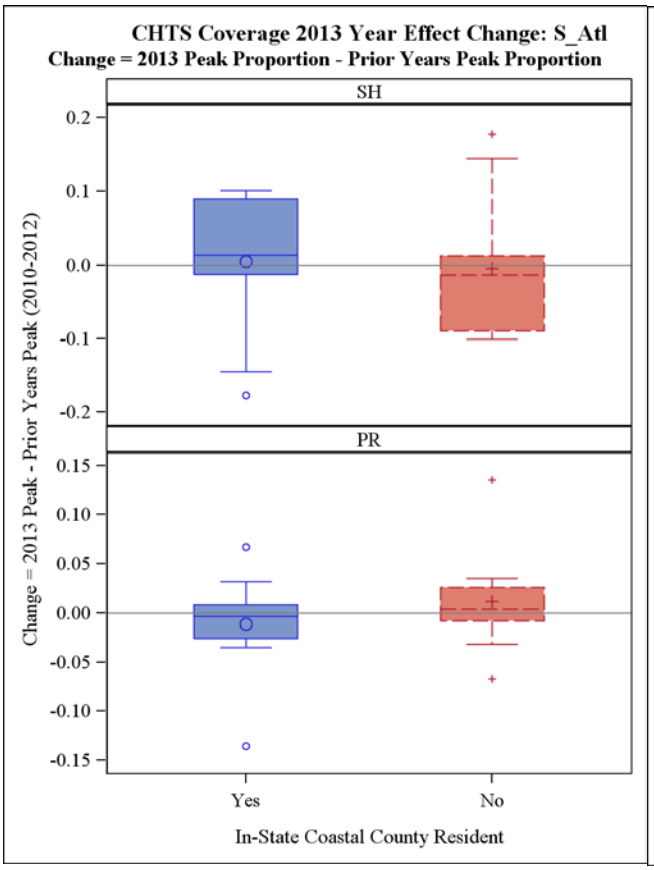


**Figure 12**. Differences in Peak Time Block In-state Coastal County Resident Trip Proportions between 2013 and prior years, 2010-2012, in the South Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include North Carolina, South Carolina, Georgia, and Florida (East Coast).

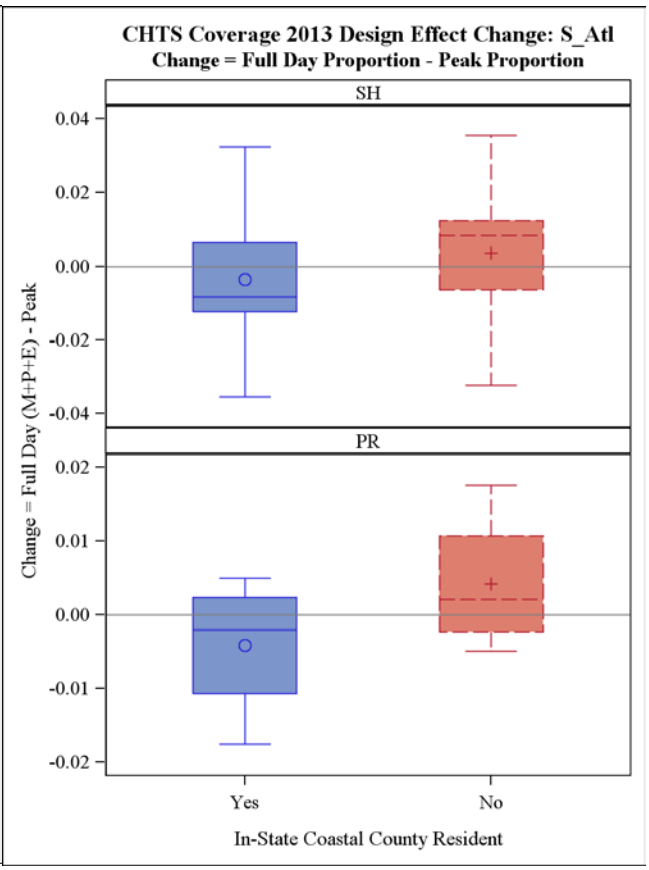


**Figure 13.** Differences in 2013 In-state Coastal County Resident Trip Proportions between Full Day and Peak time block in the South Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include North Carolina, South Carolina, Georgia, and Florida (East Coast).

Table 10. South Atlantic Weighted Proportions of Total Angler-Trips taken by In-state Residents of Coastal Counties, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|
| State | Mode | P | T | P | T | P | T | P | T |
| NC | PR Boat | 0.77 | 0.76 | 0.76 | 0.75 | 0.79 | 0.78 | 0.79 | 0.77 |
| | Beach/bank | 0.34 | 0.37 | 0.38 | 0.38 | 0.44 | 0.43 | 0.44 | 0.47 |
| | Man-made | 0.40 | 0.44 | 0.45 | 0.45 | 0.48 | 0.49 | 0.54 | 0.53 |
| SC | PR Boat | 0.77 | 0.76 | 0.88 | 0.88 | 0.78 | 0.79 | 0.75 | 0.74 |
| | Shore | 0.33 | 0.30 | 0.46 | 0.48 | 0.50 | 0.49 | 0.32 | 0.33 |
| GA | PR Boat | 0.79 | 0.79 | 0.73 | 0.70 | 0.82 | 0.83 | 0.79 | 0.79 |
| | Shore | 0.69 | 0.69 | 0.58 | 0.58 | 0.51 | 0.50 | 0.60 | 0.56 |
| FLe | PR Boat | 0.93 | 0.92 | 0.95 | 0.95 | 0.93 | 0.93 | 0.93 | 0.93 |
| | Shore | 0.86 | 0.85 | 0.83 | 0.84 | 0.86 | 0.86 | 0.85 | 0.84 |

In contrast, differences between 2013 and prior years were more noticeable in the Mid-Atlantic sub region. It appeared that both year and design change effects were present to varying degrees in 2013.

Peak time block proportions of coastal county resident trips were generally down somewhat in 2013 for Private boat mode while up slightly in Shore mode (Figure 14). Private boat differences were largest in Virginia and Maryland while Shore mode differences were most notable in Maryland and New Jersey (Table 11). Differences were minimal for both Shore and Private boat modes in New York suggesting minimal or no year effects there.

Potential design change effects were apparent in some Mid-Atlantic states as well. In Private boat mode, full day time block proportions of coastal county resident trips were typically larger than Peak proportions by 2 to 5 percentage points (Figure 15). Results were more variable for Shore mode. Full day proportions were larger than Peak in some states and smaller in others with differences ranging from 2 to 7 percentage points.

While net effects of year and design change varied, they were generally minimal in the Mid-Atlantic. For both Private boat and Shore modes in Virginia, Delaware and New York, 2013 proportions were very similar to prior years. Differences on the order of 5 to 10 percentage points were present in Maryland Private boat and New Jersey Shore mode.

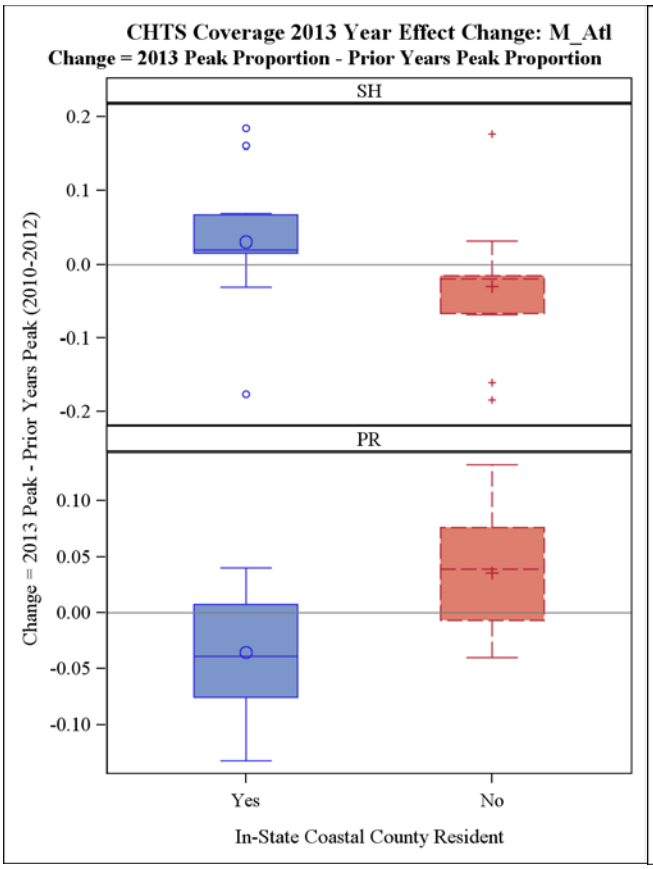


**Figure 14**. Differences in Peak Time Block In-state Coastal County Resident Trip Proportions between 2013 and prior years, 2010-2012, in the Mid-Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Virginia, Maryland, Delaware, New Jersey, and New York.

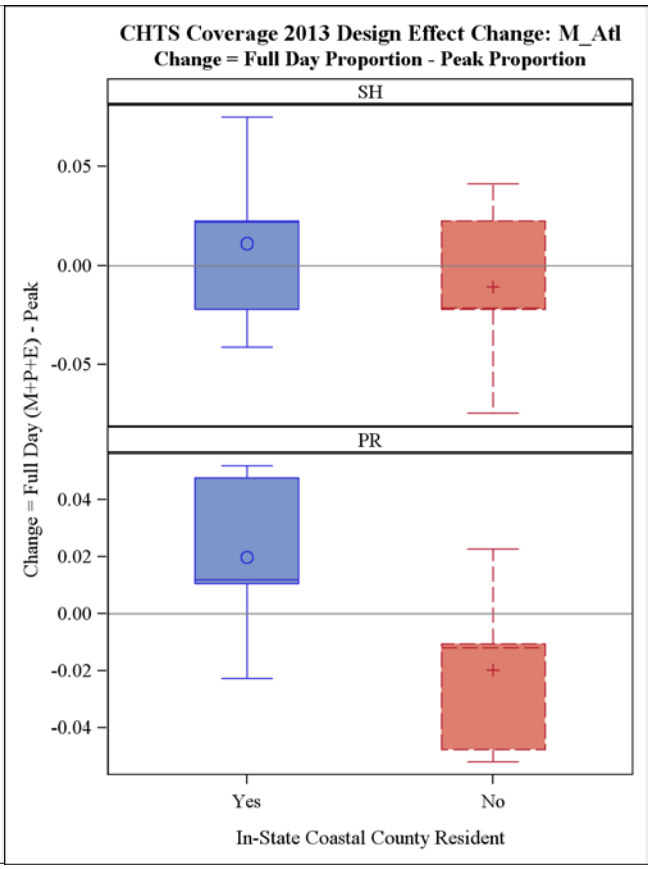


**Figure 15.** Differences in 2013 In-state Coastal County Resident Trip Proportions between Full Day and Peak time block in the Mid-Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Virginia, Maryland, Delaware, New Jersey, and New York.

