MRFSS to MRIP Adjustment Ratios and Weight Estimation Procedures for South Atlantic and Gulf of Mexico Managed Species

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*There is a corresponding spreadsheet that accompanies this reference document.

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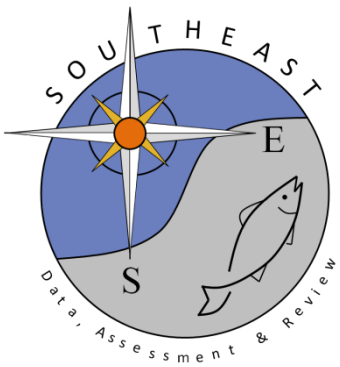
*There is a corresponding spreadsheet that accompanies this working paper titled, "SEDAR32_DW02_Matter&Rios_mrip_adj_ratios".



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MRFSS to MRIP Adjustment Ratios and Weight Estimation Procedures for South Atlantic and Gulf of Mexico Managed Species

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Introduction

The Marine Recreational Information Program (MRIP) was implemented to provide more detailed, timely, and reliable estimates of marine recreational fishing catch and effort. MRIP's independently peer reviewed methodology replaced the Marine Recreational Fisheries Statistics Survey (MRFSS) program that had operated since 1981 (Visit http://www.st.nmfs.noaa.gov/st1/recreational/ for more information on MRIP and MRFSS). Official MRIP estimates are available from 2004 to 2011 and represent the best available data for use in stock assessments. To expand the MRIP time series to include years prior to 2004, we re-estimated catch and adjusted variance for years with MRFSS data (Rios 2012). In addition, we developed a standardized approach for obtaining weight estimates throughout the recreational time series.

MRFSS to MRIP Adjustment

Adjustment ratios were first calculated for Gulf of Mexico red snapper estimates in SEDAR 31. The methods and procedures in SEDAR31-DW25 (Rios et al 2012) were used to develop adjustment ratios for all South Atlantic and Gulf of Mexico managed species. Additional considerations and procedures are described here

Methods

Hierarchy rules
We attempted to calculate ratio estimators that were species, region, and mode specific. When ratio estimators and variances of ratio estimators were not available from the species-region-mode specific data, we calculated them from species-region specific data, and when necessary from only species-specific data.

The MRFSS-MRIP adjustment requires values for the following 6 variables:
1) the ratio estimator of the ab1 estimate (re_ab1)
2) the ratio estimator of the b2 estimate (re_b2)
3) the ratio estimator of the variance of the ab1 estimate (re_varab1)
4) the ratio estimator of the variance of the b2 estimate (re_varb2)
5) the variance of re_ab1 (varR_ab1)
6) the variance of re_b2 (varR_b2)

A matrix of possible variable outcomes, where 1 indicates that a value is obtained and 0 indicates that a value is missing, is shown in Table 1. The matrix focuses on scenarios where we are missing ratio estimates in numbers or variances of those ratios (variables 1, 2, 5, and 6). The outcomes of variables 3 and 4 (ratios of variance) are not included since they mirror those of variables 1 and 2 (ratios of numbers), respectively. To substitute or re-estimate missing ratio estimates in numbers or missing variances of the ratios, we followed the steps outlined in Table 1.

Charterboat/Headboat mode
Before applying mode-specific ratio estimators to data from the Gulf of Mexico and South Atlantic regions, we separated the 1981-1985 MRFSS combined charterboat/headboat mode following the methods described in SEDAR31-DW-25. In the Mid-Atlantic and North Atlantic regions the charterboat and headboat modes were combined in the MRFSS survey from 1981 to 2003. In 2004, MRFSS began calculating estimates for these modes separately. In these regions we combined the charter and headboat modes from MRFSS and MRIP between 2004 and 2011 and then calculated ratio estimators for the combined charterboat/headboat mode.

Rounding
In contrast to the methods used by Rios et al. (2012), which included rounding the ratio estimators to three decimal places and the variances of ratio estimators to six decimal places, we did not round ratio estimators or their associated variances.

Results

When an ab1 or b2 ratio was based on only a single year of non-zero data, the ratio did not have an associated variance. When possible, we substituted the missing variance with that of a corresponding b2 or ab1 ratio estimator. However, when variances were missing for both, the estimates could not be fully adjusted and the associated variances were flagged. The AB1 estimates with flagged variances accounted for 0.01% of the landings in 1981-2003. The B2 estimates with flagged variances accounted for 0.0001% of the discards in 1981-2003.

Ratio estimators could not be calculated for all species. The following South Atlantic and Gulf of Mexico managed species do not have a ratio estimator for the AB1 landings: blackline tilefish, Nassau grouper, and smallmouth grunt. These species' landings (1981-2003) make up 0.06% of the total landings from South Atlantic and Gulf of Mexico managed species between 1981 and 2003. The following South Atlantic and Gulf of Mexico managed species do not have a ratio estimator for the B2 discards: black snapper, cottonwick, dwarf sand perch, misty grouper,

temperate bass genus, tiger grouper, and saucereye porgy. These species' discards (1981-2003) make up 0.03% of the total discards from South Atlantic and Gulf of Mexico managed species between 1981 and 2003.

