SEDAR Modifications to the MRIP Data and Comparisons Between the Original, Fully Calibrated, and Revision Assessment MRIP Data

SSC MRIP Revision Assessment Review Webinar

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Dr. Mike Errigo, SAFMC

At their October 2019 meeting, the SSC was presented with four recent assessments revised with the newly calibrated MRIP data to review (Blueline Tilefish, Red Grouper, Vermilion Snapper, and Black Sea Bass). After reviewing the results of these revised assessments, and the changes to the catch streams of these four species due to the MRIP calibration, the SSC decided there was insufficient information to proceed with a viable review at that time. The data used in the Revision assessments was estimated by calculating conversion factors for the original MRIP data and converting it to calibrated MRIP data. This document compares the actual calibrated MRIP to the converted data used in the Revision assessments to evaluate the magnitude of the difference between the two and to allow the SSC to determine if that difference is large enough to have a significant impact on the assessment outcome.

This document also looks at changes to the MRIP data, both by the calibration itself and within the SEDAR process. During the October 2018 meeting, the SSC reviewed calibrated datasets for all the SAFMC managed species, including the four that underwent Revision assessments. The SSC was curious as to why some of the changes in the trends happened in some of the species catch series. Those pertaining to the four species being looked at her were investigated further.

The SSC was also concerned about what decisions were made concerning the MRIP data in the previous assessment and if those decisions would still be valid given the changes due to the calibration. Therefore, any pertinent modifications to the MRIP data series were documented here for discussion.

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1. BLUELINE TILEFISH

In SEDAR 50, the Blueline Tilefish stock was broken into two components, north and south of Cape Hatteras, NC. Due to the inaccessibility of data for this species, the conversion factors were calculated using data from golden Tilefish and Snowy Grouper. Inspection of the catch comparisons for South (Figure 1) and North (Figure 2) of Hatteras shows that although there is a large amount of variability, the magnitude of the differences between the actual calibrated MRIP data and the data used in the Revision are not that big on average. The absolute percent differences may be large in some years, but the magnitude of the differences for most of the years is small.

The reasoning for such a small discrepancy is due to Blueline Tilefish, golden Tilefish, and Snowy Grouper all falling into the category of not changing much after the FES calibration (Figure 3). They are all deep-water species and rarely encountered in MRIP. They also all have no shore component and trips landing these species tend not to come in during peak times of day. All these factors result in the conversion factors for these species all being similar and all being close to one.

SEDAR DECISIONS CONCERNING MRIP DATA

Discard estimates from MRIP charter boat mode in NC for 2007 are significantly higher than all years.

MRIP time series of discard catch of Blueline Tilefish (b2 catch, live releases, access-point-angler-intercept-survey data)

Wave 4, 2007 South Atlantic sub-region:

estimated live releases: 32,284 (pse=93.1%)

estimated landings: 41,936 (pse=45.2%, all type A catch, available, examined)

Issue:

B2, live releases very high within time series (2007)

Details: NC, Charter Boat mode, federal waters = **32,284 (pse=93.1%)**

Source data: 6 charterboat angler interviews, all one boat party, Aug. 10, 2007 – the six anglers (interviews number 7-12) caught and released live (reported data) 6,5,8,6,6,7 Blueline Tilefish, and no other species, and no landed fish. Identification was accepted as Blueline Tilefish following review of the interviewer's work (interviewer id=1069), in aggregate, in August. A subsequent interview (number 7 on Aug. 18) had 'Blueline Tilefish' written on Available Fish section of APAIS form, but the wrong species code recorded. NC reviewing biologist subsequently requested data correction during the raw data review period (fish dump review), and included the following note: 'All T2, T3 & T9 North Carolina Tilefish changed to Blueline

Tilefish with species code 168543. I.E., the sampler knew the tilefish were 'Blueline Tilefish' but used the wrong species code. He has been informed of the error.' All records of tilefish catch recorded by this interviewer in August (all from site 150, Oregon Inlet Center) were recoded to Blueline Tilefish, although only the 6 interviews on Aug. 10 were reported catch and released (b2) fish.

Estimation from these few data records: there were 375 Charterboat angler interviews obtained from trips that fished in federal waters (=cell sample size for catch rate computation); 15 of those interviews recorded Blueline Tilefish catches: the 6 previously described were the only b2 catches; the other 9 interviews only had claimed fishes (available, landed = A type catch), or b2=0. The sample weight for those 6 b2 catch records = 850, which is moderately high, hence the total estimate derived from these few catch records.

Without any information to refute the field biologists' records and local knowledge of tilefish catches during this period in NC, the RWG recommended accepting this estimate of live discards within the time series. Any adjustment or smoothing of the value is at the discretion of the Assessment Panel, per the SEDAR Best Practices.

DW Panel Response: Several members of the DW panel present requested the RWG provide the 'adjustment' to this value, as it was perceived to be inaccurate, and not representative of the fishery in 2007, NC. A discussion followed with the result being further investigation of data re-weighting methods which may ameliorate the single-wave high value.

Using a small-area domain estimation procedure, the interview data for all of 2007 (waves 1-6) from the Charter Boat mode, Federal waters cells were reweighted, a new annual b2 catch rate (live released fish) was calculated, and this was multiplied by the annual effort estimate for CH mode, federal waters, NC in 2007 to produce an alternate ANNUAL value to replace the aggregated value (from waves 1-6, which included the anomalous wave 4 value). The new value was only ~2000 fish lower (30,311) so no real benefit from the re-estimation was realized.

Recommendation:

Following a further attempt to use design-based re-weighting and pooling of data to produce an alternate live-release catch estimate, which resulted in no real benefit to the time series, including an anomalous spike in 2007, the RWG recommends the MRIP data and estimates be submitted to the Assessment without further manipulation.

The DW Panel again rejected this recommendation (failed to reach consensus agreement to accept) and suggested a smoothing function using the average of the values from the respective cells of the previous 3 years be used to substitute a new value for the 2007 NC, CH, EEZ b2 catch estimate. The Panel recommended a sensitivity run using the original MRIP discard estimates. The RWG computed the alternate value using APAIS-adjusted annual catch estimates and produced the APAIS-adjusted substitute value of 1,560 fish, CV=1.00 (original APAIS – adjusted value was 61,494) shown in Figure 4. This substitute value will be inserted into the time series of discards for the South Atlantic region.