Table 11. Mid Atlantic Weighted Proportions of Total Angler-Trips taken by In-state Residents of Coastal Counties, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|
| State | Mode | P | T | P | T | P | T | P | T |
| VA | PR Boat | 0.73 | 0.73 | 0.73 | 0.72 | 0.75 | 0.75 | 0.68 | 0.73 |
| | Shore | 0.85 | 0.85 | 0.66 | 0.71 | 0.70 | 0.72 | 0.68 | 0.75 |
| MD | PR Boat | 0.67 | 0.69 | 0.72 | 0.72 | 0.67 | 0.68 | 0.59 | 0.63 |
| | Shore | 0.62 | 0.61 | 0.59 | 0.60 | 0.76 | 0.76 | 0.78 | 0.74 |
| DE | PR Boat | 0.64 | 0.64 | 0.65 | 0.66 | 0.62 | 0.62 | 0.61 | 0.62 |
| | Shore | 0.62 | 0.60 | 0.61 | 0.62 | 0.67 | 0.69 | 0.64 | 0.66 |
| NJ | PR Boat | 0.76 | 0.77 | 0.79 | 0.81 | 0.73 | 0.73 | 0.77 | 0.75 |
| | Shore | 0.76 | 0.75 | 0.72 | 0.73 | 0.72 | 0.69 | 0.79 | 0.81 |
| NY | PR Boat | 0.94 | 0.93 | 0.94 | 0.95 | 0.95 | 0.96 | 0.95 | 0.96 |
| | Shore | 0.96 | 0.96 | 0.96 | 0.97 | 0.94 | 0.93 | 0.98 | 0.96 |

In the North Atlantic, differences in in-state coastal county resident proportions tended to be either very minimal or somewhat large. In terms of year effects, differences between 2013 and prior year Peak proportions were particularly large (10 to 20 percentage points) in Rhode Island Private boat, New Hampshire Shore, and both Shore and Private boat modes in Maine (Table 12). In Connecticut (both modes), Rhode Island Shore, Massachusetts (both modes), and New Hampshire Private boat, 2013 Peak time block proportions were very similar to prior years. In terms of potential design change effects, differences between 2013 full day and Peak time block proportions ranged from 6 to 27 percentage points in New Hampshire Shore and both Shore and Private boat in Maine. Differences, resulting from potential design change effects, ranged from 0 to 3 points in the remaining cases.

While effects were large in some cases, year and design change tended to work in opposite directions in the North Atlantic sub region. For Shore mode, year effects tended to increase 2013 proportions while design change effects, to a lesser extent, tended to reduce them (Figures 16-17). Conversely, year effects generally decreased proportions for Private boat mode while design change effects increased them. The net result was still large differences in Rhode Island Shore with more moderate differences in New Hampshire Shore and both modes in Maine.

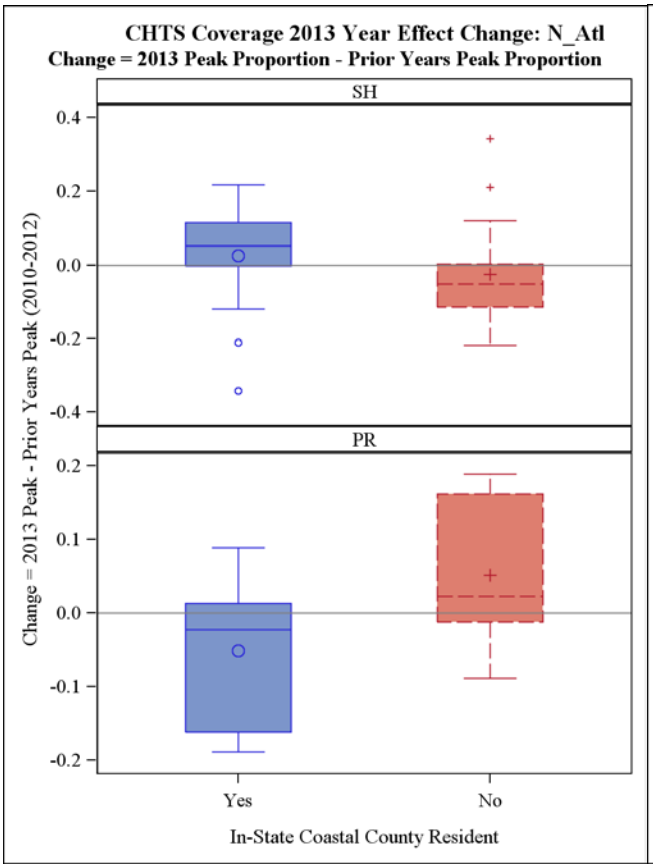


**Figure 16**. Differences in Peak Time Block In-state Coastal County Resident Trip Proportions between 2013 and prior years, 2010-2012, in the North Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

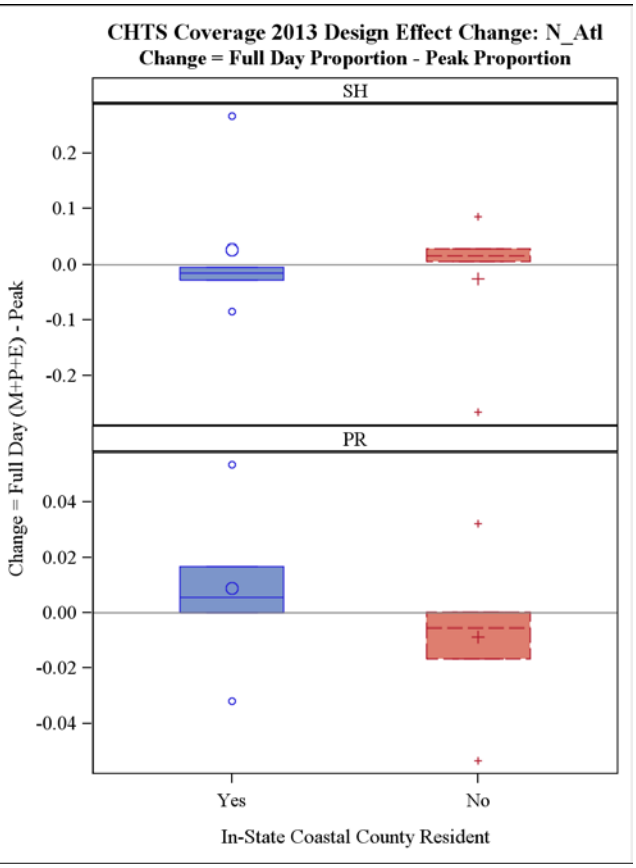


**Figure 17.** Differences in 2013 In-state Coastal County Resident Trip Proportions between Full Day and Peak time block in the North Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

Table 12. North Atlantic Weighted Proportions of Total Angler-Trips taken by In-state Residents of Coastal Counties, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|
| State | Mode | P | T | P | T | P | T | P | T |
| CT | PR Boat | 0.81 | 0.81 | 0.89 | 0.89 | 0.89 | 0.89 | 0.90 | 0.87 |
| | Shore | 0.87 | 0.88 | 0.97 | 0.96 | 0.90 | 0.94 | 0.98 | 0.96 |
| RI | PR Boat | 0.66 | 0.65 | 0.55 | 0.55 | 0.63 | 0.64 | 0.47 | 0.47 |
| | Shore | 0.55 | 0.56 | 0.45 | 0.48 | 0.52 | 0.55 | 0.57 | 0.54 |
| MA | PR Boat | 0.68 | 0.70 | 0.74 | 0.75 | 0.74 | 0.73 | 0.75 | 0.76 |
| | Shore | 0.73 | 0.72 | 0.73 | 0.71 | 0.64 | 0.64 | 0.73 | 0.72 |
| NH | PR Boat | 0.78 | 0.79 | 0.71 | 0.71 | 0.71 | 0.69 | 0.68 | 0.70 |
| | Shore | 0.53 | 0.53 | 0.59 | 0.62 | 0.54 | 0.55 | 0.75 | 0.67 |
| ME | PR Boat | 0.76 | 0.78 | 0.66 | 0.66 | 0.79 | 0.80 | 0.60 | 0.66 |
| | Shore | 0.54 | 0.56 | 0.67 | 0.68 | 0.45 | 0.51 | 0.33 | 0.60 |

# 7. For-Hire Telephone Survey Coverage Adjustment

Results for the proportions of trips on FHS frame (on-frame) vessels (proxy for the FHS coverage adjustment) varied across sub regions. In general, there was some support for year effects in all sub regions. However, the extent of potential design change effects varied from almost none to differences of 5 to 10 percentage points.

## 7.1 Gulf of Mexico

Peak time block comparisons of on-frame proportions between 2013 and prior years suggested sizable year effects may have been present in 2013. In general, 2013 Peak proportions for on-frame trips were down by 10 to 20 percentage points compared to prior years (Figure 18). Overall, differences were smallest in Florida (West Coast) and largest in Alabama (Table 13).

In general, comparisons of 2013 full day to Peak time block proportions supported the presence of design change effects, but effects were not consistent across the Gulf of Mexico sub region (Figure 19). Differences were minimal in Alabama and Florida (West) ranging from 1 to 3 percentage points. While differences for Louisiana and Mississippi were much larger, at 10 percentage points, they were in opposite directions. The full day on-frame proportion was larger than Peak in Louisiana and smaller than Peak in Mississippi.

While year effects and design change effects generally worked in opposite directions, the net effect was a decrease in on-frame proportions in 2013 compared to prior years. Proportions in Mississippi and Alabama were considerably lower than most prior years with smaller differences in Louisiana and Florida (West). The overall differences were driven by, primarily, year effects except in Mississippi where year and design change effects were in the same direction and similar in magnitude.

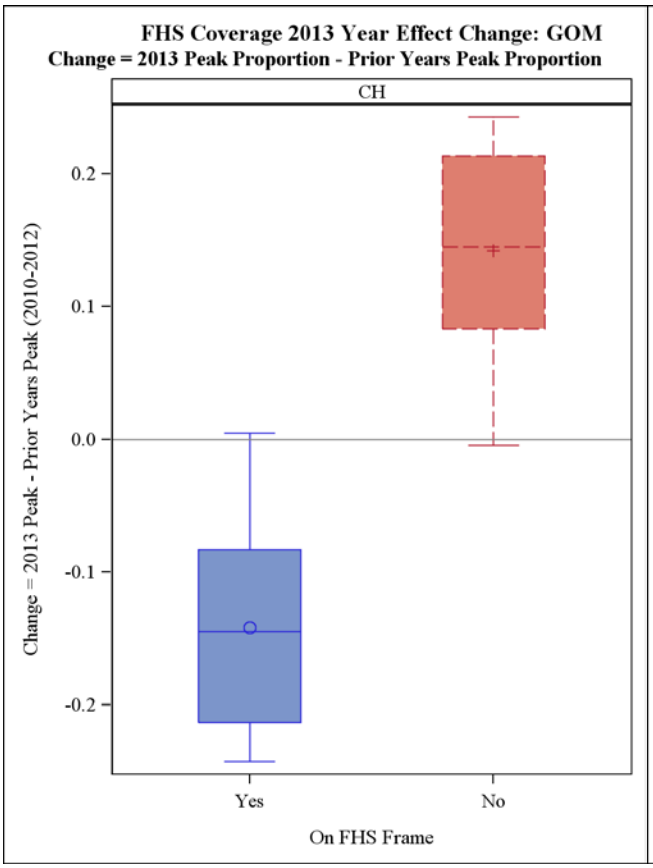


**Figure 18**. Differences in Peak Time Block On FHS Frame Vessel Trip Proportions between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

