



NOAA
FISHERIES

Sources of Large Changes and Outliers in MRIP Time Series

SAFMC SSC MRIP Data Workshop

August 2019

Charleston, SC

Presentation Outline

- Overview of sources
- Select species
 - Red porgy
 - Greater amberjack
 - King mackerel
 - Golden tilefish
 - Gag grouper

Sources



- Survey Data
- Survey Design
- Calibrations

Sources – Survey Data

- Intercept Survey (AP AIS):
 - Counts of fish caught per angler-trip
 - A: observed landings
 - B1: reported landings/discards
 - B2: reported live releases
 - Trip/Angler/Vessel characteristics related to effort
- Effort Surveys (FES, FHS)
 - Counts of trips taken by angler
 - FES: angler-trip counts by mode (PR, SH)
 - FHS: angler-trip counts by mode (CH, HB) and area (Inland, STS, EEZ)



NOAA
FISHERIES

Sources – Survey Design

- Sample Size (observations)
 - Small sample size cases
 - Rare events
 - Pulse events
- APAIS Complex Design
 - Sample Clusters
 - Sample Weights



NOAA
FISHERIES

Estimate Counts

- Average counts of estimates produced per wave in recent years
- Effort
 - ~125 effort estimates per wave
- Catch
 - ~3,000 catch estimates (landings, releases)

Sources – Calibrations

- APAIS 2013 Design Change
 - Kind-of-Day
 - Site pressure
 - Area fished
- FES Transition from CHTS
 - Multiplicative scalar for private boat and shore modes, varies over space and time



NOAA
FISHERIES

Select Species

- Red porgy: 2016
- Greater amberjack: 1981,1990,1991,2016
- King mackerel: 1990,2005,2017
- Golden tilefish: 1985,2005,2009
- Gag grouper: 1981,2000,2003,2007



NOAA
FISHERIES

Select Species

- Landings, Releases in numbers
- Series
 - **BASE**: prior to APAIS, FES calibrations
 - **ACAL**: includes APAIS calibration
 - **FCAL**: includes ACAL and FES calibration



NOAA
FISHERIES

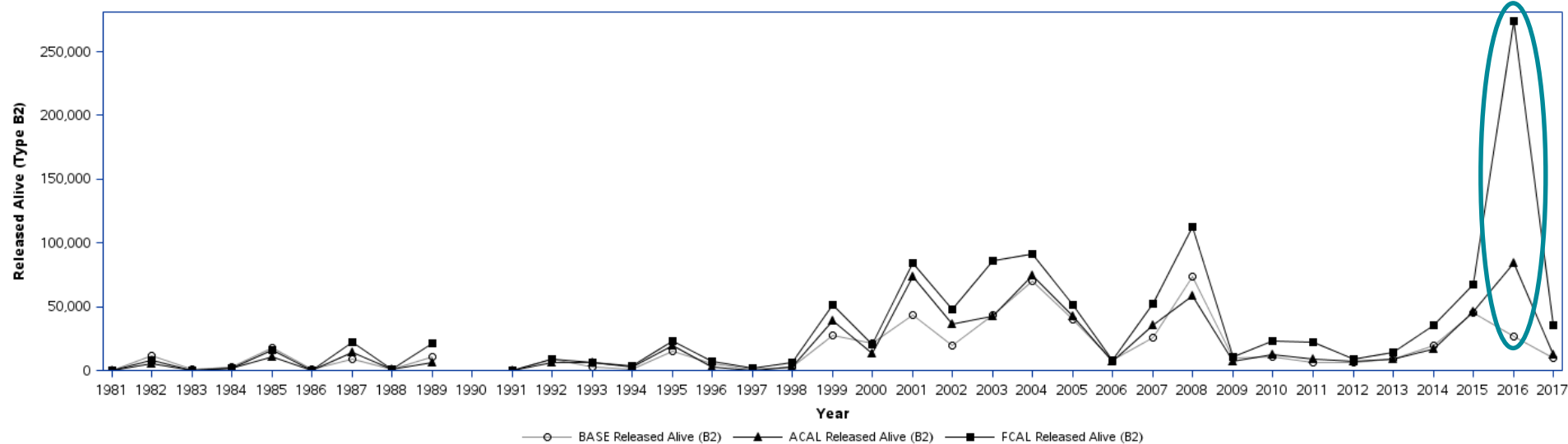
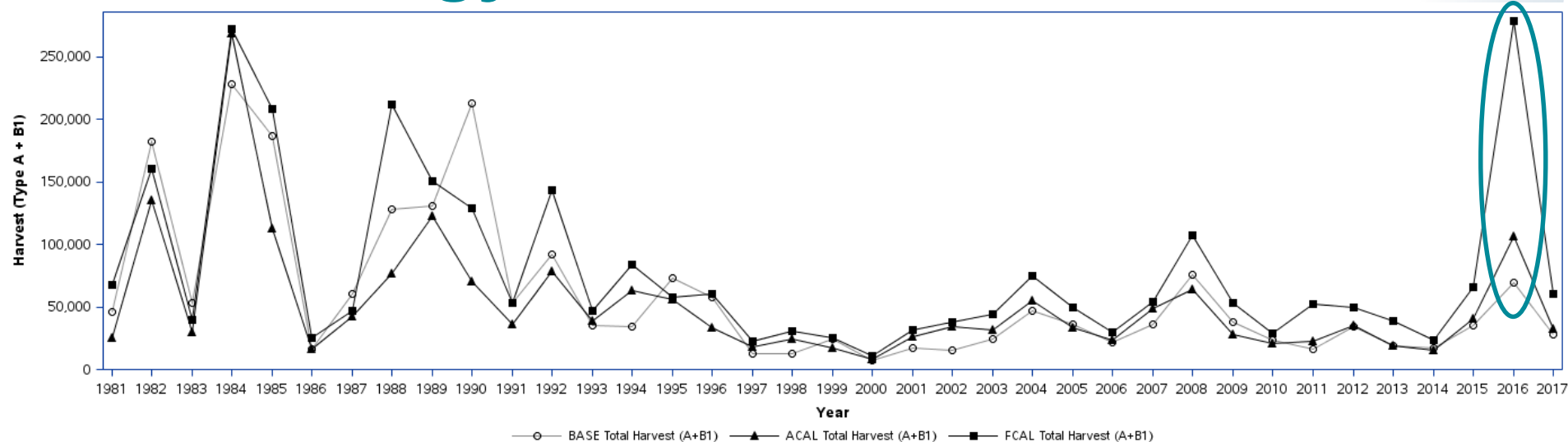
Red Porgy



NOAA
FISHERIES



Red Porgy – South Atlantic

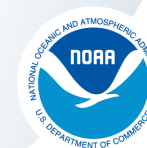




Red Porgy – 2016 S Atl Catch

- Large changes in 2016 landings and releases due to FES calibration and APAIS calibration

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	69,574	106,060	278,494	208,920	17	83
Releases	26,428	84,737	273,961	247,533	24	76