Ratio estimators of the landings, ratio estimators of the variances, and variances associated with the ratio estimators of the landings for all South Atlantic and Gulf of Mexico managed species are available in the accompanying spreadsheet (mrip_adj_ratios.xlsx).

Weight Estimation Procedure

The MRFSS and the MRIP surveys use different methodologies to estimate landings in weight. To apply a consistent methodology over the entire recreational time series, the Southeast Fisheries Science Center (SEFSC) implemented a method for calculating average weights for the MRIP (and MRIP adjusted) landings. The SEFSC has used this method in the past for substituting missing weight estimates in the MRFSS data (i.e. when sample data in a given strata include an estimate of landings in number but not in weight due to missing weight samples).

The SEFSC method obtains average weights by aggregating MRFSS/MRIP data according to the following hierarchy: species, region, year, state, mode, wave, and area (SEDAR22-DW16). The minimum number of weights required at each hierarchy level is 30 fish, except at the final species level, where the minimum is 1 fish. When sample data include lengths without associated weights, weights are estimated from length-weight equations. Average weights are multiplied by the landings estimates in number to obtain estimates of landings in weight. These estimates are provided in pounds, whole weight.

The Office of Science and Technology, the Northeast Fisheries Science Center, and the Southeast Fisheries Science Center expect to work together in the future to establish a standard method to use in stock assessments, management, and in the MRIP survey.

References

Rios, A., V. Matter, J. Walter, N. Farmer, and S. Turner. 2012. SEDAR31-DW25. Estimated Conversion Factors for Adjusting MRFSS Gulf of Mexico Red Snapper Catch Estimates and Variances in 1981-2003 to MRIP Estimates and Variances. National Marine Fisheries Service, Southeast Fisheries Science Center, Sustainable Fisheries Division, Fisheries Statistics Division, Miami, FL

Matter, V. and S. Turner. 2010. SEDAR22-DW16. Estimated Recreational Catch in Weight: Method for Filling in Missing Weight Estimates from the Recreational Surveys with Application to Yellowedge Grouper, Tilefish (golden), and Blueline Tilefish. National Marine Fisheries Service, Southeast Fisheries Science Center, Sustainable Fisheries Division.

Table 1. Matrix of outcomes for the variables used in the MRFSS-MRIP adjustment (re_ab1: the ratio estimator of the ab1 estimate; re_b2: the ratio estimator of the b2 estimate; varR_ab1: the variance of re_ab1; varR_b2: the variance of re_b2). 1 indicates that a value is obtained and 0 indicates that a value is missing. Highlighted cells represent ratio estimators that could not be calculated.

Hierarchy level	re_ab1	re_b2	varR_ab1	varR_b2	next steps
species, region, mode	1	1	1	1	
	1	1	1	0	borrow varR_b2 from varR_ab1
	1	1	0	1	borrow varR_ab1 from varR_b2
	1	0	1	0	move b2 up hierarchy (all modes collapsed)
	0	1	0	1	move ab1 up hierarchy (all modes collapsed)
	1	1	0	0	no variances associated with ratio estimators- move up hierarchy (all modes collapsed)
	1	0	0	0	no variances associated with ratio estimators- move up hierarchy (all modes collapsed)
	0	1	0	0	no variances associated with ratio estimators- move up hierarchy (all modes collapsed)
	0	0	0	0	move up hierarchy (all modes collapsed)
species, region	1	1	1	1	
	1	1	1	0	borrow varR_b2 from varR_ab1
	1	1	0	1	borrow varR_ab1 from varR_b2
	1	0	1	0	move b2 up hierarchy (all modes and regions collapsed)
	0	1	0	1	move ab1 up hierarchy (all modes and regions collapsed)
	1	1	0	0	no variances associated with ratio estimators- move up hierarchy (all modes and regions collapsed)
	1	0	0	0	no variances associated with ratio estimators- move up hierarchy (all modes and regions collapsed)
	0	1	0	0	no variances associated with ratio estimators- move up hierarchy (all modes and regions collapsed)
	0	0	0	0	move up hierarchy (all modes and regions collapsed)
species	1	1	1	1	
	1	1	1	0	borrow varR_b2 from varR_ab1
	1	1	0	1	borrow varR_ab1 from varR_b2
	1	0	1	0	flag b2
	0	1	0	1	flag ab1
	1	1	0	0	no variances associated with ratio estimators- use ab1 and b2 ratio estimators; variance will not be adjusted fully (e.g. adjust variance using re_varab1 but not with varR_ab1); flag resulting variances
	1	0	0	0	flag b2; no variances associated with ratio estimators- use ab1 ratio estimator; variance will not be adjusted fully (e.g. adjust variance using re_varab1 but not with varR_ab1); flag resulting variance
	0	1	0	0	flag ab1; no variances associated with ratio estimators- use b2 ratio estimator; variance will not be adjusted fully (e.g. adjust variance using re_varb2 but not with varR_b2); flag resulting variance
	0	0	0	0	flag ab1 and b2