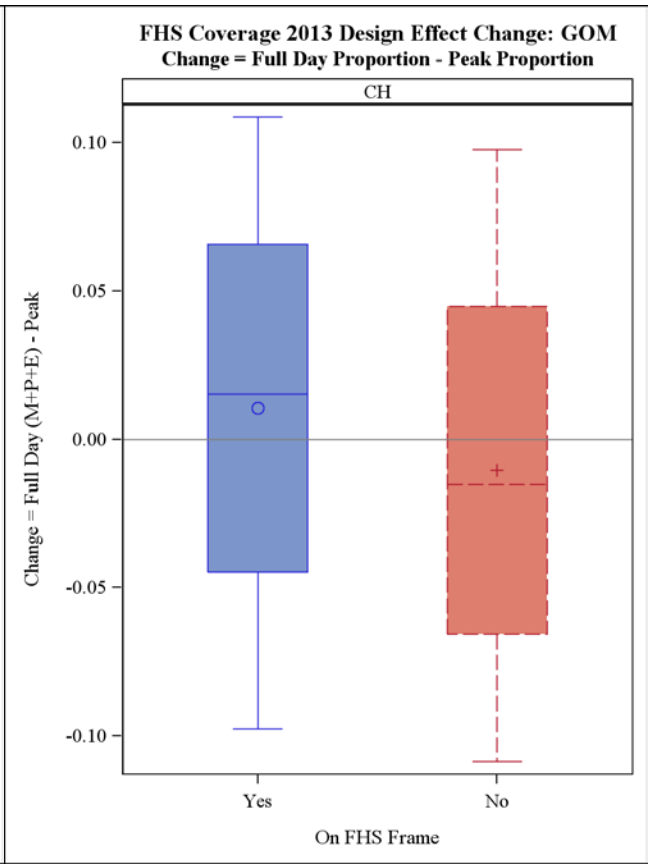


**Figure 19.** Differences in 2013 On FHS Frame Vessel Trip Proportions between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

Table 13. Gulf of Mexico Weighted Proportions of Total Charter Boat Angler-Trips taken aboard vessels on the For-Hire Survey frame, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|
| State | P | T | P | T | P | T | P | T |
| LA | 0.80 | 0.80 | 0.70 | 0.71 | 0.85 | 0.86 | 0.61 | 0.71 |
| MS | 1 | 0.49 | 1 | 1 | 0.99 | 0.99 | 0.86 | 0.76 |
| AL | >.99 | >.99 | 0.94 | 0.95 | 1 | >.99 | 0.77 | 0.80 |
| FLw | 0.83 | 0.84 | 0.85 | 0.86 | 0.78 | 0.78 | 0.78 | 0.79 |

## 7.2 Atlantic

Results for on-frame proportions in the Atlantic sub regions were more variable than in the Gulf of Mexico. While differences between 2013 and prior years were present in some Atlantic states, many

states showed little if any evidence of year or design change effects. Further, Atlantic on-frame proportions were somewhat more variable from 2010 to 2012, under the MRFSS APAIS design, than were the temporal distributions and the other effort estimation components.

In the South Atlantic sub region, there was some indication of year effects in 2013. Peak time block on-frame proportions were typically larger in 2013 (Figure 20). However, 2013 was generally similar to 2012 but noticeably higher than 2010 and 2011 in all states except Florida (East coast) where the 2013 Peak proportion was lower than in prior years (Table 14).

In contrast, there was no indication of potential design change effects for the South Atlantic. 2013 Peak on-frame proportions were identical to full day proportions in nearly every state (Figure 21). In Florida (East), Peak and full day proportions only differed by a single percentage point.

In terms of net effects on on-frame proportions, there was some indication of overall increases in the proportions in all states except Florida (East). These increases were generally due to differences between 2013 and 2010-2011.

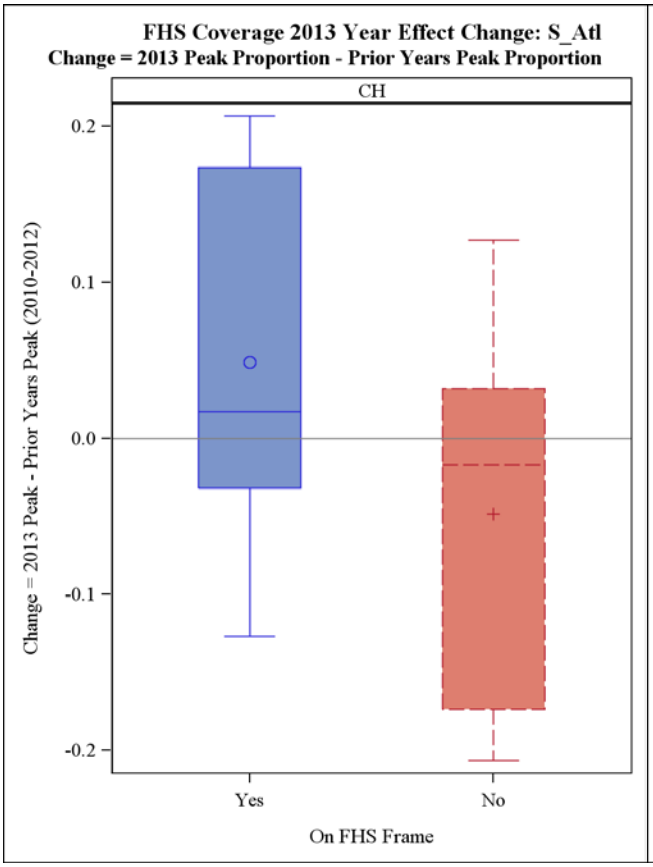


**Figure 20**. Differences in Peak Time Block On FHS Frame Vessel Trip Proportions between 2013 and prior years, 2010-2012, in the South Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include North Carolina, South Carolina, Georgia, and Florida (East Coast).

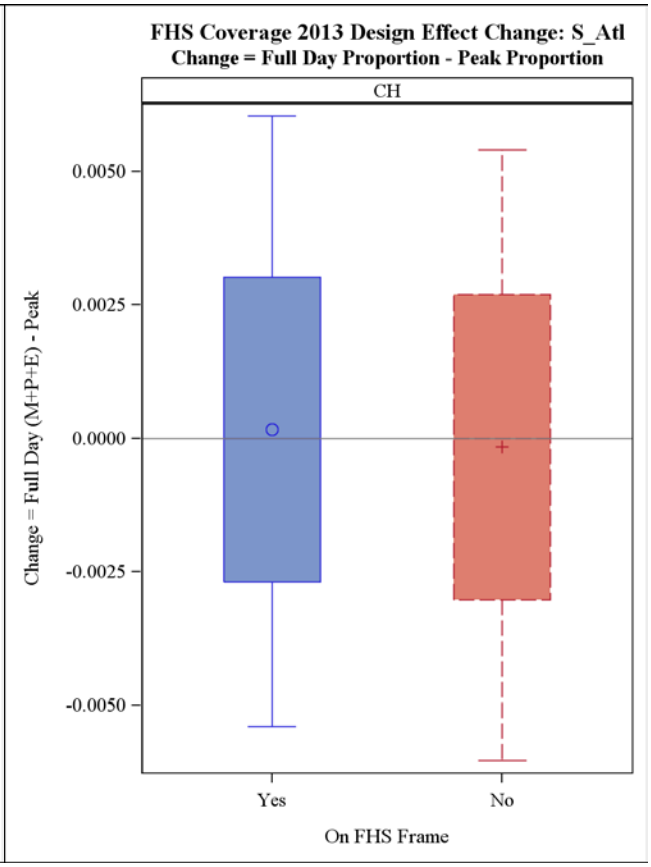


**Figure 21.** Differences in 2013 On FHS Frame Vessel Trip Proportions between Full Day and Peak time block in the South Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include North Carolina, South Carolina, Georgia, and Florida (East Coast).

Table 14. South Atlantic Weighted Proportions of Total Charter Boat Angler-Trips taken aboard vessels on the For-Hire Survey frame, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|
| State | P | T | P | T | P | T | P | T |
| NC | 0.81 | 0.72 | 0.80 | 0.76 | >.99 | 0.99 | 0.99 | 0.99 |
| SC | 0.82 | 0.84 | 0.79 | 0.81 | 0.94 | 0.96 | 1 | 1 |
| GA | 0.97 | 0.97 | >.99 | >.99 | 1 | 1 | 1 | 1 |
| FLe | 0.90 | 0.90 | 0.98 | 0.98 | 0.90 | 0.89 | 0.85 | 0.84 |

Results varied considerably in the Mid-Atlantic sub region. There was some indication of years effects (Figure 22), particularly between 2013 and 2010-2011. However, on-frame proportions in the MRFSS APAIS years also varied considerably from roughly 0.7 to 1 (Table 15). Except in New York, 2013 Peak proportions were very similar to 2012 and generally larger than or similar to 2010 and 2011. In New York, Peak proportions in 2013 were considerably smaller than all prior years except for 2011 which had the lowest proportions in the time series.

There was also support for design change effects in the Mid-Atlantic. Typically, full day proportions were smaller than Peak proportions in 2013 (Figure 23). However, differences were minimal in Maryland, Delaware, and New Jersey but noticeably larger (5-7 percentage points) in Virginia and New York.

The net effect of year and design change on on-frame proportions also varied by state in the Mid-Atlantic. Typically the two effects were in opposite directions with year effects increasing on-frame proportions while design change effects reduced them. However, net differences were minimal in New Jersey, Delaware, and in Maryland to some extent. Larger differences were primarily limited to Virginia and New York. Even so, the 2013 proportions were in the range of proportions from prior years in all states.

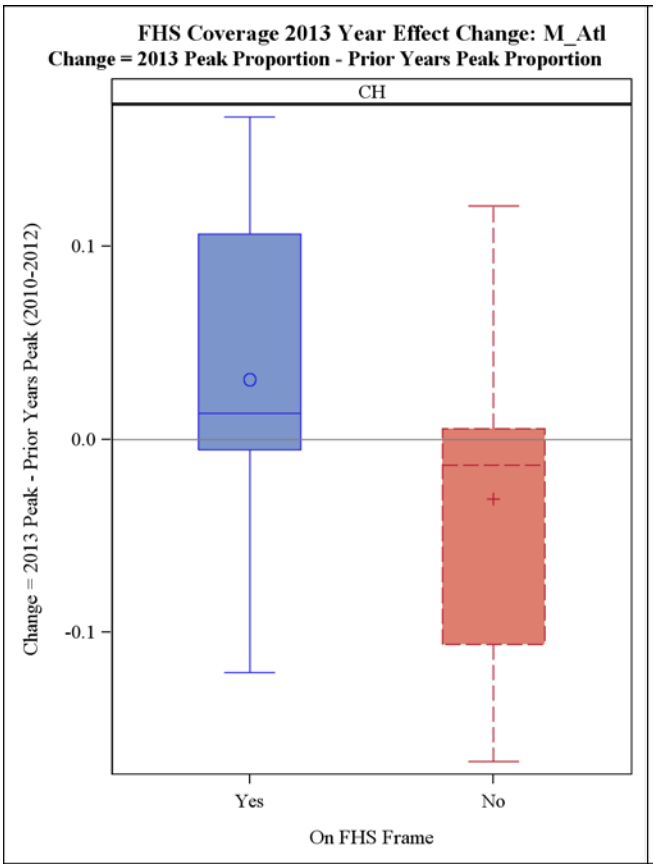


**Figure 22**. Differences in Peak Time Block On FHS Frame Vessel Trip Proportions between 2013 and prior years, 2010-2012, in the Mid-Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Virginia, Maryland, Delaware, New Jersey, and New York.