NOAA
FISHERIES

Red Porgy – 2016 S Atl Catch

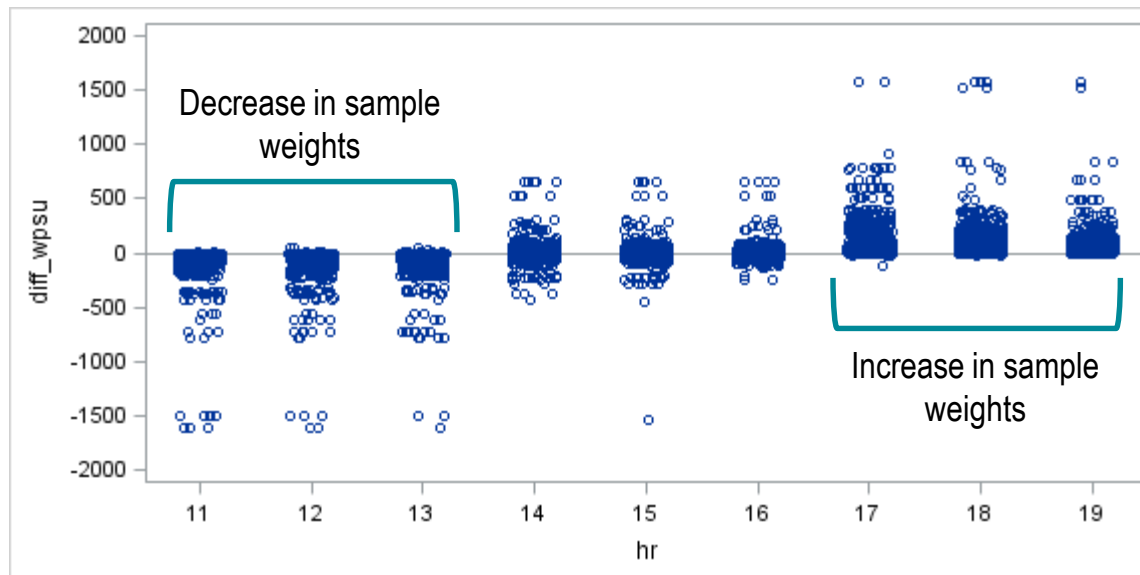
- FES calibration effects

Estimate Type	Total ACAL	Total FCAL	Change Ratio
Landings (no. fish)	106,060	278,494	2.63
Releases (no. fish)	84,737	273,961	3.23
Private Boat Effort (no. angler-trips)	7,152,265	21,252,299	2.97

- Summary information calculated at regional, annual levels
- FES calibrations calculated at more detailed levels

Red Porgy – 2016 S Atl Catch

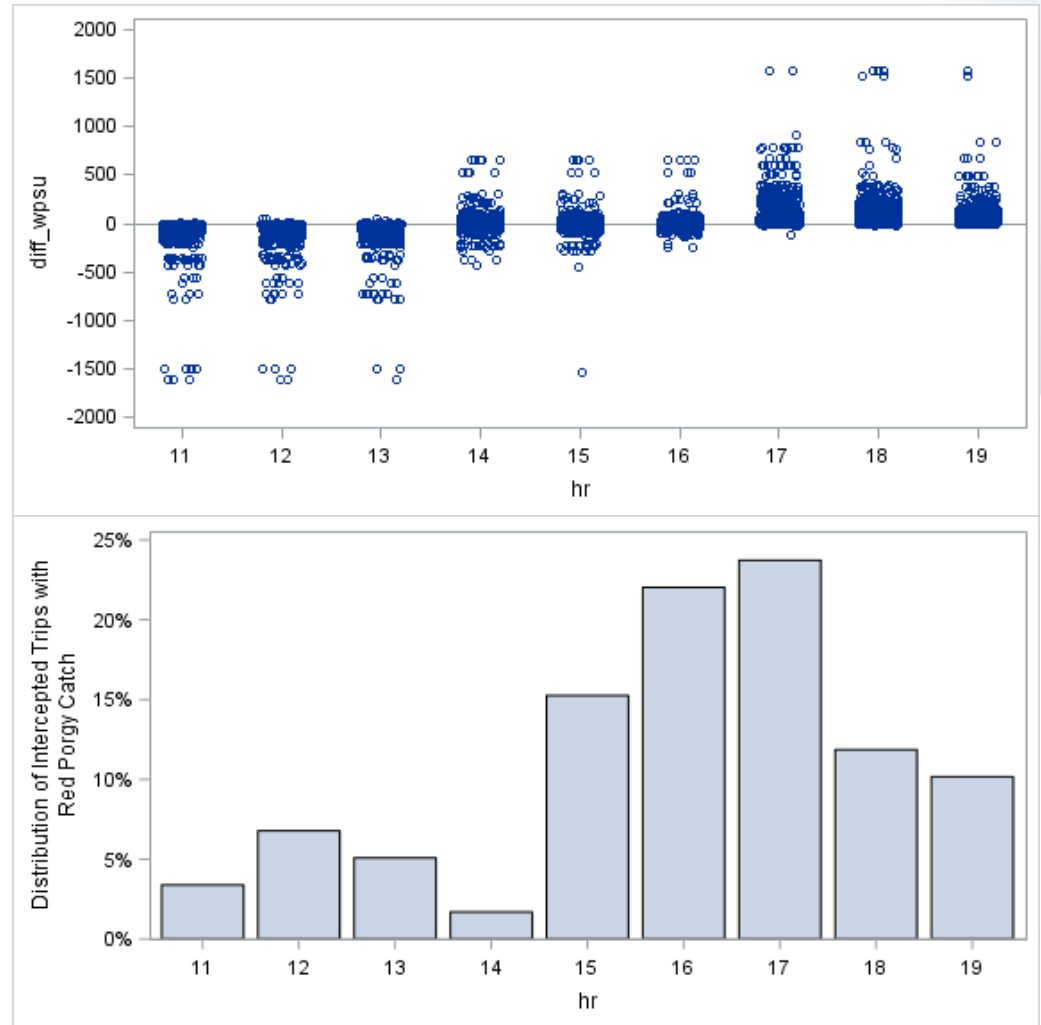
- APAIS calibration effects
 - Adjust sample weights to account for overlapping sample time intervals implemented in 2014



Jittered differences between adjusted and original APAIS sample weights by trip end hour for all intercepted trips in the South Atlantic, 2016