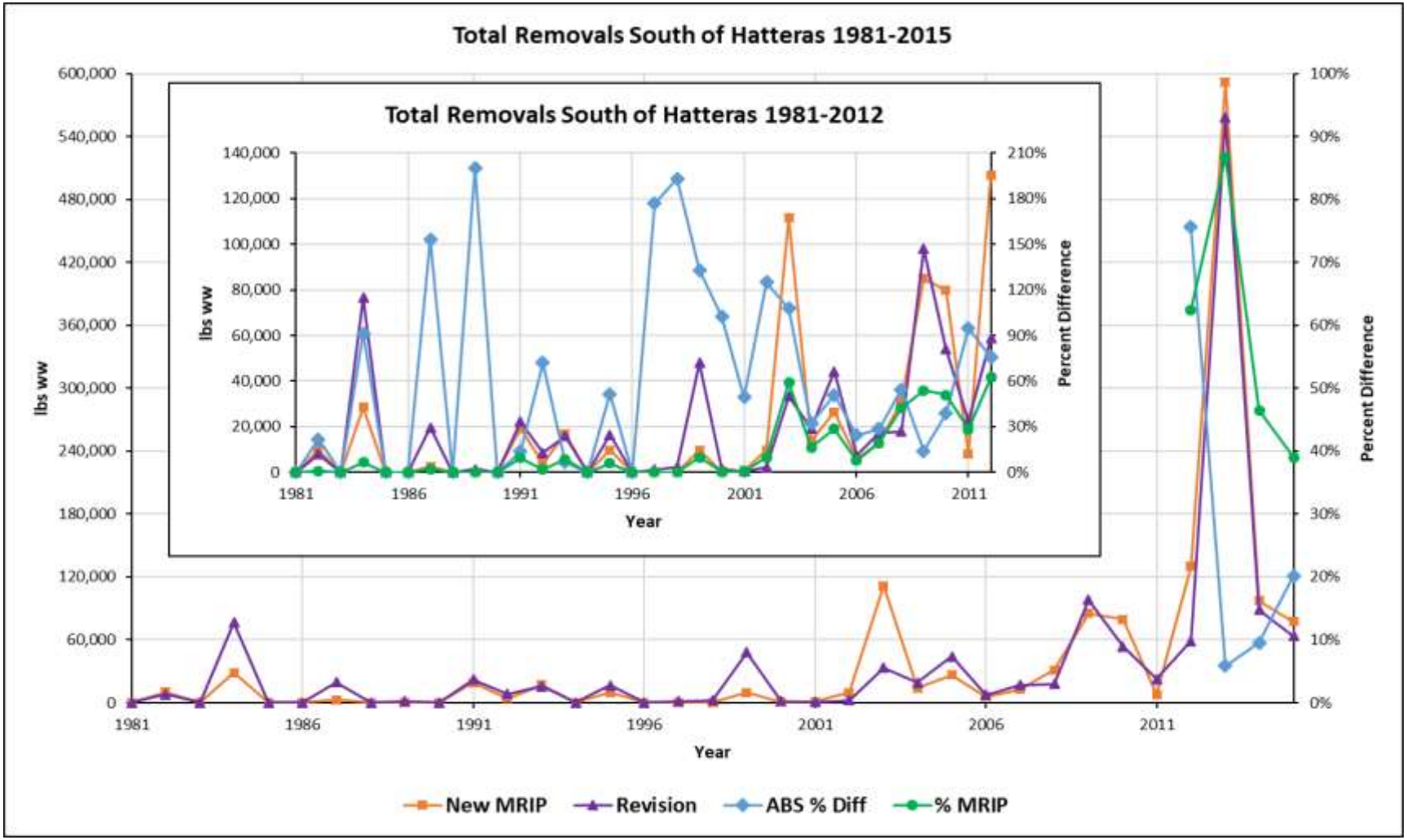

Figure 1. Total MRIP removals of Blueline Tilefish South of Cape Hatteras, NC comparing between the newly calibrated MRIP data (orange) and the data used in the current Revision assessment (purple) in pounds whole weight. The absolute percent difference between the calibrated MRIP estimates and the data used in the Revision (blue) is displayed on the secondary axis, as well as the percentage of the total removals made up by the calibrated MRIP data (green).

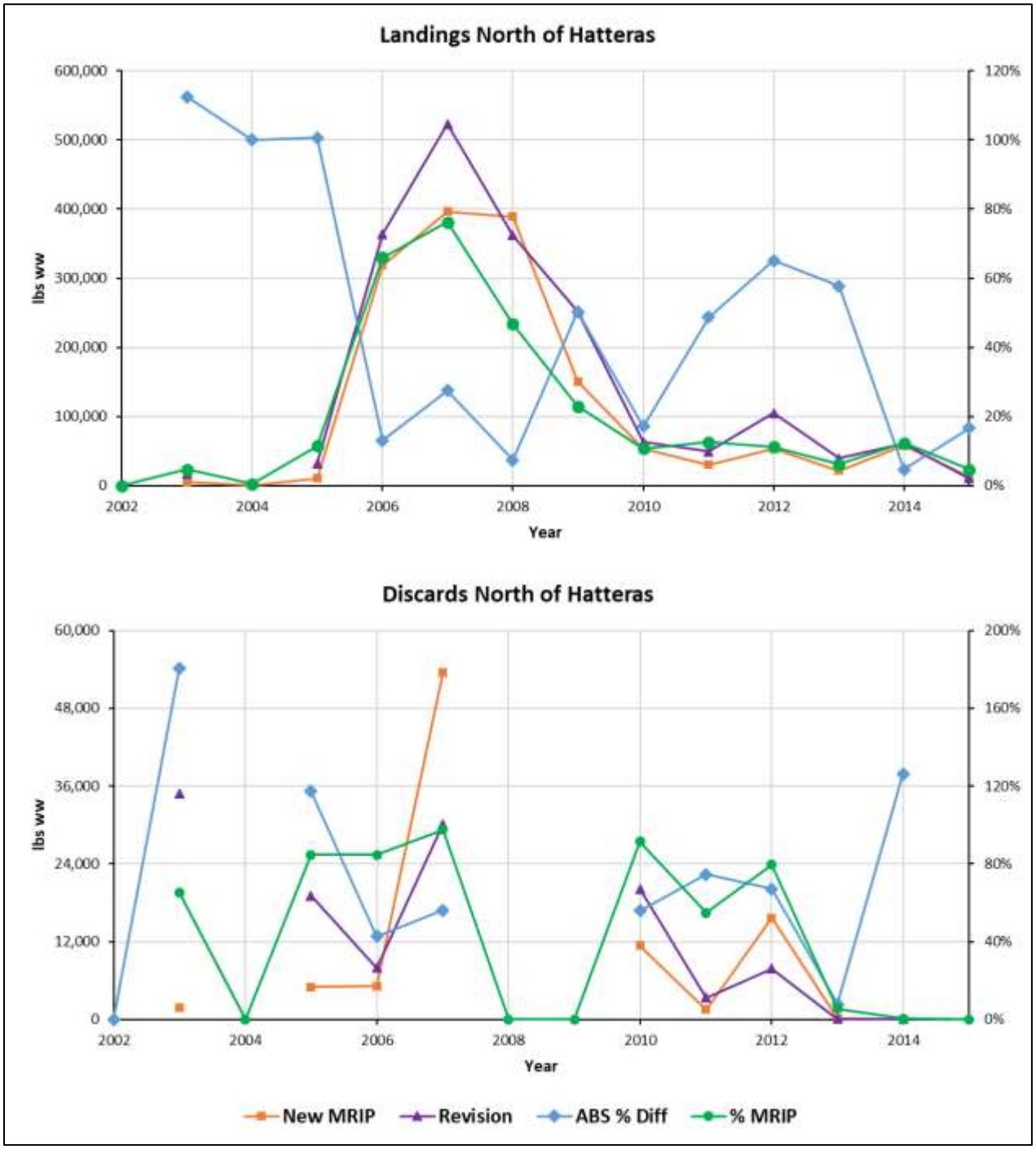

Figure 2. MRIP landings and discards of Blueline Tilefish North of Cape Hatteras, NC comparing between the newly calibrated MRIP data (orange) and the data used in the current Revision assessment (purple) in pounds whole weight. The absolute percent difference between the calibrated MRIP estimates and the data used in the Revision (blue) is displayed on the secondary axis, as well as the percentage of the total landings or discards made up by the calibrated MRIP data (green).