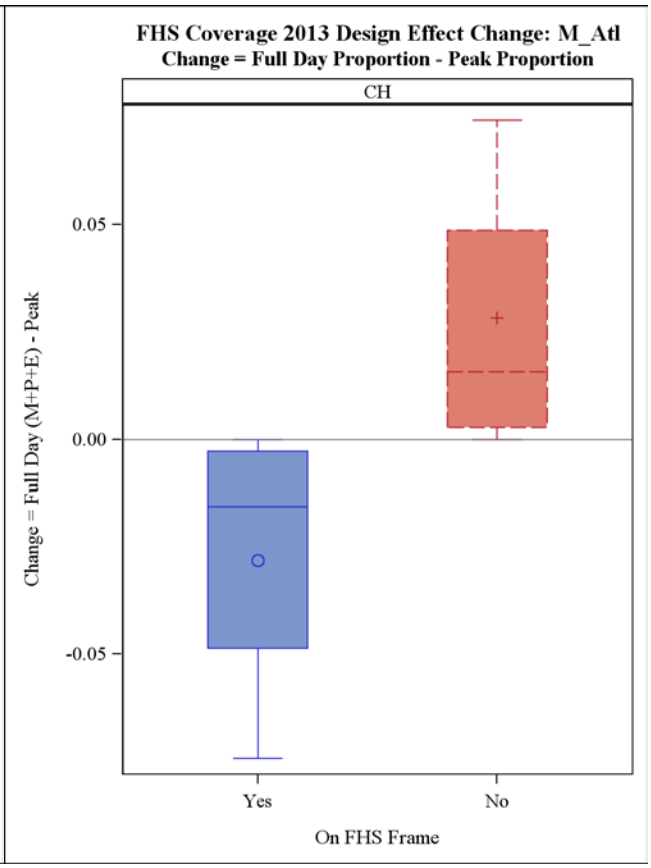


**Figure 23.** Differences in 2013 On FHS Frame Vessel Trip Proportions between Full Day and Peak time block in the Mid-Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Virginia, Maryland, Delaware, New Jersey, and New York.

Table 15. Mid Atlantic Weighted Proportions of Total Charter Boat Angler-Trips taken aboard vessels on the For-Hire Survey frame, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|
| State | P | T | P | T | P | T | P | T |
| VA | 0.87 | 0.87 | 0.84 | 0.84 | 1 | 1 | 0.94 | 0.87 |
| MD | 0.89 | 0.89 | 0.87 | 0.88 | >.99 | 0.99 | 0.99 | 0.98 |
| DE | 0.98 | 0.97 | 1 | 0.99 | >.99 | >.99 | 0.99 | 0.99 |
| NJ | 0.98 | 0.98 | 0.86 | 0.87 | 1 | 1 | 1 | 1 |
| NY | 0.96 | 0.94 | 0.71 | 0.73 | 1 | 1 | 0.88 | 0.83 |

In the North Atlantic sub region, on-frame proportions were generally similar across all states and years. Proportions were greater than 0.9 in all cases except Rhode Island, 2011 (Table 16). While there was some indication of year effects (Figure 24), differences larger than 5 percentage points in Peak proportions among years were primarily limited to 2013 and 2011.

There was also support for design change effects in the North Atlantic. In general, it appeared that full day proportions tended to be smaller that Peak proportions in 2013 (Figure 25). However, these differences were less than 5 percentage points and limited to Connecticut and Rhode Island. Peak and full day proportions were nearly identical in Massachusetts and New Hampshire.

Overall, net effects were minimal in the North Atlantic. Similar to results in the Mid-Atlantic, year and design change effects appeared to work in opposite directions. However, the magnitude of both effects was typically small. All 2013 proportions were similar to prior years. In Massachusetts, the 2013 proportions were minimally higher than all prior years. However, this difference was in-line with an increasing trend over the prior three years.

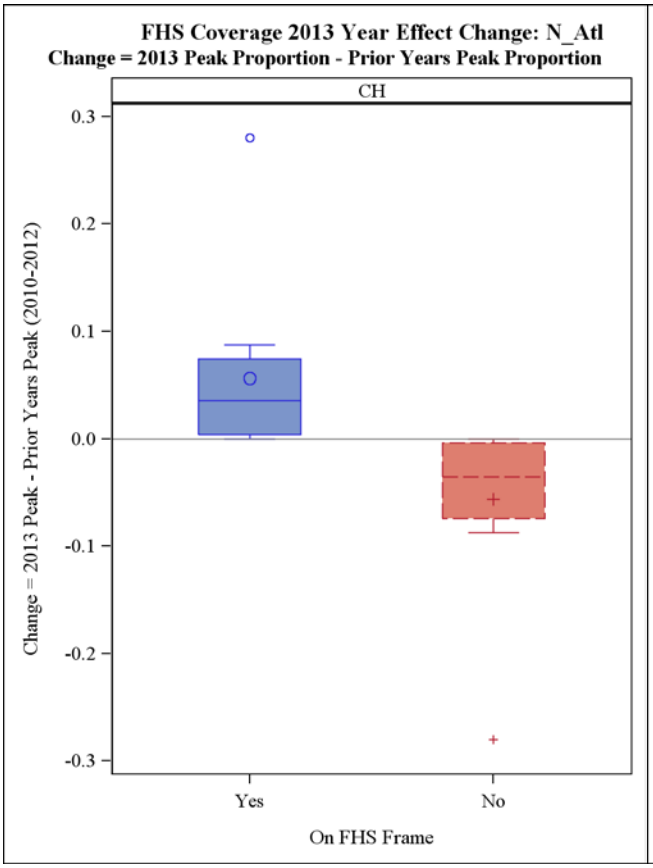


**Figure 24**. Differences in Peak Time Block On FHS Frame Vessel Trip Proportions between 2013 and prior years, 2010-2012, in the North Atlantic Sub Region. Differences are calculated as $p_{2013} - p_{2010}$, $p_{2013} - p_{2011}$, $p_{2013} - p_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat). States include Connecticut, Rhode Island, Massachusetts, and New Hampshire.

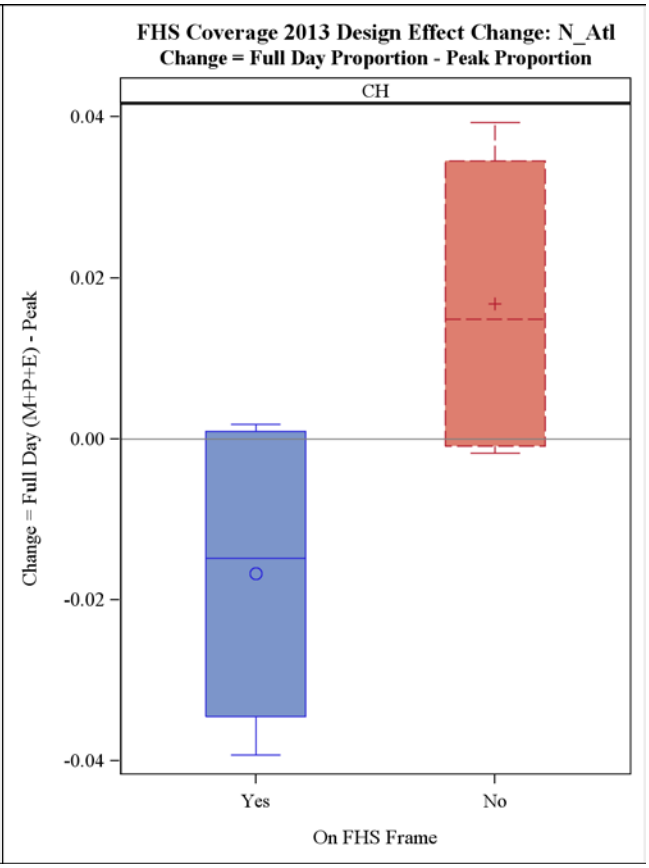


**Figure 25.** Differences in 2013 On FHS Frame Vessel Trip Proportions between Full Day and Peak time block in the North Atlantic Sub Region. Differences are calculated as $p_{full} - p_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat). States include Connecticut, Rhode Island, Massachusetts, and New Hampshire.

Table 16. North Atlantic Weighted Proportions of Total Charter Boat Angler-Trips taken aboard vessels on the For-Hire Survey frame, by State and Mode of Fishing for Years 2010-2013. Proportions are reported separately by Time Block: P – Peak, T – Total (Full Day).

| | 2010 | | 2011 | | 2012 | | 2013 | |
|---|---|---|---|---|---|---|---|---|
| State | P | T | P | T | P | T | P | T |
| CT | 1 | 1 | 0.92 | 0.92 | 1 | 1 | 1 | 0.97 |
| RI | 0.99 | 0.99 | 0.72 | 0.73 | 1 | 1 | 1 | 0.96 |
| MA | 0.94 | 0.92 | 0.94 | 0.94 | 0.98 | 0.99 | 1 | 1 |
| NH | 0.99 | 0.99 | 0.91 | 0.91 | 0.94 | 0.94 | 0.99 | >.99 |

Note: Maine CH Boat was excluded from the Descriptive Analysis as sampling in this stratum used a separate vessel-based design that was consistent across years 2010-2013.

# 8. Catch Rates for Selected Species

Results for catch rates (mean landings per trip) were the most variable of all the MRIP estimation components. When considering all species included in the analysis, year effects and design change effects were frequently centered around zero suggesting that 2013 catch rates were similar to prior years. However, effects for individual species were often considerable and resulted in noticeable differences, increases or decreases, in mean landings per angler-trip.

## 8.1 Gulf of Mexico

For the 23 species analyzed in the Gulf of Mexico sub region, results were highly variable. In general, differences in Peak mean landings per angler-trip between 2013 and prior years were centered around zero for all modes and areas (Figure 26). However, differences for individual species ranged from approximately -1.5 to 1.5, suggesting year effects could have been present for some species. Also for Charter boat mode in Inland waters, it did appear that 2013 Peak rates tended to be slightly down compared to prior years.

In terms of potential design change effects on mean landings, once again differences tended to be centered around zero with large variability across species. Differences in 2013 full day and Peak means typically ranged from roughly -0.5 to 0.5 (Figure 27), with a couple of differences approaching -1.0 in the STS area for Charter and Private boat modes.

While results in the Gulf of Mexico did not support systematic year or design change effects across selected species, substantial effects were clearly present for individual species. However, these effects varied in direction and magnitude even within individual mode and area combinations.