Red Porgy – 2016 S Atl Catch

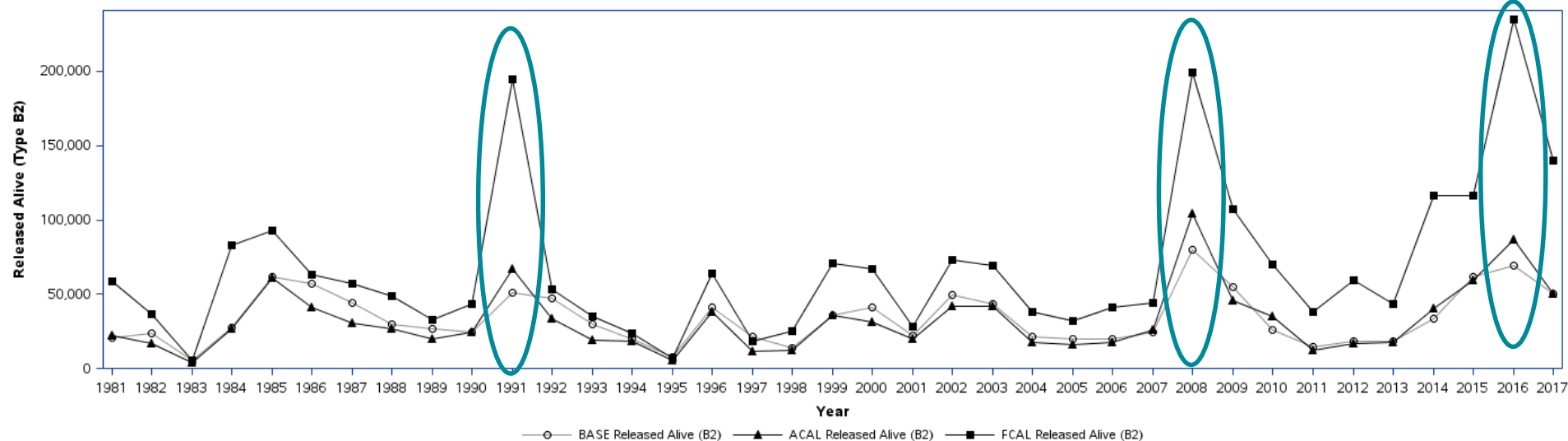
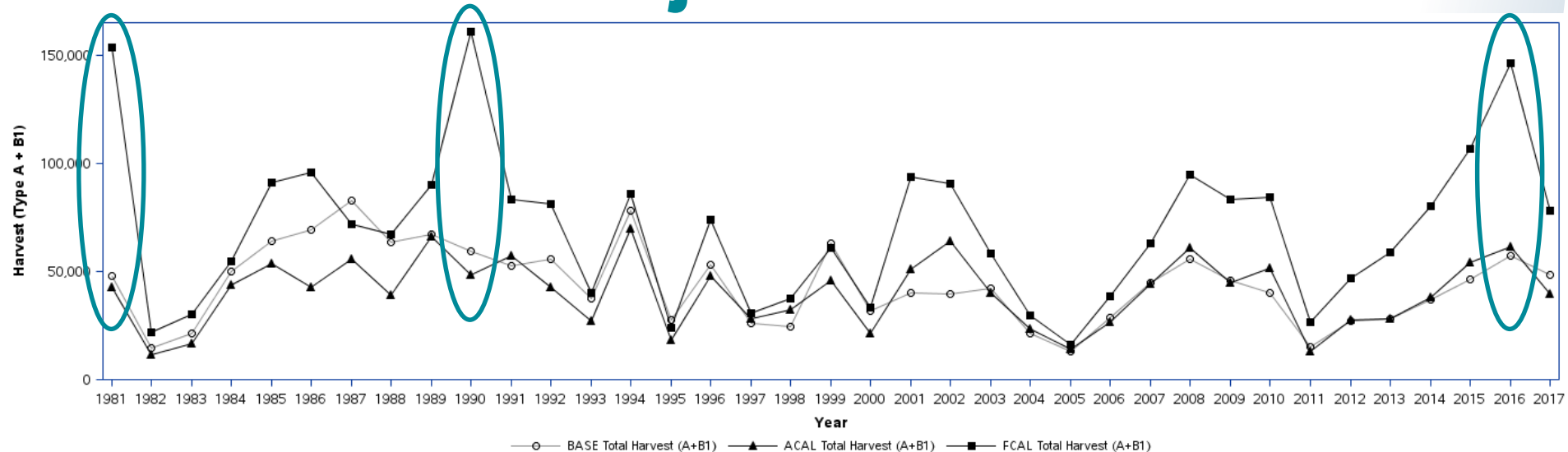
- Larger percentage of red porgy intercepts were obtained in the later afternoon hours (sample weights increased) compared to mid-day hours (sample weights decreased)



Greater Amberjack



Greater Amberjack – South Atlantic





Greater Amberjack – Landings 1981

- Large changes in 1981 landings due to FES calibration primarily in Florida private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	48,092	42,632	153,693	105,601	-5	105
Landings – EFL,PR,W2	29,294	24,308	107,730	78,436	-6	106

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,PR,W2	24,308	107,730	4.4
Effort – EFL,PR,W2	444,598	1,970,400	4.4



NOAA
FISHERIES

Greater Amberjack – Landings 1990

- Large changes in 1990 landings come from Florida, shore mode, ocean (≤ 3 mi)

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,SH,STS,W6	9,616	89,474	9.3
Effort – EFL,SH,STS,W6	287,494	2,675,014	9.3

APAIS Estimate Component	BASE	ACAL
State Resident – EFL,SH,W6	65%	58%
Out of State – EFL,SH,W6	35%	42%

- FES calibration accounting for most of change with some additional change coming from APAIS calibration effects on the APAIS effort coverage adjustment

Greater Amberjack – Landings 2016

- Large changes in 2016 landings due primarily to FES calibration in Florida, private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	57,599	61,353	146,118	88,519	4	96
Landings – EFL,PR	26,528	31,148	96,066	69,538	7	93

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,PR	31,148	96,066	3.08
Effort – EFL,PR	4,233,566	12,392,990	2.93

Greater Amberjack – Releases 1991

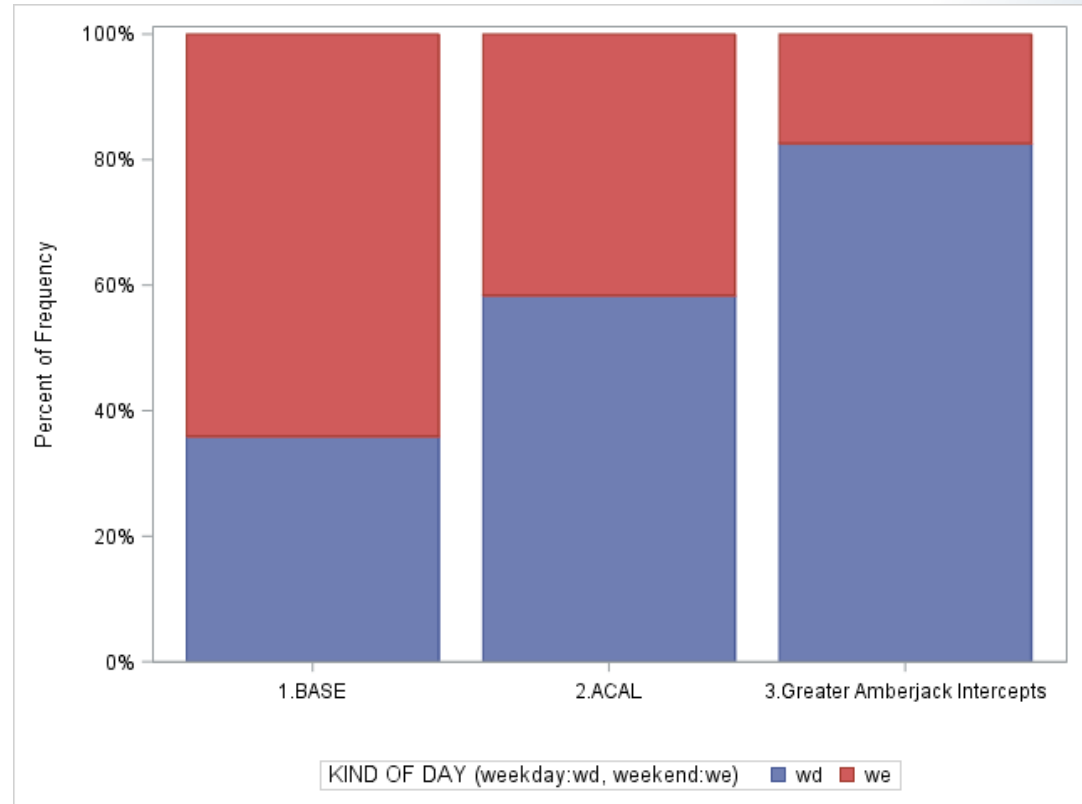
- Large changes in 1991 releases due to FES calibration in North Carolina shore mode with additional increase from APAIS calibration