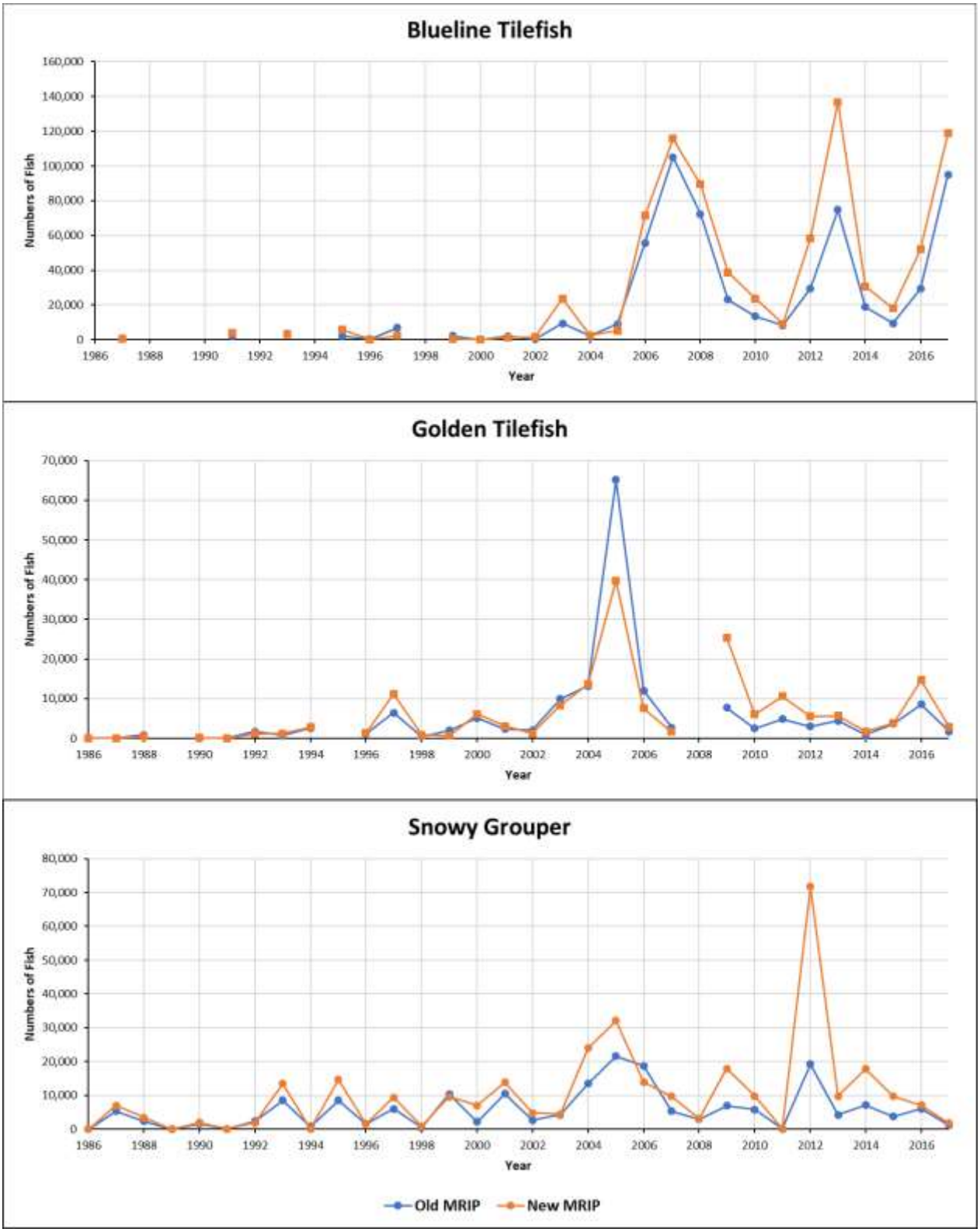

Figure 3. Comparison of total removals from the old MRIP data (blue) and the newly calibrated MRIP data (orange) for Blueline Tilefish and the two species used to estimate the conversion factors in the Revision, golden Tilefish and Snowy Grouper.

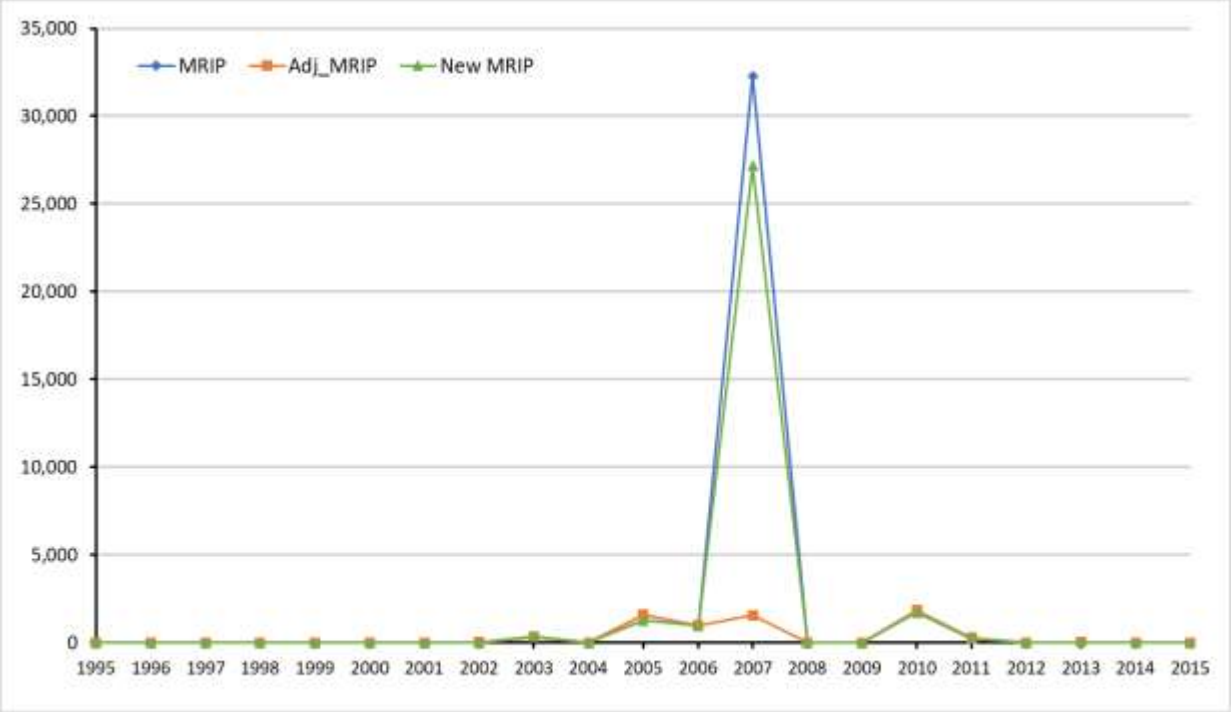

Figure 4. MRIP charter discards from North Carolina shown in blue. The DW panel requested substitution using the average of the values from the respective cells of the previous 3 years are shown in orange. The newly calibrated MRIP data is shown in green to facilitate discussion on whether this decision should be retained in the Revision assessment. (SEDAR 50 Stock Assessment Report, Figure 4.11.6)

2. RED GROUPER

The raw landings (Figure 5) and raw discards (Figure 6) of Red Grouper show that the data going into the Revision mostly under-estimated the catches coming from the newly calibrated MRIP data. One reason for the discrepancy could be that the conversion factors used in the assessment were calculated using data from the South Atlantic Est Coast only (excluding Monroe county). This may be problematic since in many of the years of the time series Monroe county made up the bulk of the catches (Figure 5Figure 6). In fact, whenever there is a significant difference between the calibrated MRIP data and the Revision data, the catches mostly come from Monroe county.

To explore this further, I calculated conversion factors both with and without Monroe county data to examine the magnitude of the differences. Figure 7 shows the conversions factors I calculated, for both landings and discards, with and without Monroe county, as well as the absolute percent difference between the two. In almost every year, with few exceptions, the conversion factors including Monroe county were higher than those without it.

However, the Revision did not use the conversion factors to convert the raw catches to calibrated catches. The next section explains how the MRIP data was smoothed for Red Grouper using a smoothing spline. The conversion factors were applied to the smoothed data.

SEDAR DECISIONS CONCERNING MRIP DATA

During the Assessment Workshop of SEDAR 19, the AW panel decided that due to the biologically implausible swings in the data that they would use a smoothing spline to smooth the landings and discard data provided by MRIP (then MRFSS). See the excerpt from the SEDAR 19 stock assessment report below (Assessment Workshop Report section 2.2.3, pdf page 293).