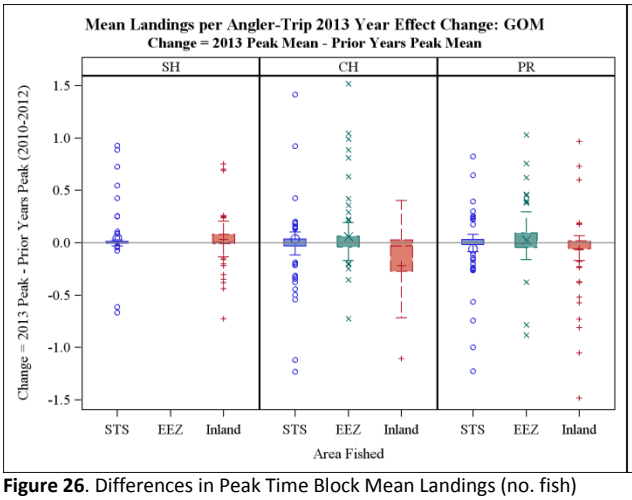


**Figure 26**. Differences in Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

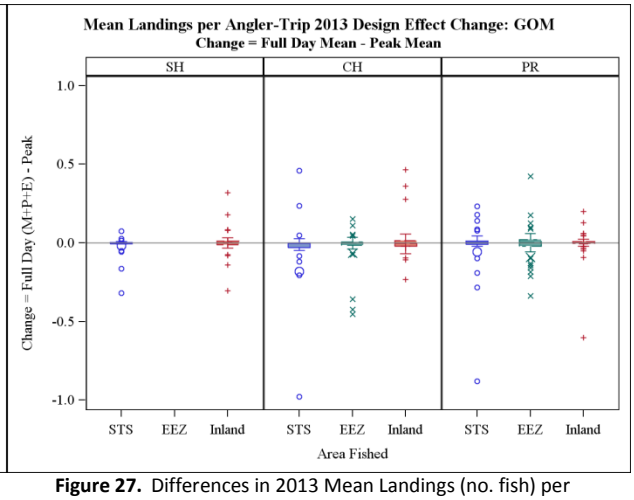


**Figure 27.** Differences in 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

### 8.1.1 Red Snapper

In the Gulf of Mexico, results indicated support for both year and, to a lesser extent, design change effects in red snapper mean landings. There were sizeable increases in the 2013 Peak time block mean landings compared to Peak in prior years (Figure 28). These increases occurred primarily in the EEZ area for both Charter and Private boat modes. In contrast, design change effects tended to reduce mean landings in the EEZ area (Figure 29) with 2013 full day means being smaller than Peak means. Results for design change were more mixed in the STS area with a small increase for Private boat mode and almost no change for Charter boats. Net effects indicated overall increases in mean landings for red snapper as year effects were generally larger than design change effects in cases where the two effects were in opposite directions.

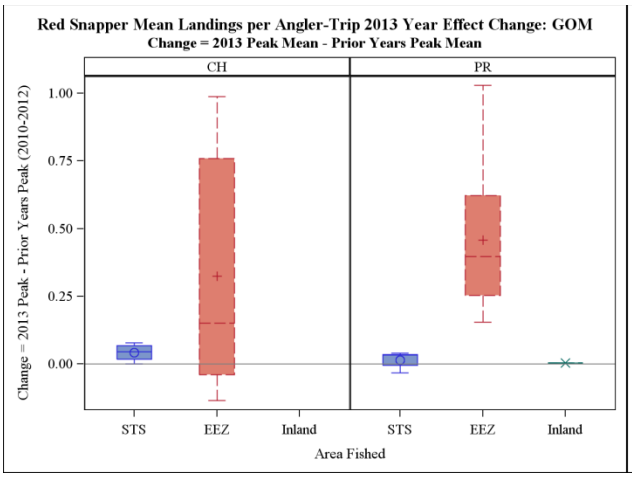


**Figure 28**. Differences in **RED SNAPPER** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

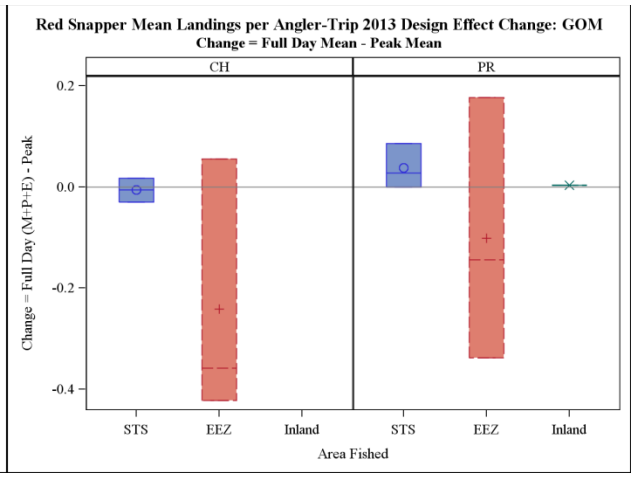


**Figure 29.** Differences in **RED SNAPPER** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

### 8.1.2 King Mackerel

King mackerel results were more variable compared to red snapper in the Gulf of Mexico. Differences in Peak means between 2013 and prior years were generally small (Figure 30). For Charter boat mode, there were a couple of sizeable decreases in 2013, but most differences were small with limited support for year effects in the STS area. In Private boat mode, there was some indication of year effects with small increases in the STS area and similar decreases in the EEZ. Potential design change effects also varied by mode and area (Figure 31). In the EEZ area, full day means were typically larger than Peak means in Charter mode but generally smaller than Peak for Private boats. Differences were more variable in STS but generally smaller compared to EEZ differences. In terms of net effects, there was some indication of increases in means for Charter mode in the EEZ with similar decreases for Private boat mode.

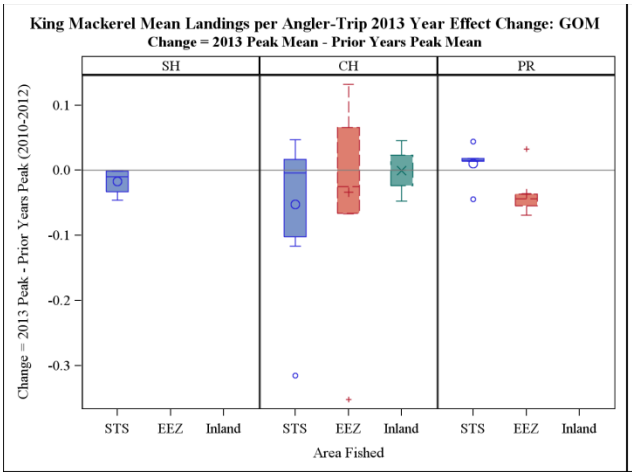


**Figure 30**. Differences in **KING MACKEREL** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

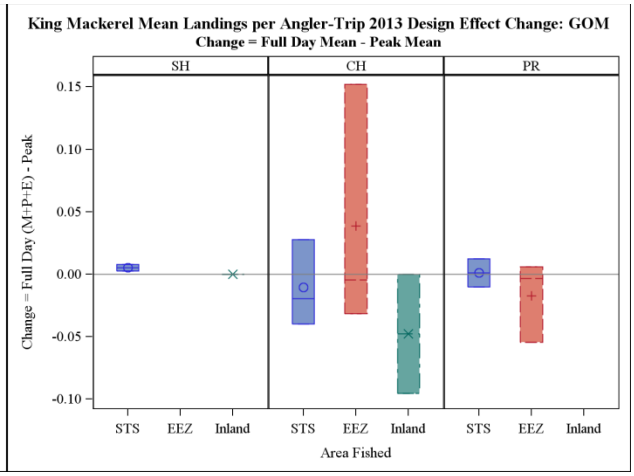


**Figure 31.** Differences in **KING MACKEREL** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

### 8.1.3 Red Drum

In the Gulf of Mexico, results for red drum did support the presence of both year and design change effects. However, directions and magnitudes varied between effects by fishing mode and area fished. For year effects, differences in Peak means between 2013 and prior years were generally positive across all areas in Private boat but more mixed for Charter boat and Shore modes (Figure 32). Charter mode saw small to moderate decreases in Inland and STS areas with small increases in the EEZ. Shore mode had small increases in Inland waters and almost no change in the STS. Potential design change effects were minimal in Shore mode and larger in Charter and Private boat modes (Figure 33). Differences between 2013 full day and Peak means in Charter mode were typically negative for STS and EEZ areas but positive for Inland waters. For Private boats, differences were negative in the EEZ and more variable and generally smaller in the STS and Inland waters. Year and design change effects were generally in opposite directions except for Charter boat mode in the STS area where both effects were usually negative.

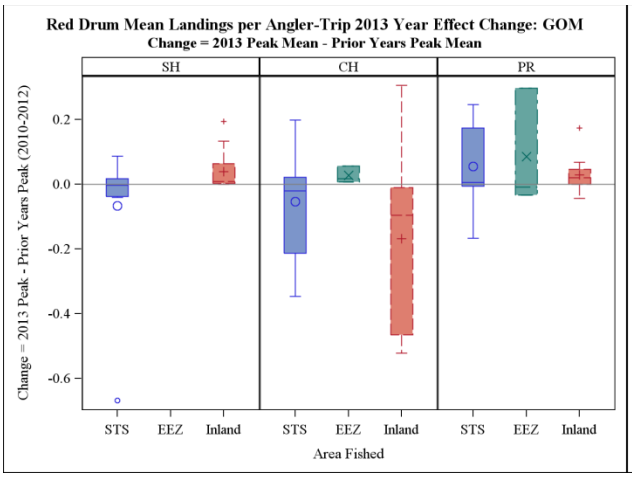


**Figure 32**. Differences in **RED DRUM** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

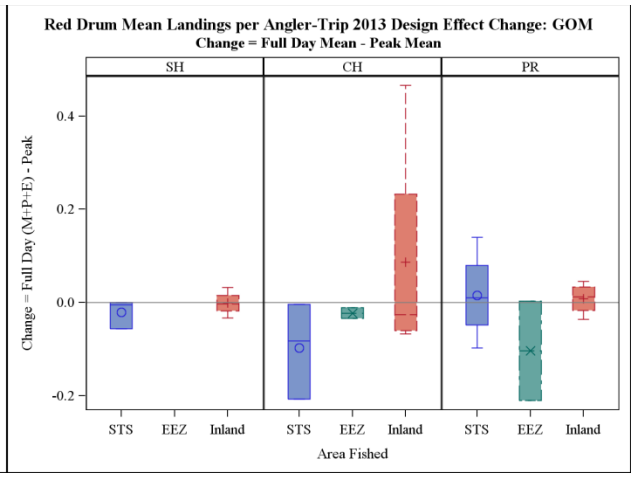


**Figure 33.** Differences in **RED DRUM** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Gulf of Mexico Sub Region. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area. States include Louisiana, Mississippi, Alabama, and Florida (West Coast).

## 8.2 Atlantic

Results for the 26 species analyzed in the Atlantic sub regions were similar to those in the Gulf of Mexico. Differences in Peak mean landings per angler-trip between 2013 and prior years as well as differences between 2013 full day and Peak means were generally centered around zero (Figure 34). However, differences in some cells did suggest more systematic effects. As in the Gulf of Mexico, larger effects were apparent for individual species.

Across the Atlantic sub regions, differences in Peak mean landings between 2013 and prior years were generally small and centered around zero with several exceptions. In Charter boat mode, differences tended to be more positive in the Mid-Atlantic sub region for STS and EEZ areas while differences were generally negative across all areas in the North Atlantic region (Figure 34). For Charter boats in the South Atlantic sub region, small positive differences were noted for STS with similar negative differences for Inland waters. Likewise, differences for Shore mode in the North Atlantic were generally positive. In the remaining cases where differences were more closely centered around zero, noticeable differences were still observed for individual species. Overall, results for Peak differences suggested few minor systematic year effects by sub region, mode of fishing, and area fished with a number of larger year effects for individual species.