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	50,713	67,129	194,620	143,907	11	89
Releases NC,SH,W4	21,035	44,900	156,880	135,845	18	82

Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – NC,SH,W4	44,900	156,880	3.49
Effort – NC,SH,W4	532,396	1,860,168	3.49

Greater Amberjack – Releases 1991

- APAIS calibration effect due to changes in sample weighting by kind of day
- Weekend sampled at higher rate than weekdays
- MRFSS estimation did not appropriately weight by kind of day
- Majority of greater amberjack intercepts occurred on weekdays and were upweighted in APAIS calibration



North Carolina Shore Mode 1991

APAIS sample weight and greater amberjack intercept percentages by kind of day

Greater Amberjack – Releases 2008

- Large changes in 2008 releases due to effects of both FES and APAIS calibrations in Florida, private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	79,985	103,911	199,153	119,168	20	80
Releases – EFL,PR	47,240	63,505	140,970	93,730	17	83

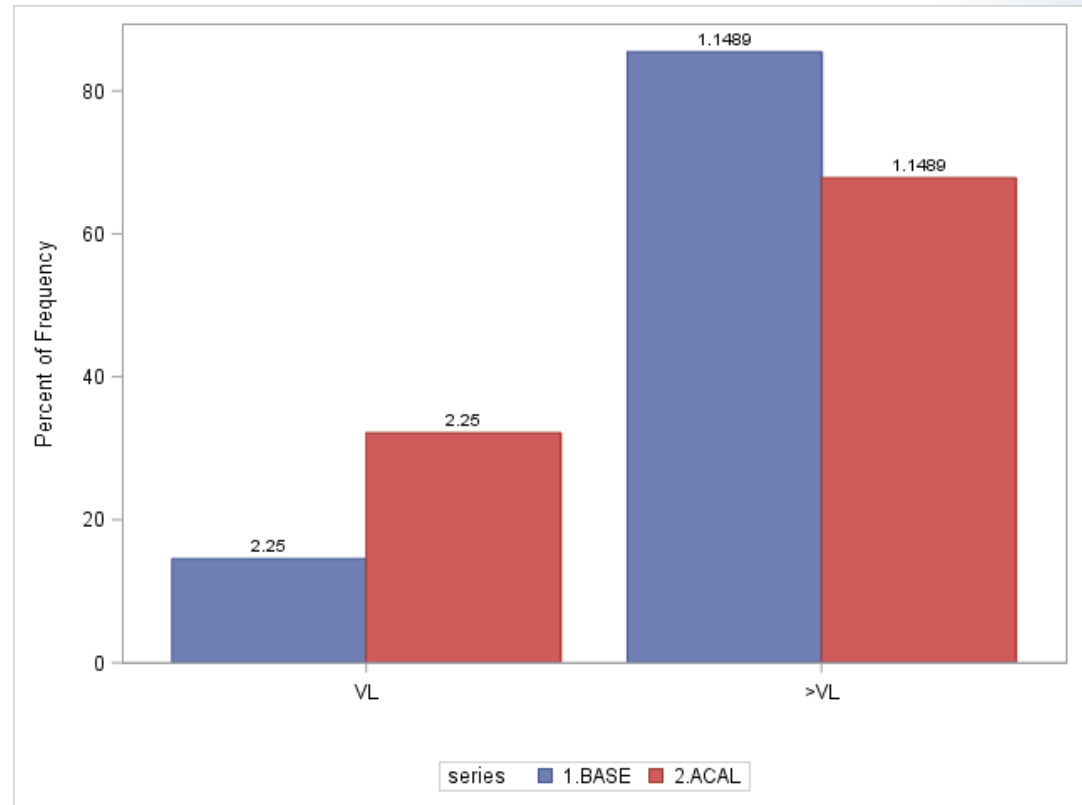
Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – EFL,PR	63,505	140,970	2.22
Effort – EFL,PR	6,406,405	13,485,019	2.10



NOAA
FISHERIES

Greater Amberjack – Releases 2008

- APAIS calibration effect due to changes in sample weighting by site pressure
- High pressure sites sampled at a higher rate compared to low pressure sites
- MRFSS estimation did not appropriately weight for unequal selection probabilities across site pressure levels
- Greater amberjack trips at very low pressure sites had higher releases on average and sample weights increased with APAIS calibration



Florida Private Boat Mode 2008

APAIS sample weight percentages and mean releases (data labels) by collapsed site pressure groups

Greater Amberjack – Releases 2016

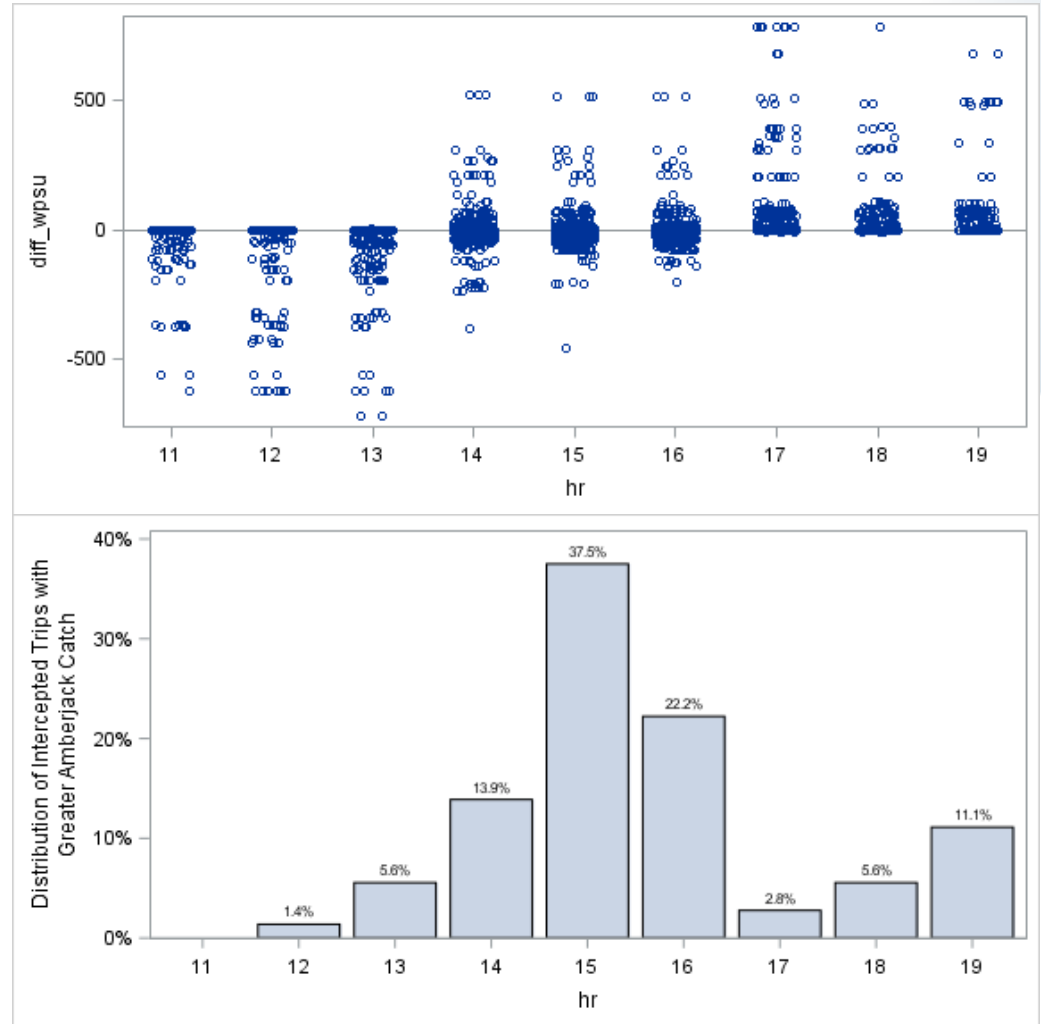
- Large changes in 2016 releases due to effects of both FES and APAIS calibrations in Florida, private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	69,006	86,592	234,906	165,900	11	89
Releases – EFL,PR	35,537	54,643	175,439	139,902	14	86