2.2.3. Smoothing of MRFSS

Large fluctuations that are biologically implausible were observed in the landings and discard data provided by MRFSS. Large spikes were suspected to reflect sampling error, and thus both the landings time series and discard time series were smoothed using a cubic smoothing spline (smooth.spline function in R with smoothing parameter set to 0) weighted by the inverse of the annual CVs (Figure 8).

COMPARISON OF SMOOTHED DATA

Since the conversion factors were applied to the smoothed data, I needed to use the same smoothing technique to smooth the calibrated MRIP data for a true comparison. I used the same smoothing algorithm used in SEDAR 53 to smooth the calibrated MRIP data, however I wasn't sure which variances to use for weighting to get a comparable series for comparison (Figure 9). Therefore, I used both the actual variance estimates for the newly calibrated MRIP data and I calculated variances using the CVs from SEDAR 53 to use for weighting of the smoothing spline. In either case there are some significant differences between these smoothed datasets and the one used in the Revision in certain years (Figure 9).

The large spike in discards seen in the Revision data in 1984 was of concern, so I investigated that further (Figure 9). It is caused by the calculation of the conversion factor using data that excluded Monroe county. After the FES calibration, the estimate from the South Atlantic for that year went form 3,852 fish to 27,244 fish, causing the conversion factor to be 7.07. However, the smoothed value from SEDAR 53 was 179,715 fish, the difference of which all came from Monroe county. If Monroe county data had been included when calculating the conversion factor, it would have been around 3.19, significantly smaller.

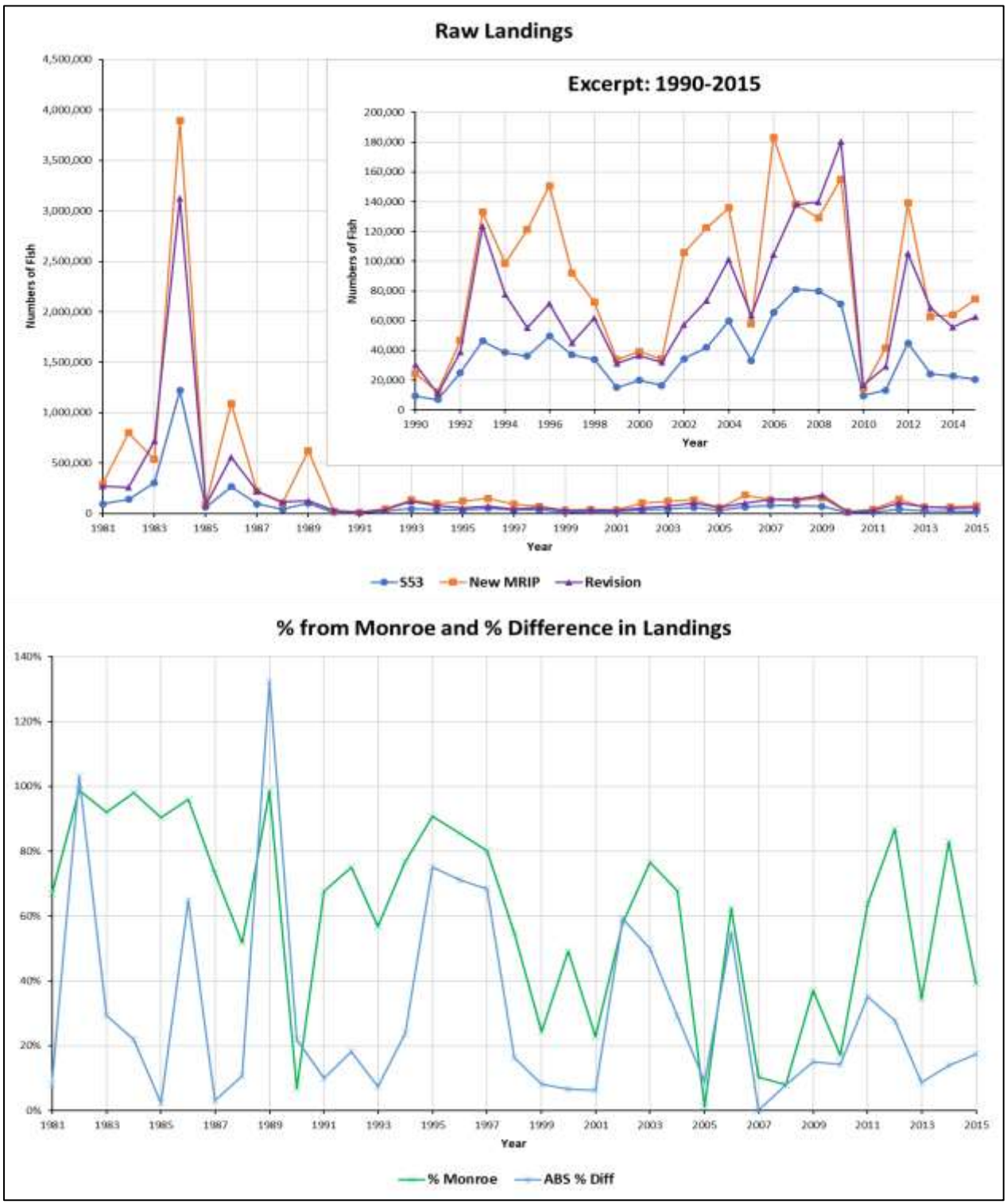

Figure 5. Upper graph: Raw MRIP landings (not smoothed) comparing between the SEDAR 53 data (blue), the newly calibrated MRIP data (orange), and the data used in the current Revision assessment (purple) in numbers of fish. The excerpt is a blow-up of the years 1990 – 2015, which are barely visible in the larger graph due to the magnitude of the early years' landings. Lower graph: Shows the percent of the landings from Monroe county (green) and the absolute percent difference in landings between the calibrated MRIP data and the data used in the Revision (blue).