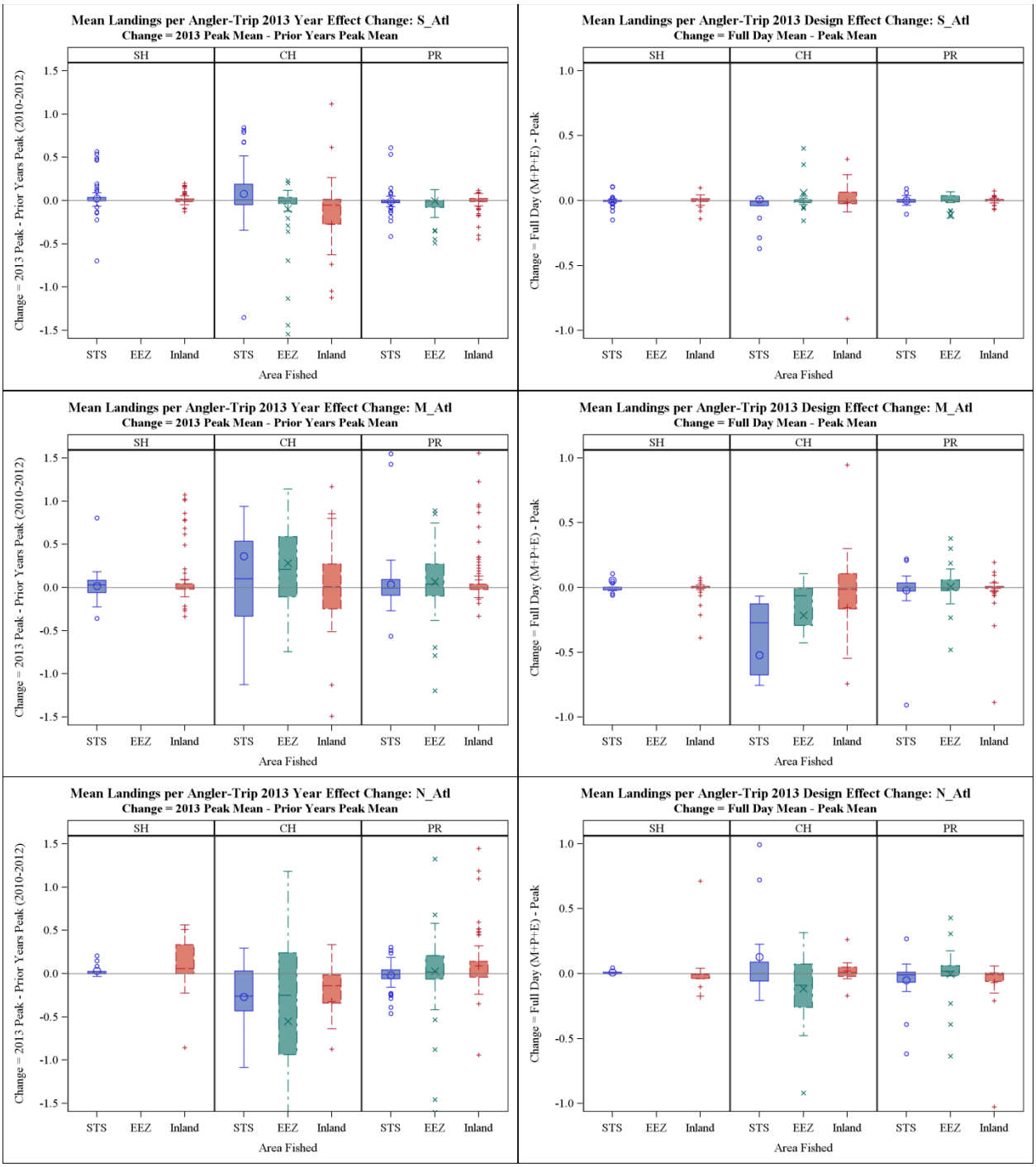


**Figure 34**. Differences in Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States included were S_Atl: North Carolina, South Carolina, Georgia, and Florida (East Coast), M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

**Figure 35.** Differences in 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States included were S_Atl: North Carolina, South Carolina, Georgia, and Florida (East Coast), M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

Results for potential design change effects were generally consistent across the Atlantic sub regions as well. With the exception of Charter boat mode in the Mid-Atlantic, differences in mean landings between 2013 full day and Peak time block were typically centered around zero and usually less than +/- 0.5 (Figure 35). For Charter boats in the Mid-Atlantic, there appeared to be a systematic difference across the selected species in both STS and EEZ areas. In these cases, differences between full day and Peak means were generally negative. Larger differences were also noted for individual species in all modes, particularly in the Mid-Atlantic and North Atlantic sub regions. Given the differences observed, results supported potential design change effects in 2013 mean landings in the Atlantic sub regions with considerable variation in direction and magnitude across species.

### 8.2.1 Black Sea Bass

Comparisons of mean landings per angler-trip for black sea bass were made for all three Atlantic sub regions in Private and Charter boat modes. While results varied across sub regions, 2013 year effects were generally negative while potential design change effects were more variable.

Generally negative year effects meant that Peak means in 2013 were less than prior year means in most cases. Larger negative differences were observed for Charter boats in the North Atlantic in all three areas as well as Charter STS in the Mid-Atlantic sub region (Figure 36). However, large increases in mean landings (2013 Peak > Peak in prior years) were observed in the Mid-Atlantic for Charter mode in the EEZ. For Private boat mode, differences in Peak means were generally much smaller than in Charter mode. In most cases, Private boat differences were slightly negative or roughly centered around zero.

Potential design change effects varied across sub regions, modes, and areas. In 2013, full day means were generally smaller than Peak means in South Atlantic Private boats in the EEZ, Mid-Atlantic Charter boats in the STS and EEZ, and, in the North Atlantic, Charter boats in the EEZ and Private boats in the STS (Figure 37). In the remaining cases, differences were either centered around zero or somewhat positive. Somewhat larger positive differences were observed for Charter boats in the South Atlantic EEZ, and in the North Atlantic for Charter boat mode in the STS and for Private boats in the EEZ.

Net effects for black sea bass mean landings were variable as well. In some cases, year and design change effects were in opposite directions (e.g. Mid-Atlantic Charter boat EEZ). In other cases, the two effects were in the same direction (e.g. South Atlantic Private boat EEZ). In a few cases, both effects were centered around zero giving little indication of systematic year or design change effects (e.g. Mid-Atlantic Private boat all areas).

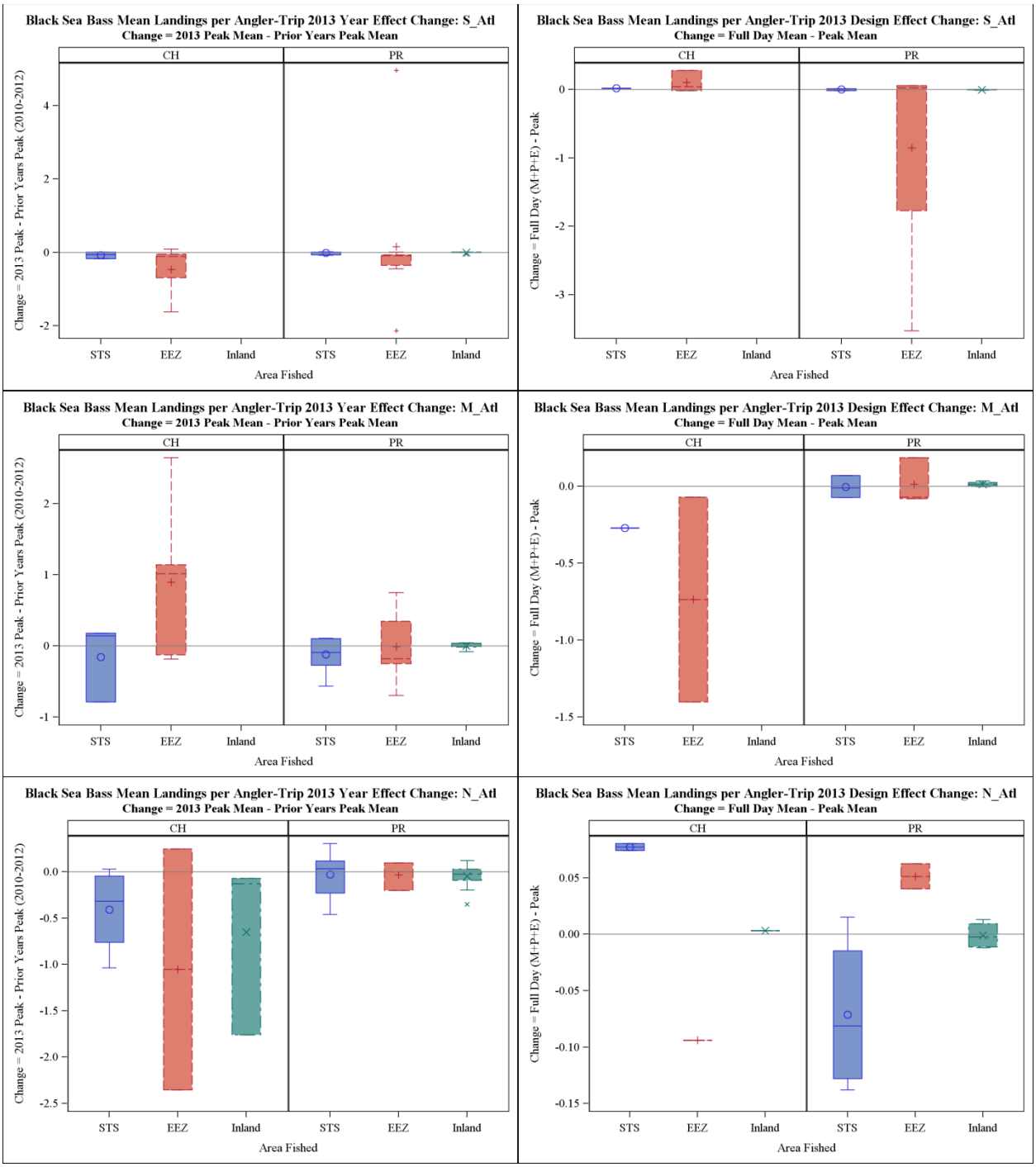


**Figure 36**. Differences in **BLACK SEA BASS** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States included were S_Atl: North Carolina, South Carolina, Georgia, and Florida (East Coast), M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

**Figure 37.** Differences in **BLACK SEA BASS** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States included were S_Atl: North Carolina, South Carolina, Georgia, and Florida (East Coast), M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

### 8.2.2 Striped Bass

Comparisons of mean landings per angler-trip for striped bass were made for the Mid-Atlantic and North Atlantic sub regions in Shore, Private and Charter boat modes. Differences were typically larger in the Charter boat mode for both sub regions.

In general, year effects for striped bass were centered around zero and were smaller than effects for black sea bass. Larger differences between 2013 Peak and prior year means were observed for Charter boats (Figure 38). In the Mid-Atlantic, Charter mode differences were generally positive in the STS and EEZ areas. For the North Atlantic, Charter differences spanned zero but negative differences were generally larger in magnitude than positive differences. Differences in Peak means for Private boat and Shore modes were generally much smaller than in Charter mode and were centered around zero.