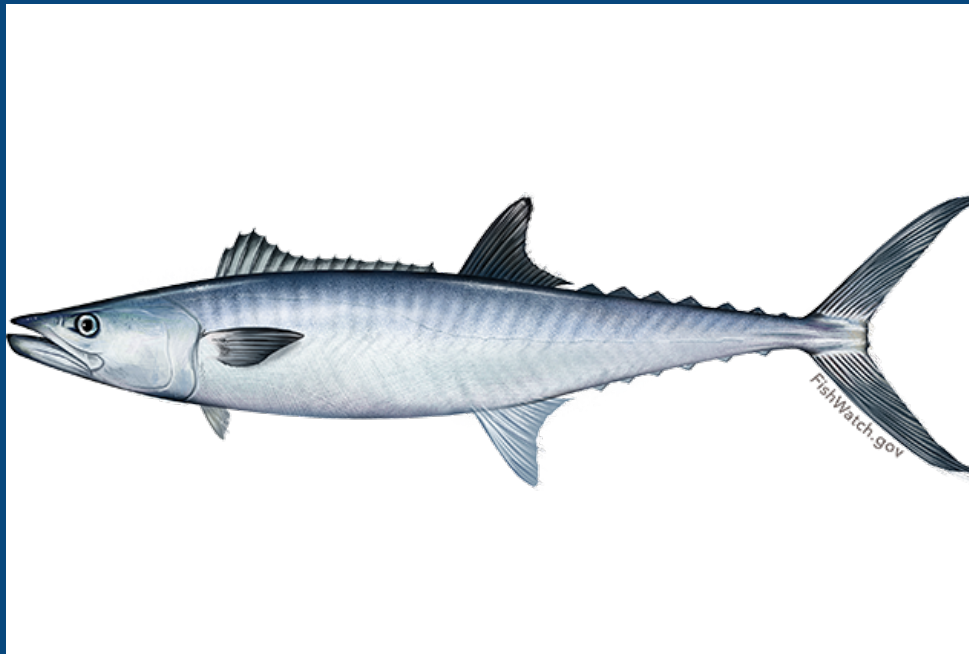
Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – EFL,PR	54,643	175,439	3.21
Effort – EFL,PR	4,233,566	12,392,990	2.93

Greater Amberjack – Releases 2016

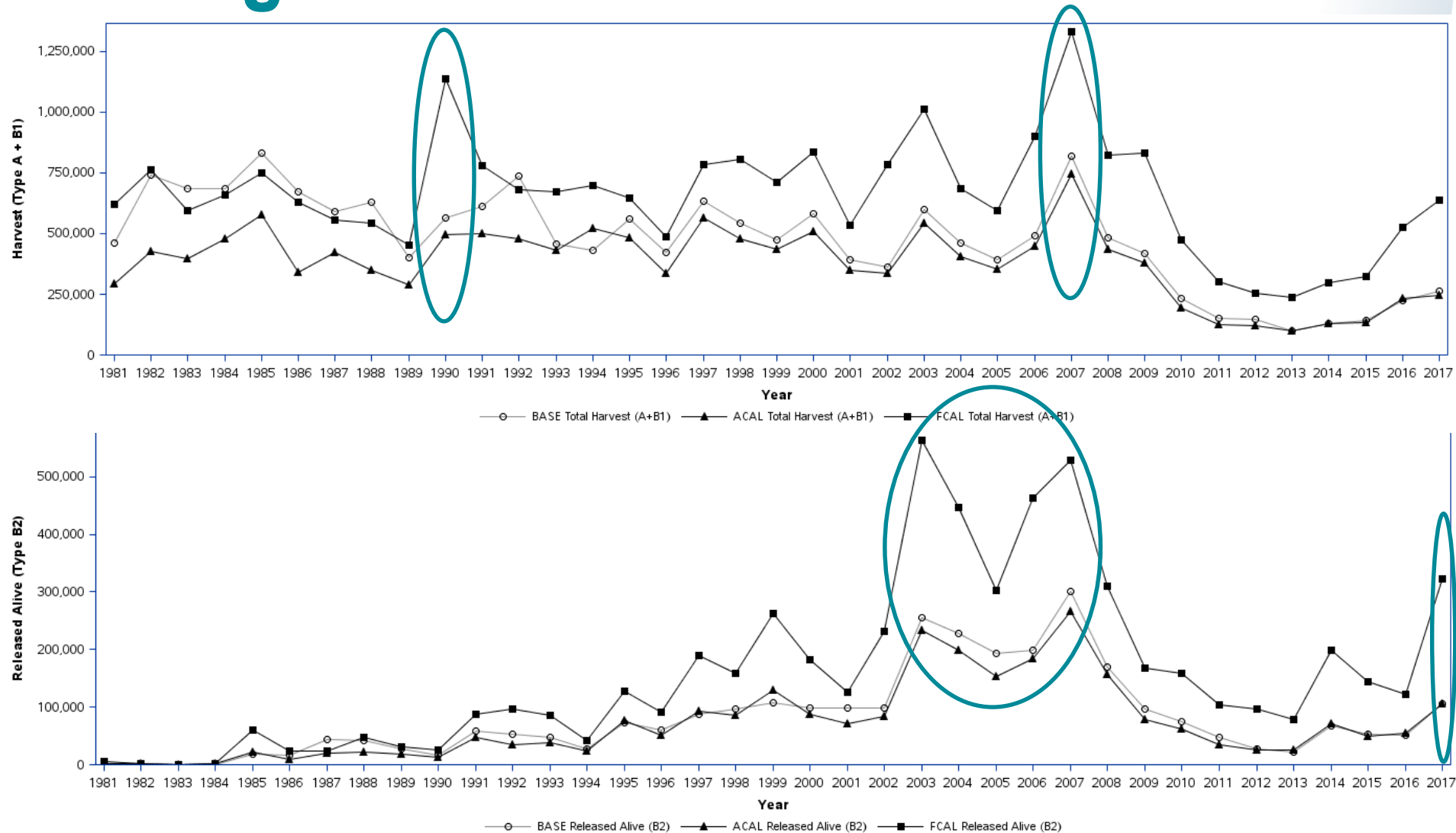
- Larger percentage of greater amberjack intercepts were obtained in the later afternoon hours (sample weights increased) compared to mid-day hours (sample weights decreased)



King Mackerel



King Mackerel– South Atlantic



NOAA
FISHERIES

King Mackerel – Landings 1990

- Large changes in 1990 landings due to FES calibration primarily in Florida shore mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	564,020	493,767	1,137,457	573,437	-12	112
Landings – EFL,SH,W6	27,731	46,965	436,987	409,256	5	95

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,SH,W6	46,965	436,987	9.3
Effort – EFL,SH,W6	535,256	4,980,334	9.3