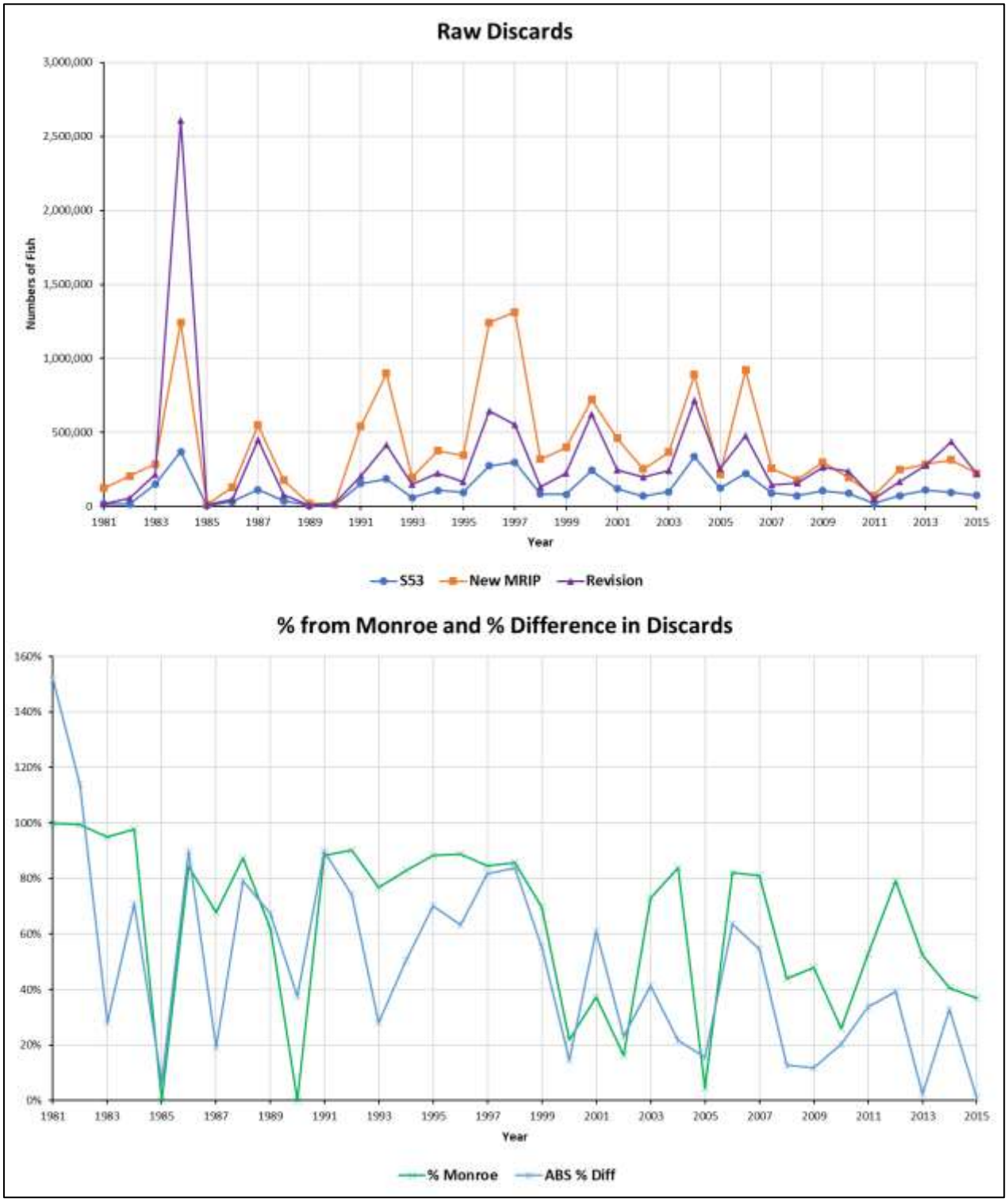

Figure 6. Upper graph: Raw MRIP discards (not smoothed) comparing between the SEDAR 53 data (blue), the newly calibrated MRIP data (orange), and the data used in the current Revision assessment (purple) in numbers of fish. Lower graph: Shows the percent of the discards from Monroe county (green) and the absolute percent difference in discards between the calibrated MRIP data and the data used in the Revision (blue).

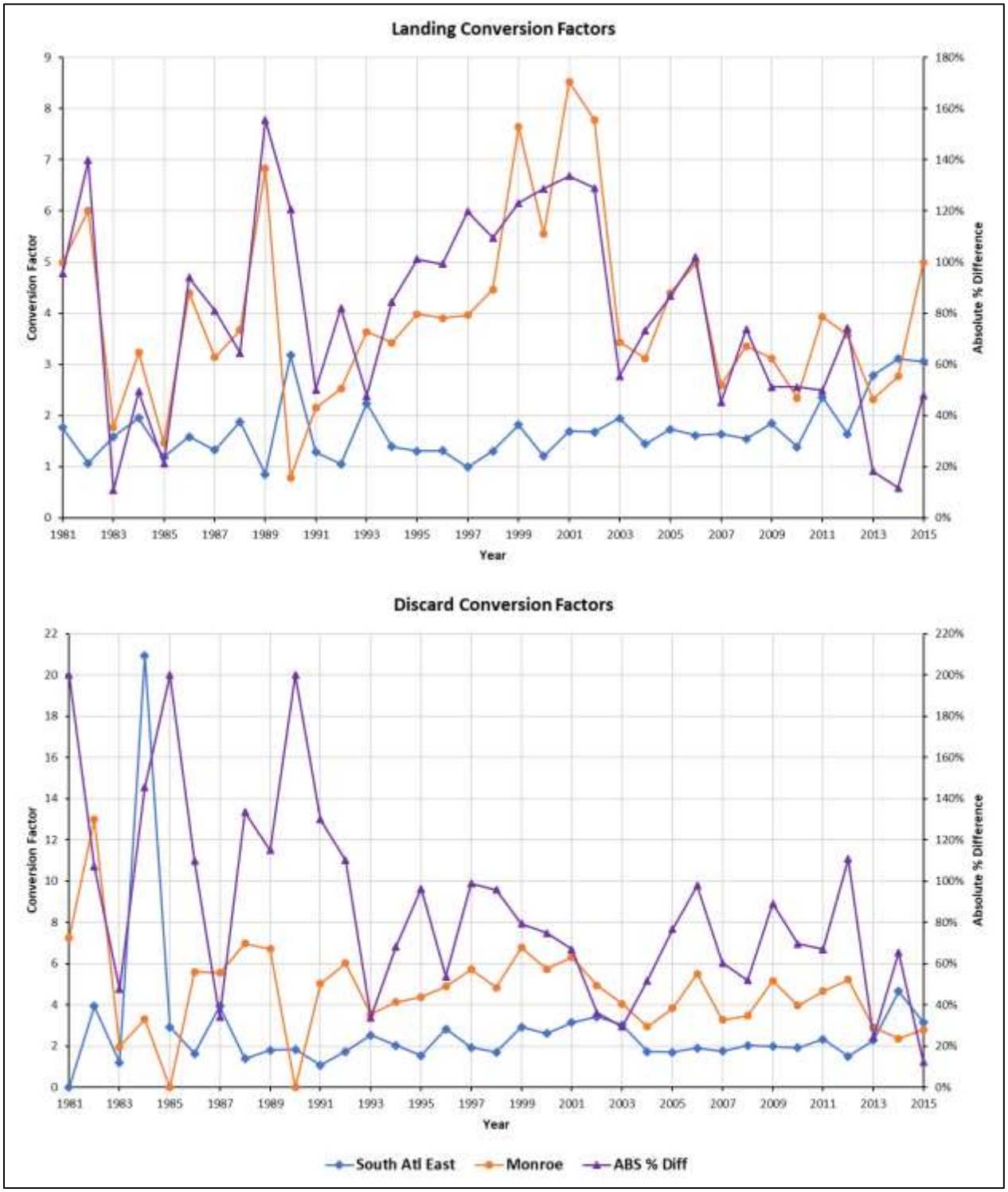

Figure 7. Calculated conversion factors from the old MRIP data to the FES calibrated MRIP data using just catches from the South Atlantic excluding Monroe county (blue), including Monroe county (orange), and the absolute percent difference between the two (purple).