Potential design change effects varied across sub regions, modes, and areas. In 2013, full day means were generally very close to Peak means for Shore and Private boat modes (Figure 39). For Charter mode, differences between full day and Peak means were negative in both sub regions for STS and negative in the Mid-Atlantic for the EEZ area. Positive differences were observed for Charter boats in the Mid-Atlantic Inland waters, with remaining cases roughly centered around zero.

Net effects for striped bass mean landings also varied. For Private boat and Shore modes, both effects were generally small and centered around zero with few exceptions. For Charter boats, year and design change effects were in opposite directions in the Mid-Atlantic. For North Atlantic Charter boats, the two effects were similar in direction with year effects being generally larger than design change effects.

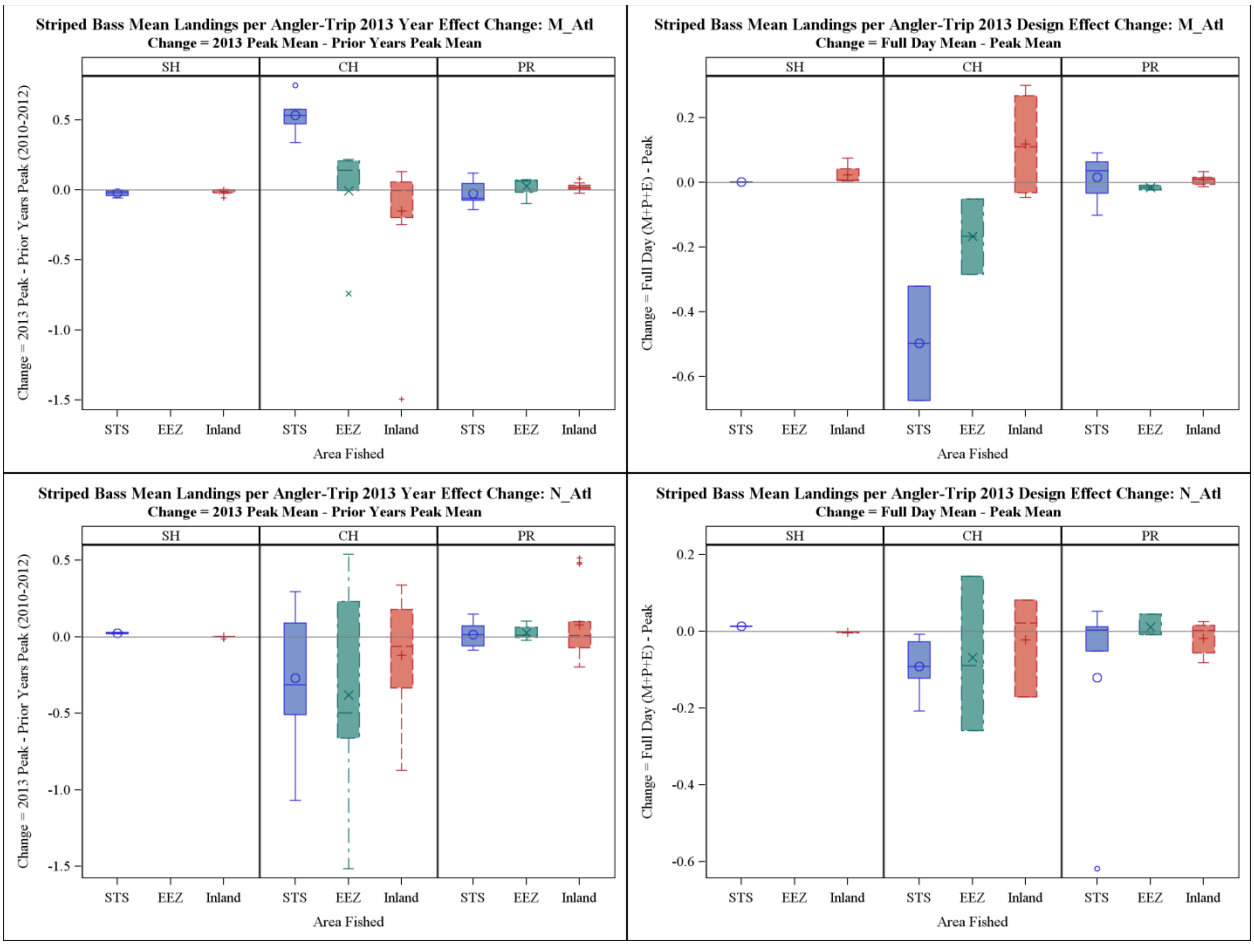


**Figure 38**. Differences in **STRIPED BASS** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States included were M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

**Figure 39.** Differences in **STRIPED BASS** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States included were M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

### 8.2.3 Summer Flounder

Comparisons of mean landings per angler-trip for Summer flounder were made for the Mid-Atlantic and North Atlantic sub regions in Shore, Private and Charter boat modes. Differences were typically larger in the Charter and Private boat modes for both sub regions compared to Shore mode.

Year effects for summer flounder varied considerably by mode, area and sub region. In Shore mode, differences in Peak mean landings per angler-trip between 2013 and prior years were very close to zero (Figure 40). For Charter mode, differences in the Mid-Atlantic were positive for STS and generally negative for EEZ and Inland areas. Conversely, Charter differences were negative for STS and positive for EEZ in the North Atlantic. Differences were generally positive across all areas for Mid-Atlantic Private boats. In the North Atlantic, Private boat differences were generally negative for STS, centered around zero for EEZ, and typically positive for Inland waters.

Potential design change effects varied as well. In 2013, full day means were generally very close to Peak means for Shore mode (Figure 41). For Charter mode, differences ranged from negative for STS to positive for Inland in the Mid-Atlantic. In the North Atlantic, Charter differences were positive in STS and negative in the EEZ. Private boat differences were notably larger than Charter boat and Shore mode differences. Private boat differences were typically negative in the Mid-Atlantic and positive in the North Atlantic sub region.

Net effects for striped bass mean landings also varied. For Shore mode, both effects were generally small and centered around zero. For Charter and Private boat modes, year and design change effects were in opposite directions with similar magnitudes in both Mid-Atlantic and North Atlantic sub regions.

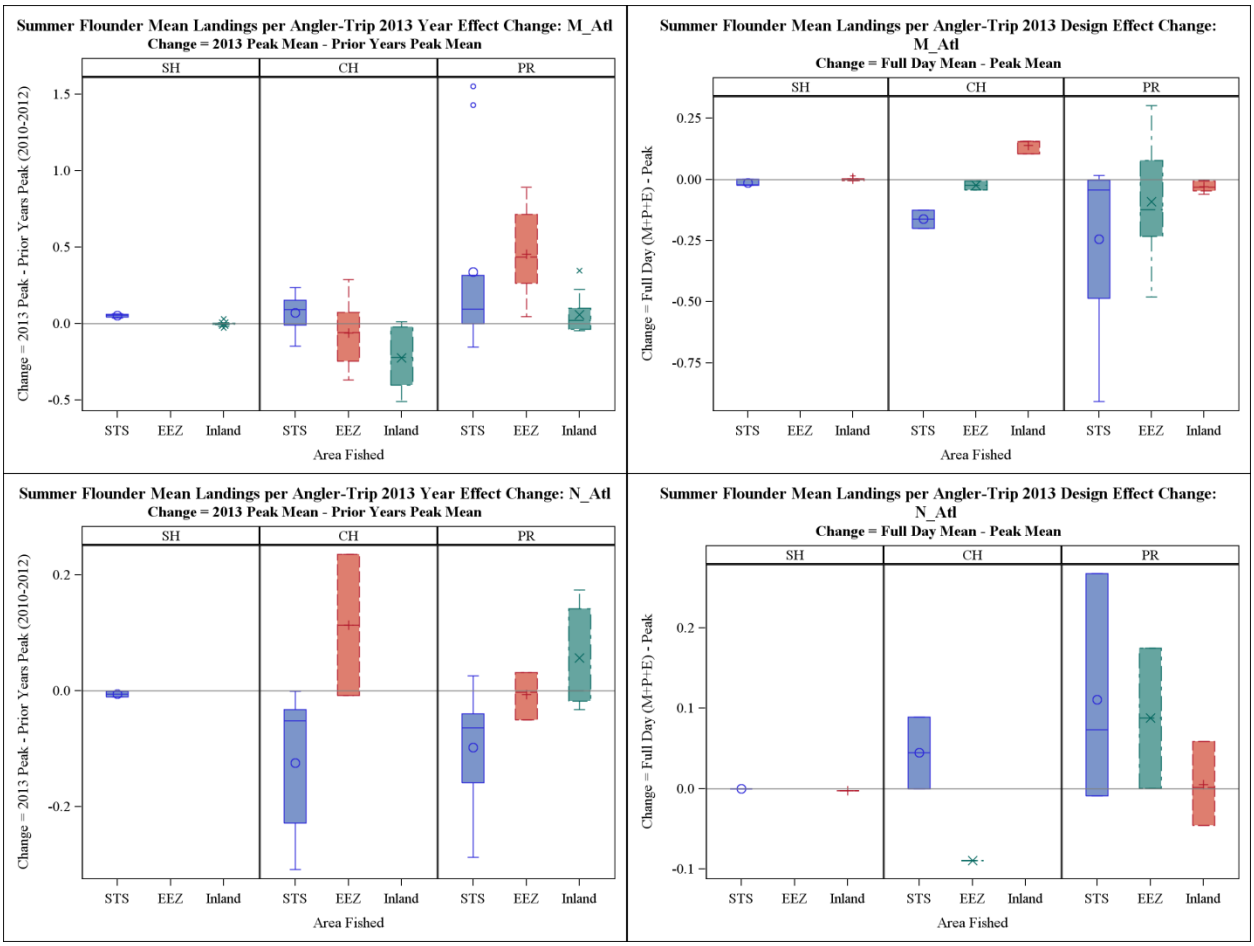


**Figure 40**. Differences in **SUMMER FLOUNDER** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States included were M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

**Figure 41.** Differences in **SUMMER FLOUNDER** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the Atlantic Sub Regions. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States included were M_Atl: Virginia, Maryland, Delaware, New Jersey, New York, N_Atl: Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

### 8.2.4 Atlantic Cod

Comparisons of mean landings per angler-trip for Atlantic cod in the North Atlantic sub region varied by mode and area but were similar for year and design change effects. For the Charter boats, year effects and design change effects were both negative in the EEZ with year effects being somewhat larger than design change effects (Figures 42-43). For Private boats, differences in STS and Inland areas were very close to zero. For Private boat mode in the EEZ area, differences in both effects spanned zero with slightly more negative differences in year effects and slightly more positive differences in design change effects.