NOAA
FISHERIES



King Mackerel – Landings 2007

- Large changes in 2007 landings due to FES calibration primarily in Florida private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	818,467	747,112	1,330,683	512,216	-14	114
Landings – EFL,PR	446,968	414,998	820,992	374,024	-9	109

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,PR	414,998	820,992	2.0
Effort – EFL,PR	7,072,923	15,931,859	2.3



NOAA
FISHERIES

King Mackerel – Releases 2005

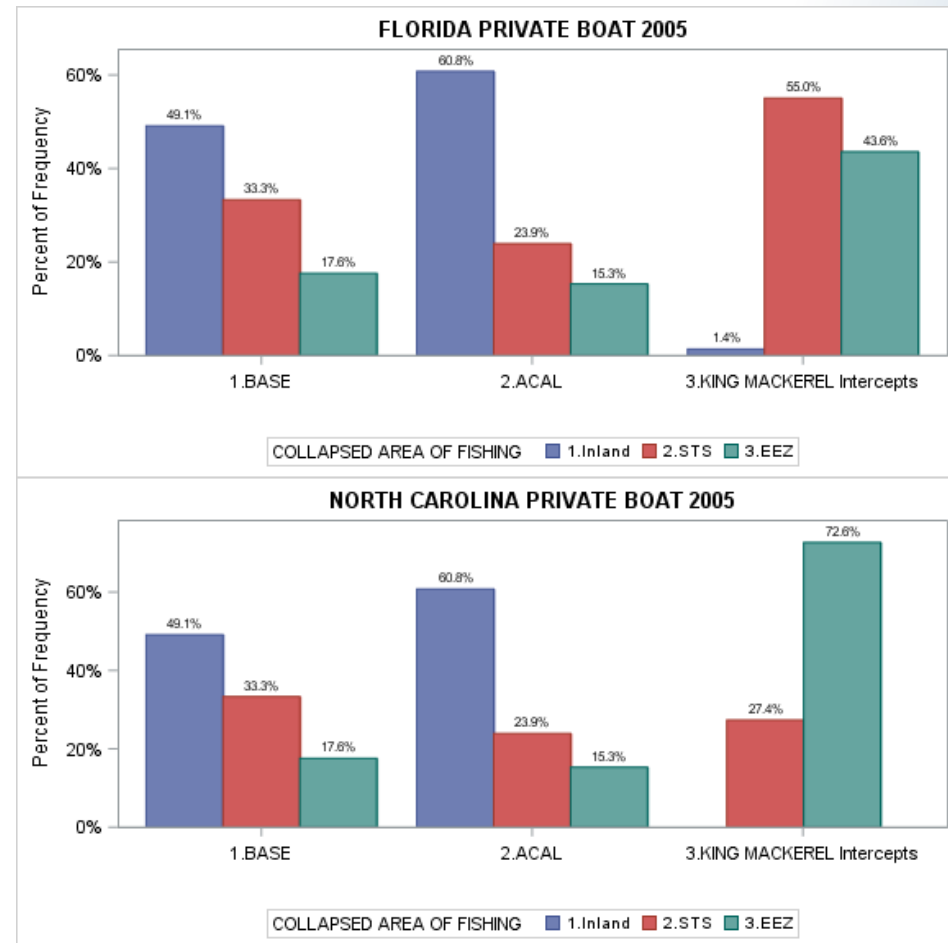
- Overall changes in 2005 releases due to FES calibration primarily in Florida and North Carolina private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	192,982	153,406	303,085	110,103	-36	136
Releases – EFL,PR	104,448	75,156	165,889	61,441	-48	148
Releases – NC,PR	70,355	60,780	99,226	28,871	-33	133

- APAIS calibration reduced overall increases from FES calibration due to adjustments in sample weighting by area fished

King Mackerel – Releases 2005

- APAIS calibration effect due to changes in sample weighting by area fished
- Area fished was included as raking variable
- Changes in area fished distributions observed with APAIS design change
- King mackerel trips in State Territorial Seas downweighted in APAIS calibration



APAIS sample weight and king mackerel intercept percentages by area fished

King Mackerel – Releases 2017

- Large changes in 2017 release due to FES calibration primarily in Florida private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	105,707	105,212	322,568	216,861	-0	100
Releases – EFL,PR	41,516	40,686	151,211	109,695	-1	101
Releases – NC,PR	28,343	29,579	73,112	44,769	3	97

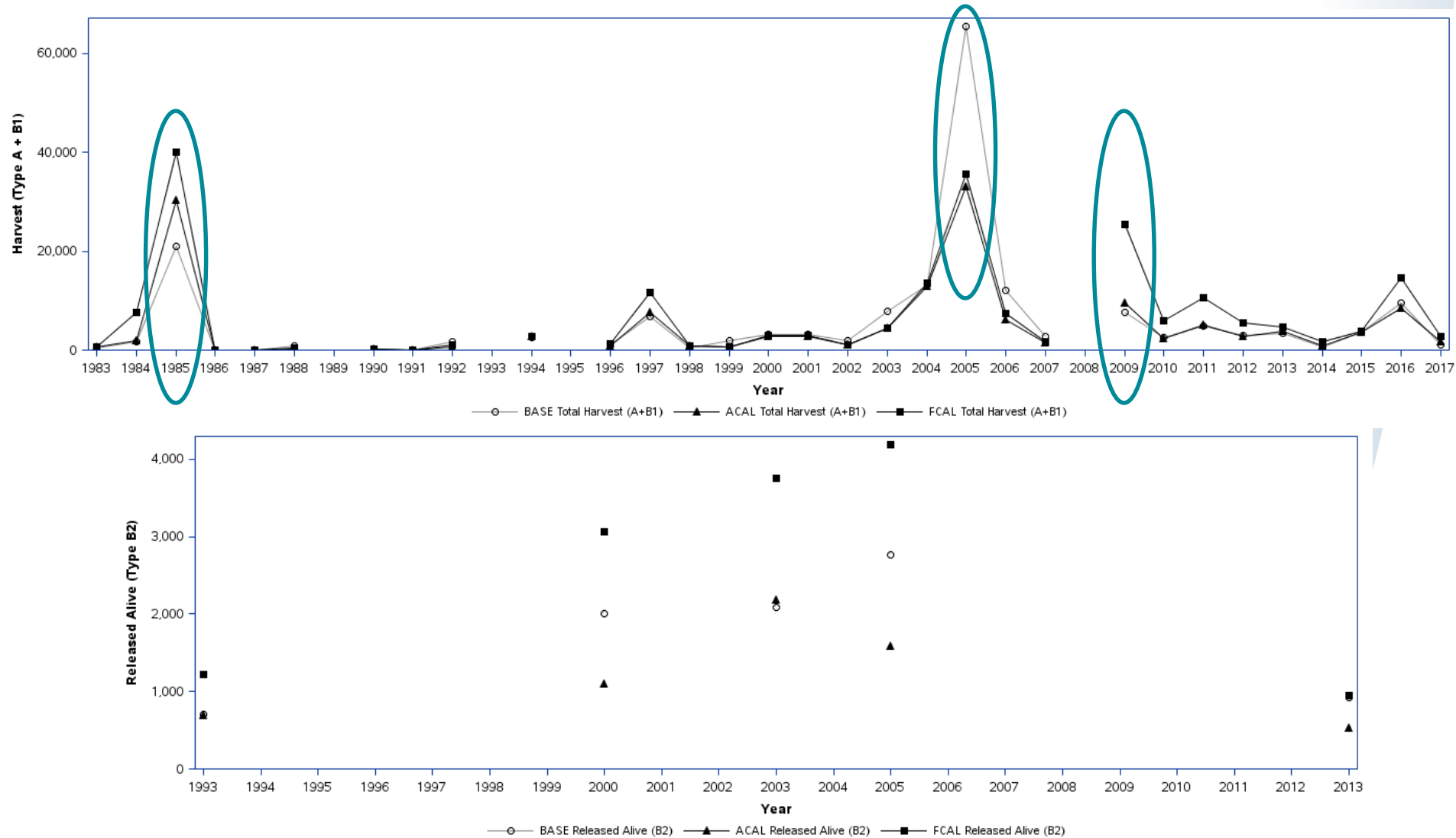
Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – EFL,PR	40,686	151,211	3.7
Effort – EFL,PR,W4+W5	1,050,591	4,800,818	4.6
Releases – NC,PR	29,579	73,112	2.5
Effort – NC,PR	1,790,504	5,044,731	2.8