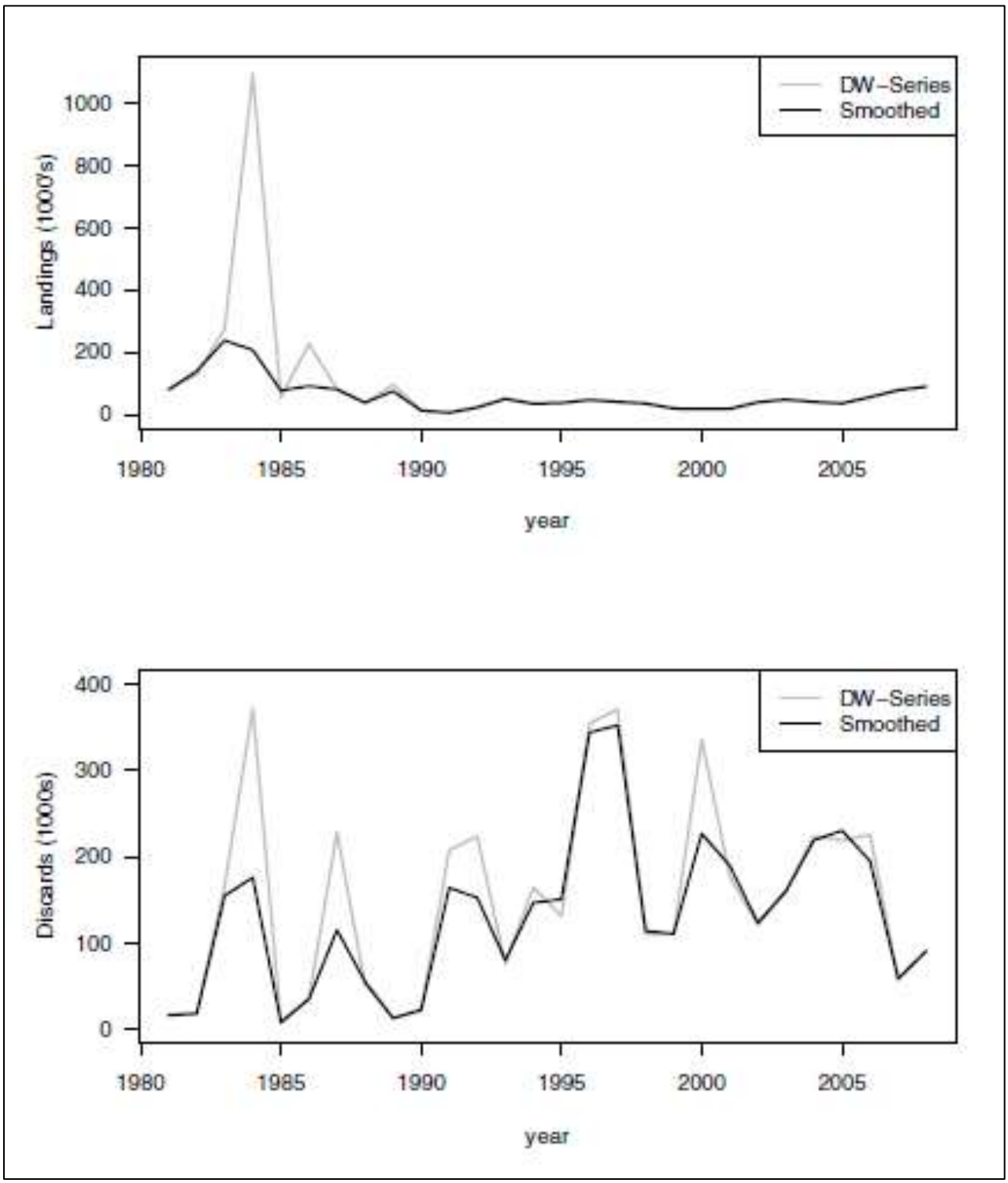

Figure 8. Red Grouper in the Atlantic: Smoothing of MRFSS Landings and Discards. (SEDAR 19 Stock Assessment Report, Figure 2)

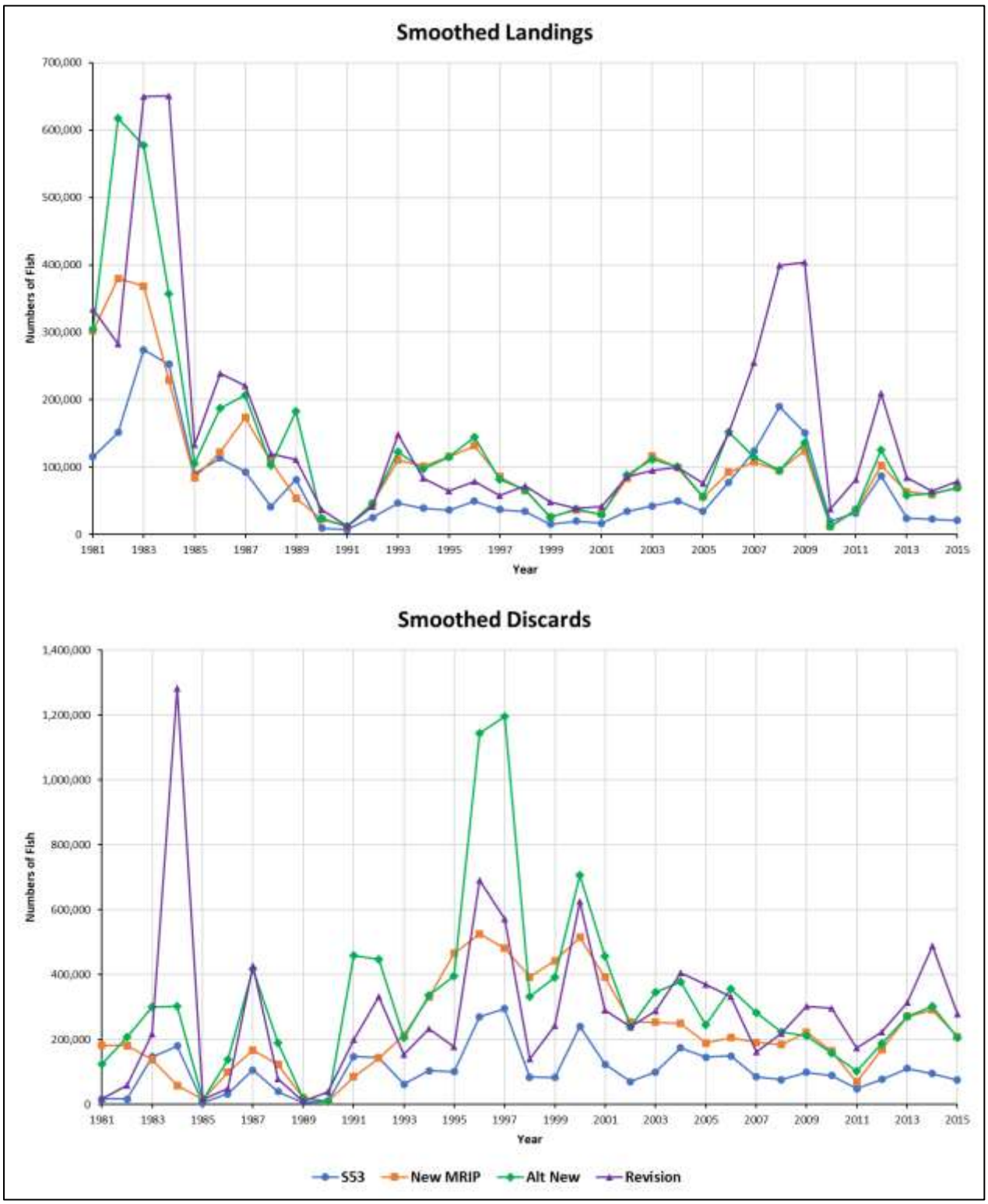

Figure 9. MRIP catches of Red Grouper smoothed using a smoothing spline in R, as was done in SEDAR 53. There are two calibrated MRIP data series that were smoothed using this technique: one using the variances of the newly calibrated MRIP data for weighting (orange) and the other using the CVs from SEDAR 53 to calculate the variances used for weighting (green). The converted smoothed data used in the Revision (purple) and the original smoothed data from SEDAR 53 (blue) are included for comparison.

3. VERMILION SNAPPER

The landings from the Revision show a bit of an over-estimate in the early years of the time series compared with the actual calibrated MRIP data, but then switch to being significantly under-estimating the calibrated MRIP data during the 2000's (Figure 10). The two datasets come back together until the terminal year, where the calibrated MRIP data is again much higher than the data from the Revision.

The discards are a follow a simpler pattern. The data from the Revision significantly over-estimates the true calibrated MRIP data until 2013, where the two datasets come together (Figure 10). However, they again diverge in 2016, this time with the calibrated MRIP data exceeding the data used in the Revision.

SEDAR DECISIONS CONCERNING MRIP DATA

The only decisions that were made regarding the MRIP data were made during SEDAR 17 and carried through to SEDAR 55. There were several years of very low or zero discards that were replaced by the average of the surrounding years. See the excerpt from the Assessment Workshop report from SEDAR 17 below.