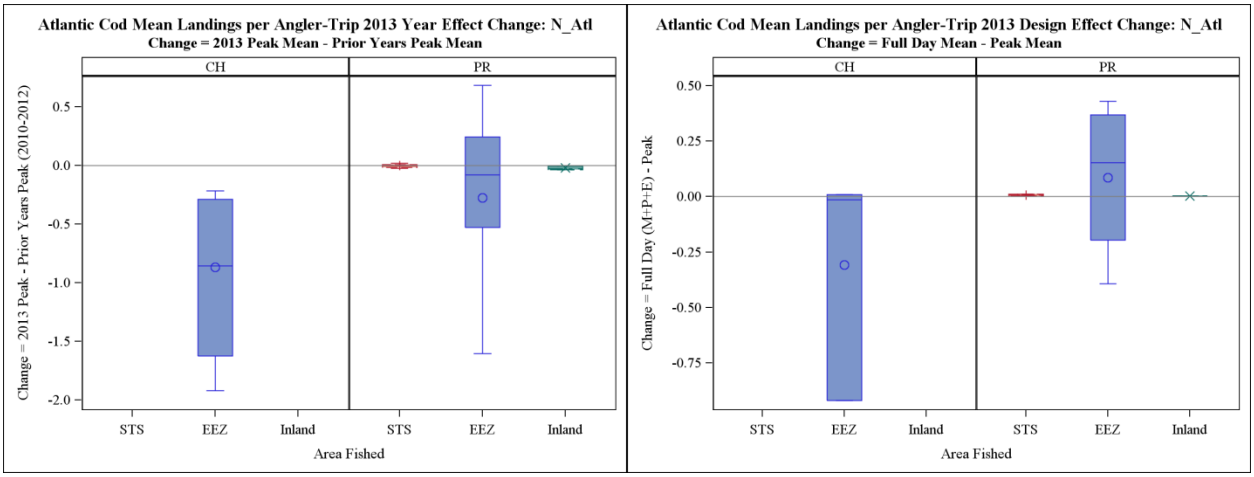


**Figure 42**. Differences in **ATLANTIC COD** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the North Atlantic Sub Region. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States included were Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

**Figure 43.** Differences in **ATLANTIC COD** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the North Atlantic Sub Region. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area fished for all analyzed species. States included were Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

### 8.2.5 Red Drum

Comparisons of mean landings per angler-trip for red drum in the South Atlantic sub region varied somewhat but were similar for year and design change effects. The largest differences in both year and design change effects were observed for Charter boat mode in Inland waters (Figures 44-45). In this case, differences spanned zero for both effects with year effects being somewhat larger in magnitude than design change effects. For Private boat and Shore modes, differences for both effects were generally small and centered around or very close to zero except for the Private boat EEZ design change, where differences were negative.

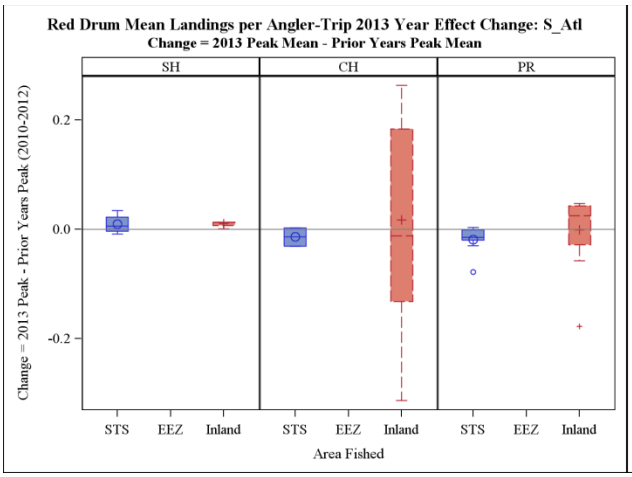


**Figure 44**. Differences in **RED DRUM** Peak Time Block Mean Landings (no. fish) per Angler-Trip between 2013 and prior years, 2010-2012, in the South Atlantic Sub Region. Differences are calculated as $\hat{y}_{2013} - \hat{y}_{2010}$, $\hat{y}_{2013} - \hat{y}_{2011}$, $\hat{y}_{2013} - \hat{y}_{2012}$. Box plots summarize state level differences among years by mode of fishing (SH – Shore, PR – Private boat) and area fished. States include North Carolina, South Carolina, Georgia, and Florida (East Coast).

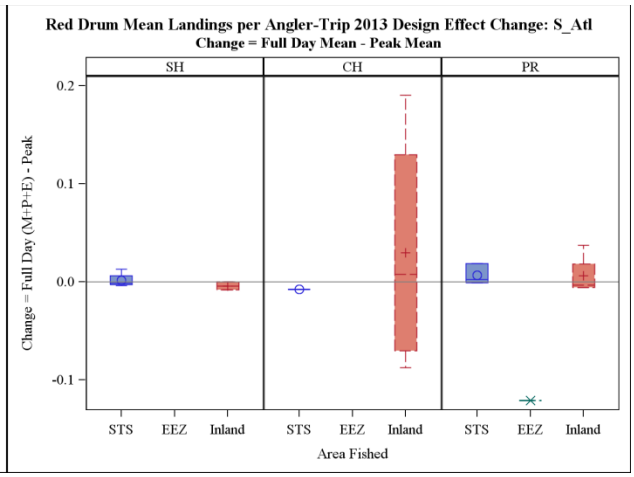


**Figure 45.** Differences in **RED DRUM** 2013 Mean Landings (no. fish) per Angler-Trip between Full Day and Peak time block in the South Atlantic Sub Region. Differences are calculated as $\hat{y}_{full} - \hat{y}_{peak}$. Box plots summarize state level differences by mode of fishing (SH – Shore, PR – Private boat) and area. States include North Carolina, South Carolina, Georgia, and Florida (East Coast).

# 9. Conclusions

While the Descriptive Analysis cannot definitively identify or quantify design change effects, it does answer several important questions: 1) did changes occur in the temporal distributions of angler-trips between 2013 and prior years, 2) did changes occur in MRIP estimation components over the same range of years, and 3) were those changes associated with any changes in temporal distributions?

It is clear that estimates of temporal distributions of angler-trips in 2013 were substantially different from prior years. The Peak activity time block account for noticeably fewer trips while Evening, primarily, and Morning time blocks accounted for more in 2013 compared to prior years sampled under the MRFSS APAIS design. Furthermore, these differences were nearly universal across sub regions, states, and modes of fishing.

Despite the fact that year and design change effects were confounded in this analysis, it seems reasonable to attribute the temporal differences to 2013 MRIP APAIS design changes, specifically full temporal coverage, instead of year effects. Several arguments can be made to support this assertion.

First, MRFSS APAIS distributions have remained very consistent across years even though significant events have occurred that might have been expected to change temporal distributions. In the Gulf of Mexico, the 2010 oil spill caused major disruptions to recreational fishing from Louisiana to the West coast of Florida as evidenced by significant reductions in 2010 Gulf-wide effort estimates. However, 2010 temporal distributions remained very much in-line with 2011 and 2012. On the Atlantic coast, the company contracted to conduct the MRFSS APAIS was different in 2012 compared to 2010 and 2011. Even with all of the associated personnel changes, 2012 temporal distributions were still very similar to 2010 and 2011. Given that the MRFSS APAIS temporal distributions appear relatively consistent in the

presence (or absence) of significant external events, it seems less likely that the 2013 temporal distributions would have changed because of some event independent of the design change.

The second argument builds on the first by considering temporal distributions in the two locations where the MRFSS APAIS was conducted in 2013, Puerto Rico and Hawaii. For both, 2013 temporal trip distributions were very similar to prior years (data not shown). The fact that there were no or only minimal temporal changes in locations where MRFSS APAIS was conducted but substantial changes in locations where MRIP APAIS was conducted supports design change being the primary cause of the differences. There are some issues with this argument, however. First, one might expect true differences between recreational fisheries on two relatively small island locations and those in mainland coastal states along the Gulf of Mexico and Atlantic Ocean. Second, MRIP sample weights have not yet been developed for MRFSS APAIS data collected in Hawaii or Puerto Rico, so weighted temporal distributions may differ somewhat from the unweighted distributions referenced here.

Finally, temporal trip distributions based on CHTS data have typically had larger proportions of Evening trips and smaller proportions of Peak trips compared to the MRFSS APAIS proportions in years prior to 2013 (data not shown). In 2013, CHTS temporal distributions were consistent with prior year CHTS distributions and similar to the 2013 MRIP APAIS distributions. The consistency of 2013 CHTS distributions with prior years also supports design change as the cause of differences in the intercept temporal distributions instead of possible year effects.

It is also clear that all of the MRIP estimation components changed, in at least some of the cases, from 2010 to 2013. While that is not particularly notable or unexpected, what is notable here is that inter-annual differences from 2010-2012 were generally smaller than the pairwise differences between 2013 and 2010-2012 – an indication that 2013 may have differed more systematically from the prior years. That leads to the final question of whether or not the differences in 2013 were associated with the changes in temporal distributions of trips.

The findings here do support an assertion that changes in temporal distributions resulted in changes in the 2013 MRIP estimation components in many cases. Frequently, the differences in Peak estimates across years were minimal while differences between 2013 full day and Peak estimates were larger. In these cases, the off-Peak trips, particularly the Evening trips, were different on average from the Peak trips so that the change in temporal distribution resulted in increased differences between 2013 and prior years.

However, it must be noted again that differences varied considerably across sub regions, states, modes of fishing, areas fished, and MRIP estimation components. This variability likely reflects differences in temporal coverage of the MRFSS APAIS design among states as well as the characteristics of the recreational fisheries across the range of states. In cases with small or minimal differences between 2013 and prior years, the MRFSS APAIS design appeared to provide better temporal coverage of the fisheries for some cases while less systematic differences between Peak and off-Peak trips accounted for other cases.

There are a few additional caveats that must be included for the Descriptive Analysis. While this analysis has focused on changes in temporal coverage, additional design changes were made in 2013. Other changes included 1) replacing alternate site sampling with formal site clustering, 2) stratifying larger states into sub-state regions, 3) eliminating the 30-interview per site visit cap, and 4) replacing sample weights that were partly design and partly model-based with fully design-based sample weights.

However, these design changes are much more difficult to operationalize and analyze using the current approach, and none of them result directly in temporal or spatial coverage changes. Regardless, the additional design changes could have impacted results presented here and will be evaluated in the Simulation Study Phase. Lastly, MRIP APAIS interviewing productivities (interviews per assignment) in 2013 were generally lower than in previous years under the MRFSS APAIS design. Adjustments were made that greatly improved productivities for Private boat and Shore mode sampling, but gains were not as large for Charter boat sampling. As such, Charter boat sample sizes were considerably smaller for some states in 2013. It is possible that some of the larger differences observed among the Peak comparisons of 2013 with prior years could be due to a combination of the additional design changes as well as reduced samples sizes. Finally, it is likely for at least some cases that potential design change effects at the wave level could be quite different from the annual results presented here.

In summary, estimated temporal distributions of trips were markedly different in 2013 compared to prior years. The changes in temporal distribution had the potential to create systematic differences in the MRIP estimation components calculated from intercept sample data to the extent that off-Peak trips were systematically different from Peak trips. While differences were observed in the MRIP estimation components between 2013 and prior years, they were highly variable and typically much smaller than the differences in temporal distributions. Ultimately, this report cannot reach a definitive conclusion about the exact impact of design changes on MRIP estimation components due to the confounding of year and design change effects. However, these findings do provide considerable support for the presence of design change effects, related to the change in temporal coverage, in both estimates of temporal distributions of angler-trips and some fraction of the 2013 MRIP estimation components.