Golden Tilefish





Golden Tilefish – South Atlantic



Golden Tilefish – Landings 1985

- Large changes in 1985 landings due to effects of both FES and APAIS calibrations in Florida, private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	20,960	30,329	40,127	19,167	49	51
Landings – EFL,PR,W3	20,384	30,104	39,902	19,518	50	50

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,PR,W3	30,104	39,902	1.33
Effort – EFL,PR,W3	954,988	1,265,828	1.33

Golden Tilefish – Landings 1985

- APAIS calibration effect due to changes in sample weighting by site pressure
- The APAIS calibration increased sample weights for intercepts from low activity sites to account for their lower probabilities of selection compared to intercepts from high activity sites
- All tilefish intercepts came from single site (294) which was a low activity site

Estimate	Total BASE	Total ACAL	Change Ratio
Landings – EFL,PR,W3	20,384	30,104	1.5
Site 294 % of Total Sample Weights – EFL,PR,W3	1.84	2.76	1.5



Golden Tilefish – Landings 2005

- Large changes in 2005 landings due primarily to effects of APAIS calibration in North Carolina, charter boat mode

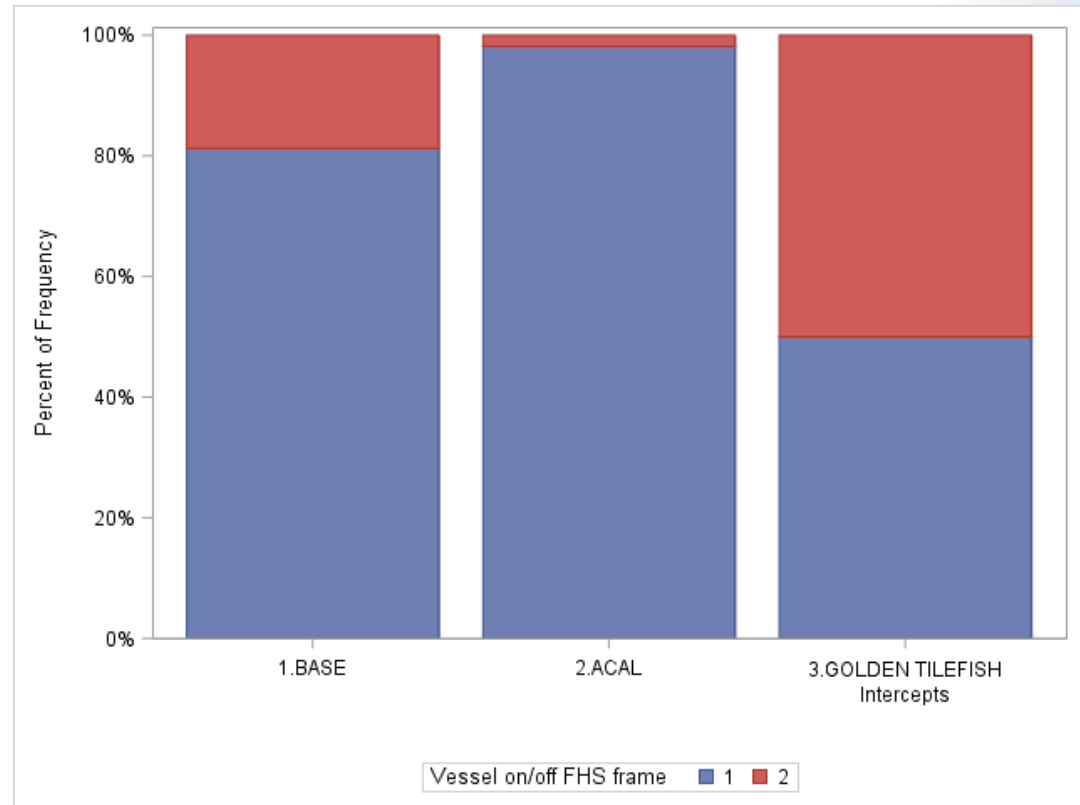
Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	65495	33,116	35,588	-29,907	108	-8
Landings – NC,CH	60,630	28,306	28,306	-32,324	100	0



NOAA
FISHERIES

Golden Tilefish – Landings 2005

- APAIS calibration effect due to changes in sample weighting by FHS frame status
- Sample weights for off-frame vessels (2) were too large prior to calibration
- Close to half of golden tilefish intercepted trips were from off-frame vessels and were downweighted in APAIS calibration



North Carolina Charter Mode 2005

APAIS sample weight and golden tilefish intercept percentages by FHS frame status

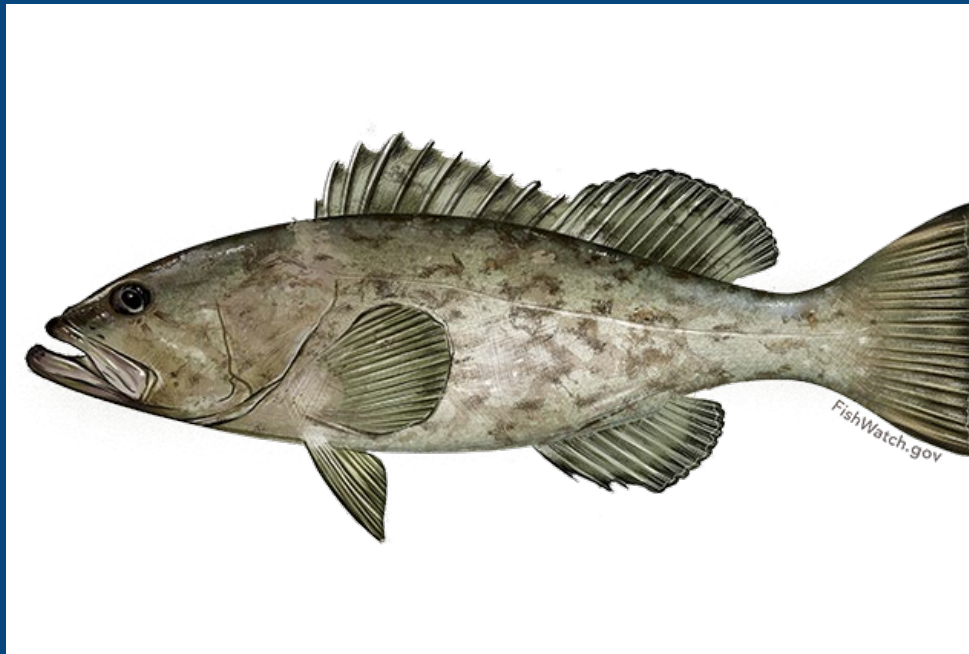
Golden Tilefish – Landings 2009

- Large changes in 2009 landings due to effects of both FES and APAIS calibrations in Florida, private boat mode