2.3.3 Recreational Discards

… In a few years of MRFSS discards (1981, 1983, 1985-1987), discards were zero or near zero, and in those cases were replaced with the average of the two surrounding years. …

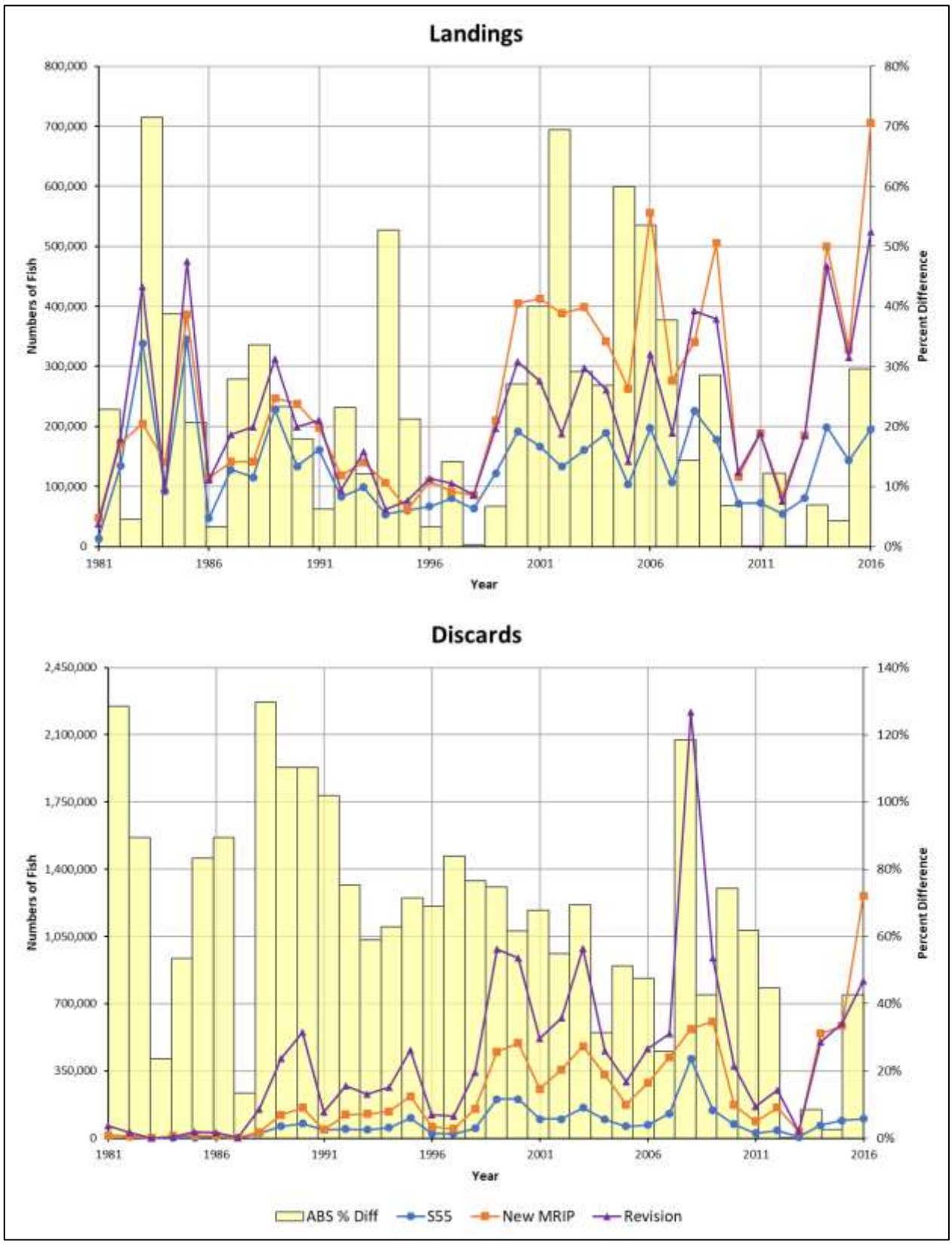

Figure 10. Vermilion Snapper MRIP landings and discards comparing between the SEDAR 55 data (blue), the newly calibrated MRIP data (orange), and the data used in the current Revision assessment (purple) in numbers of fish. The absolute percent difference between the calibrated MRIP estimates and the data used in the Revision (Yellow bars) is also displayed for context.

4. BLACK SEA BASS

In the Black Sea Bass Revision assessment, the revisions landings and discards are both an over-estimate of the actual calibrated MRIP data. The over-estimation is most severe in the early part of the time series for the landings, with some estimates over 4 times higher than the actual calibrated data series (Figure 11). The discards show a more severe over-estimation from 2004 through 2012, after the wireless effect comes into play. The discard estimates then become very closely matched from 2013 to the end of the time series, which is when the Black Sea Bass ACL was increased after the SEDAR 25 update and the recreational size limit was increased from 12 to 13 inches (Figure 11).

There were no decisions made during the SEDAR process to change any of the MRIP data for Black Sea Bass.

TREND IN DISCARDS

The SSC was interested in taking a closer look at the change in the trend of the discards from the original to the calibrated MRIP data. The significant increase in the trend in the second half of the time series was the cause of some concern. Therefore, I investigated what may have caused this change in trend. I first looked at the proportion of the discards coming from the charter mode vs. private and shore modes over time (Figure 12). This is not the cause of the change in trend because the trend in the percent of discards due to the Charter Mode is going in the opposite direction of what would be expected if it was causing the change. If the proportion of the discards due to Charter vs. those due to Private/Shore were responsible for the change in trend seen in the discards between the original and calibrated MRIP datasets, we would expect to see the proportion of discards due to Charter decreasing and the proportion due to Private/Shore increasing.

I also looked at the trend in discards by state to see if I could discern a pattern (Figure 13). Here is where I started to notice why the trend looks like it does. In all states, discards are higher in the later part of the time series and they show an increasing trend. However, NC and SC show very steep increasing trends in the newly calibrated data that start at almost the level of the original MRIP data. Whereas the trend in GA and FL is less steep, but the entire newly calibrated time series is shifted up from the original MRIP data. The slopes of the trend lines for the latter parts of the newly calibrated time series are an order of magnitude higher than they are in GA and FL (See formulas in Figure 13). What we are seeing here are two different phenomena happening at the same time in this dataset. In all four states, we are seeing the wireless effect, which is adding to the increasing trend in the discards (also seen in the original MRIP data, Figure 13). This effect is especially prevalent in the Carolinas, where the increasing trend in discards is significantly steeper than elsewhere.

The other phenomenon we are seeing is the 8-fold increase in the Shore Mode catches. This is seen to some extent in GA, but mostly in FL (Figure 13). FL has much more discards of Black Sea Bass from Shore than the other states do. This is causing a baseline shift from the original to the newly calibrated MRIP data. So we have the original increasing trend in discards caused by ACL closures, minimum sizes, and the deterioration of the health of the stock and the abundance of larger individuals, the wireless effect, and the Shore Mode effect all coming together to produce the trend in the newly calibrated MRIP data seen in Figure 11.

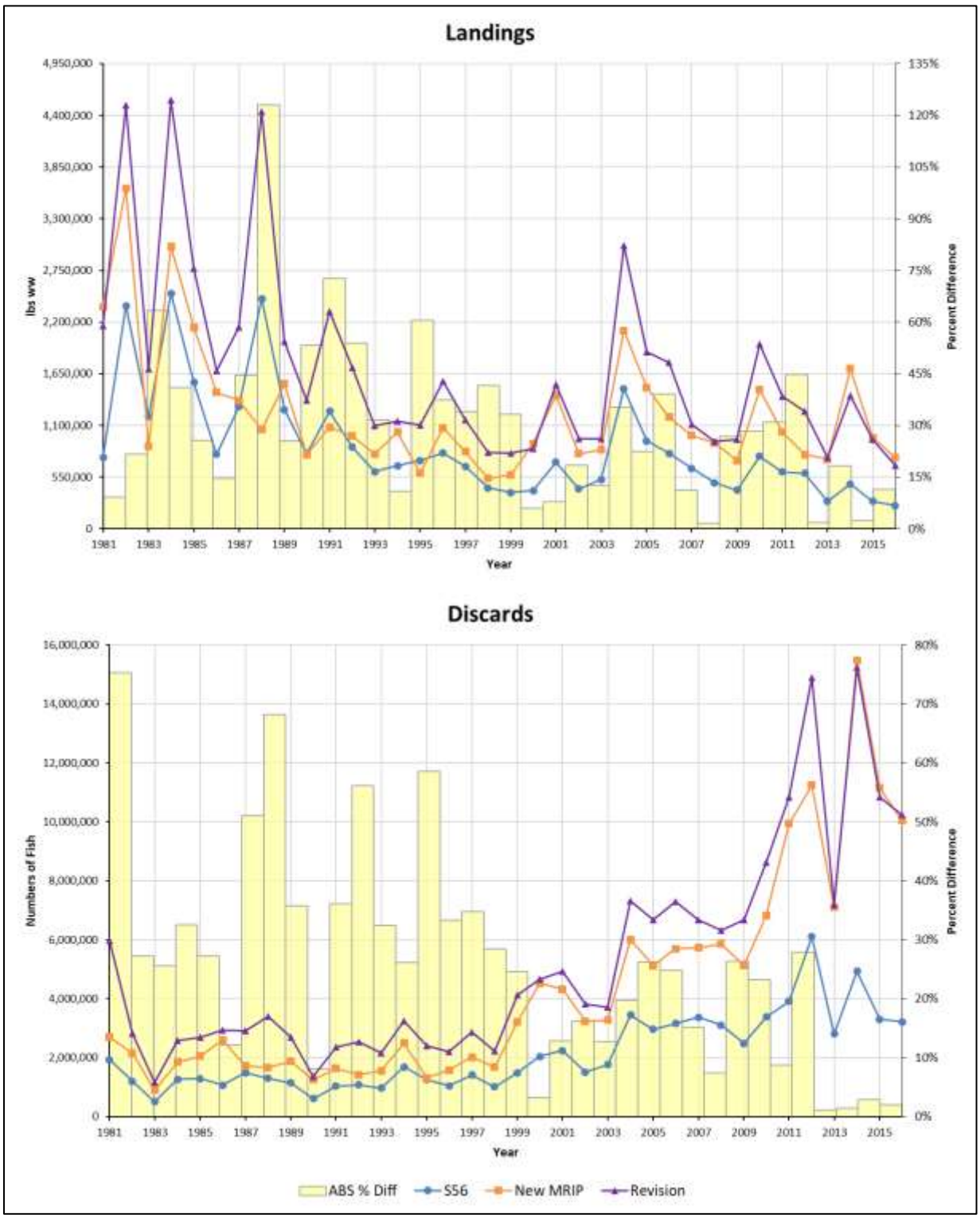

Figure 11. Black Sea Bass MRIP landings and discards comparing between the SEDAR 56 data (blue), the newly calibrated MRIP data (orange), and the data used in the current Revision assessment (purple). Landings are in pounds whole weight, discards are in numbers of fish. The absolute percent difference between the calibrated MRIP estimates and the data used in the Revision (Yellow bars) is also displayed for context.

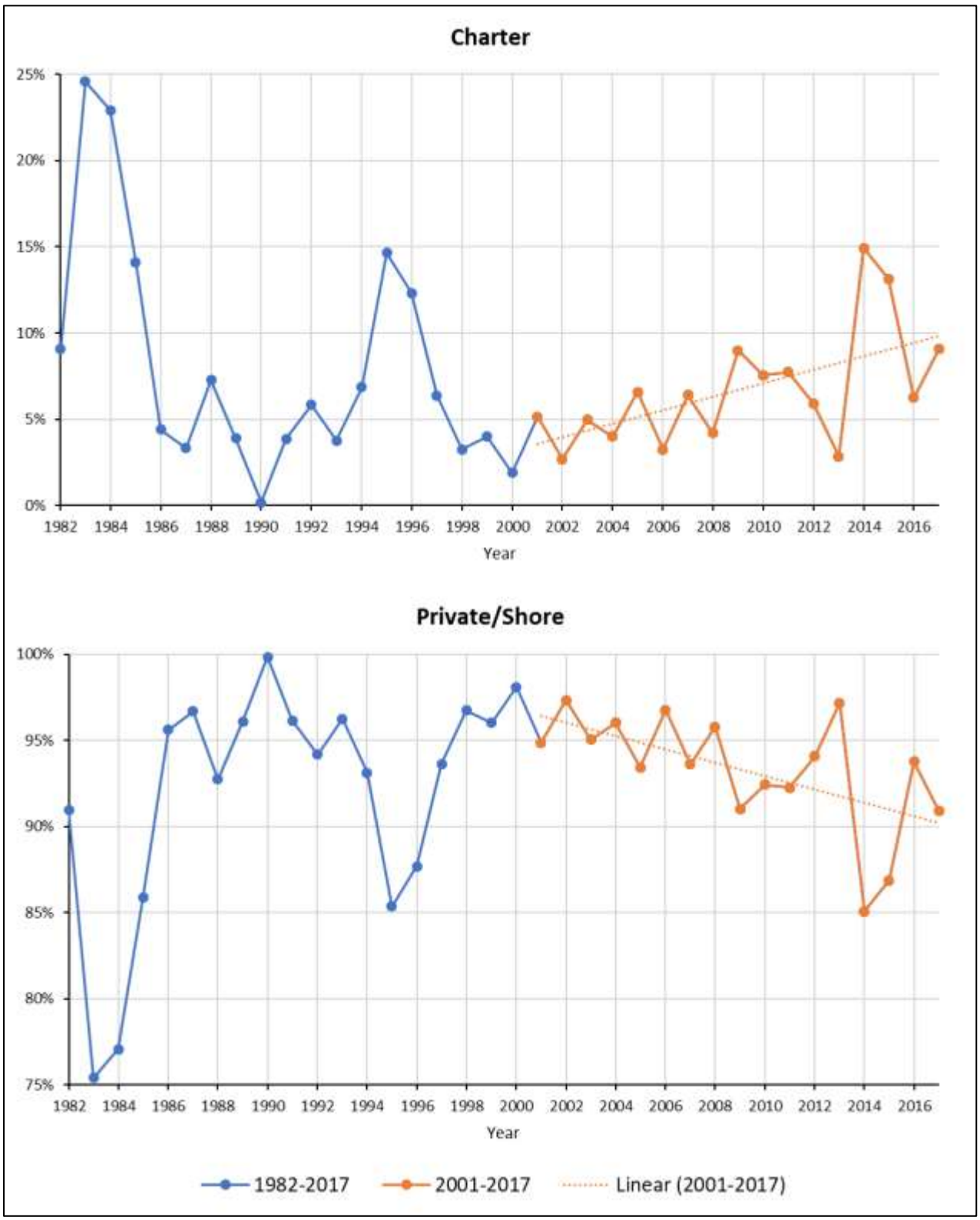

Figure 12. Percent of Black Sea Bass discards due to Charter Mode (upper graph) and Private/Shore Modes (lower graph) in the original MRIP data from 1982 to 2017. 2001 to 2017 (orange) is the time period when the trend in the discards changes in the newly calibrated MRIP data.

Figure 13. Discards of Black Sea Bass from the original and newly calibrated MRIP data by state, broken where the trend in the new data changes and including trend lines. The colored boxes include the trendline formulas for the line of that corresponding color.