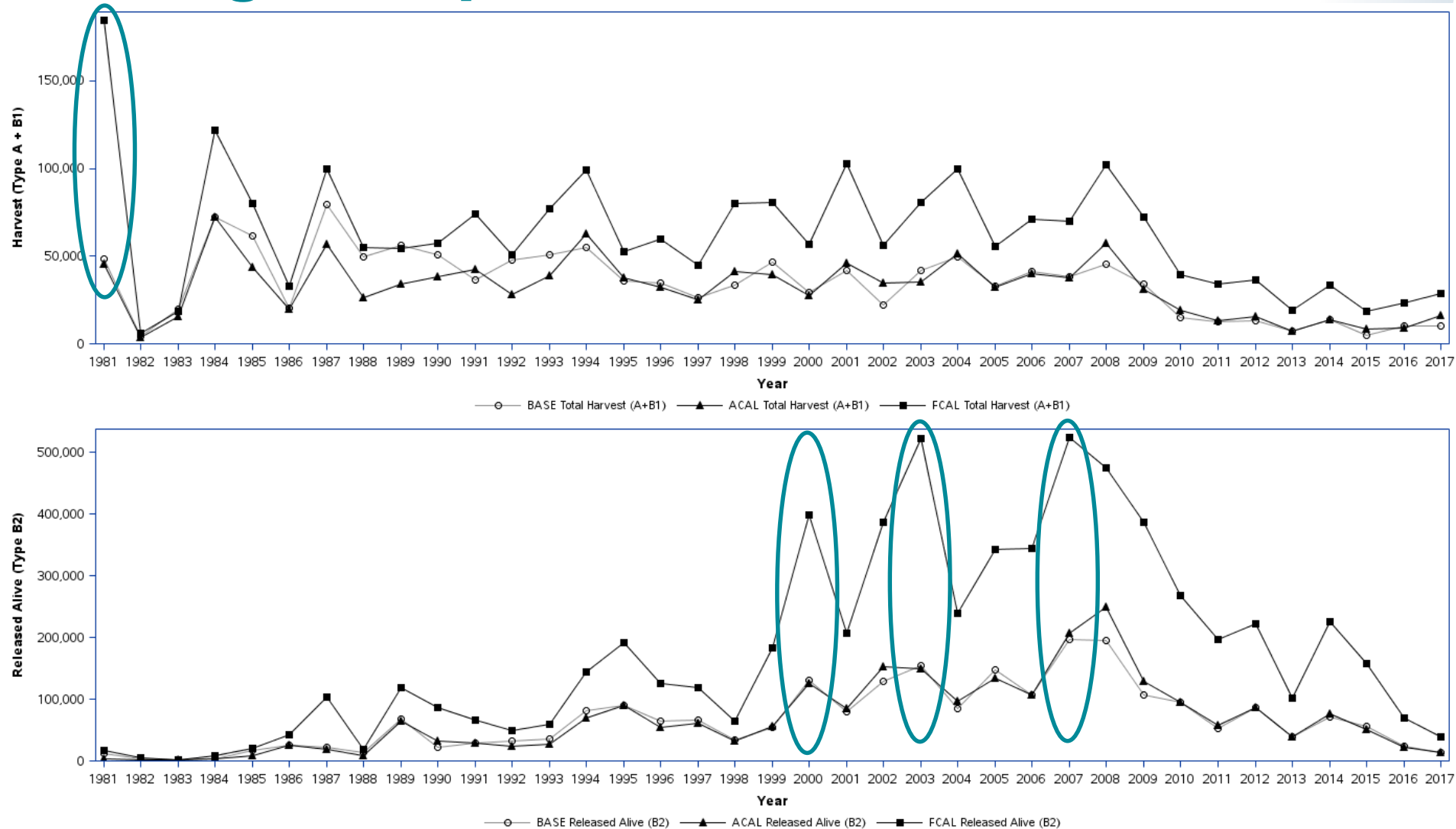
Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	7,741	9,491	25,397	17,656	10	90
Landings – EFL,PR,W6	5,893	7,298	21,881	15,988	9	91

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,PR,W6	7,298	21,881	3
Effort – EFL,PR,W6	1,117,454	3,350,322	3

Gag Grouper



Gag Grouper – South Atlantic





Gag Grouper – Landings 1981

- Large changes in 1981 landings due to FES calibration primarily in Florida private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Landings	48,679	45,483	184,575	135896	-2	102
Landings – EFL,PR,W2	35,294	30,285	134,221	98927	-5	105

Estimate	Total ACAL	Total FCAL	Change Ratio
Landings – EFL,PR,W2	30,285	134,221	4.4
Effort – EFL,PR,W2	444,598	1,970,400	4.4



NOAA
FISHERIES



Gag Grouper – Releases 2000

- Large changes in 2000 releases due to FES calibration primarily in Florida private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	130,681	125,595	398,796	268,115	-1	101
Releases – EFL,PR,W1	69,032	61,255	223,851	154,819	-5	105

Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – EFL,PR,W1	61,255	223,851	3.65
Effort – EFL,PR,W1	633,303	2,314,342	3.65



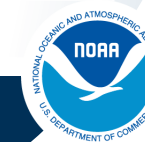
NOAA
FISHERIES

Gag Grouper – Releases 2003

- Large changes in 2003 releases due to FES calibration primarily in Florida private boat and shore modes

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	154,981	148,839	521,792	366,811	-2	102
Releases – EFL,PR	110,855	98,982	235,304	124,449	-10	110
Releases – EFL,SH,W2	9,411	20,595	139,965	130,554	9	91
Releases – EFL,SH,W6	8,193	13,344	102,510	94,317	5	95

Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – EFL,PR	98,982	235,304	2.38
Effort – EFL,PR	6,237,591	14,011,769	2.25
Releases – EFL,SH,W2	20,595	139,965	6.80
Effort – EFL,SH,W2	865,846	5,884,400	6.80
Releases – EFL,SH,W6	13,344	102,510	7.68
Effort – EFL,SH,W6	702,046	5,393,375	7.68



NOAA
FISHERIES

Gag Grouper – Releases 2007

- Large changes in 2007 releases due to FES calibration primarily in Florida private boat mode

Estimate	Total BASE	Total ACAL	Total FCAL	Total Change	% Change APAIS	% Change FES
Releases	197,307	207,232	524,172	326,865	3	97
Releases – EFL,PR	102,739	128,688	327,353	224,614	12	88

Estimate	Total ACAL	Total FCAL	Change Ratio
Releases – EFL,PR	128,688	327,353	2.5
Effort – EFL,PR	7,072,923	15,931,859	2.3

Summary

- FES calibration is primary driver for most changes, including large changes
 - Effort calibrations vary spatially, temporally, and by fishing mode
 - Shore calibrations larger than private boat, can produce large changes for species where shore catch is rare
- APAIS calibration is secondary, but important in specific cases
 - Kind of day: weekday vs weekend differential sample weighting
 - Site pressure: differential sample weighting by activity level
 - Area fished: differential sample weighting across Inland, STS, EEZ areas
 - Time interval: sample weight adjustments to account for overlapping time intervals starting in 2014



NOAA
FISHERIES

Sources of Large Changes and Outliers in MRIP Time Series

SAFMC SSC MRIP Data Workshop

August 2019

Charleston, SC