



## Southeast Data, Assessment, and Review

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### SEDAR Procedural Workshop 7

# Data Best Practices

September 11, 2015

SEDAR  
4055 Faber Place Drive, Suite 201  
North Charleston, SC 29405

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## Executive Summary

SEDAR Procedural Workshops provide an opportunity for focused discussion and deliberation on topics that arise in multiple assessments and are structured to develop best practices for addressing common issues across assessments. The seventh procedural workshop developed best practice recommendations for common decisions made at SEDAR Data Workshops (DW).

Throughout the course of DW's, certain topics arise repeatedly in discussions. Discussions related to these topics often occupy considerable time as participants work to come up with reasonable solutions and at least document, or in some cases revisit, past solutions to common issues. In a process that is severely limited by time and resources and increasingly challenged to increase productivity, effort spent readdressing an issue that has been considered previously numerous times is time and effort that is lost addressing the new or unique issues of a particular stock. Since many data challenges are inherent to data collection programs and therefore the same from stock to stock, decisions and approaches for dealing with common challenges could be standardized. Doing so could give data providers the guidance they need to better prepare for workshops, allow workshop participants to focus on unique issues of the stock under consideration, and improve consistency in the treatment of common unknowns, uncertainties and data collection issues.

SEDAR convened the procedural workshop from June 22-26, 2015 in Atlanta, GA. The main goal of the workshop was to identify common decisions made in SEDAR data workshops and to develop recommended best practices to help support and streamline such decisions for future assessments. This workshop focused on data compilation and analysis, and procedural issues that may help or hinder that work.

Prior to the procedural workshop, a series of focus group webinars were held in the winter/spring of 2015 to develop an inventory of SEDAR Data Workshop common or recurring data and analysis issues. Five focus groups were identified (life history, commercial, recreational, indices of abundance, and catch at size/age) and a separate webinar was held for each group. Each focus group was responsible for developing an inventory of common or recurring data workshop issues relevant to their group, prioritizing the identified issues, and identifying whether the issues had straight-forward or more complex solutions. Issues were categorized into three main groups: process, technical or broader data collection issues.

Focus group members and the workshop Organizing Committee acknowledged that it would likely not be possible to tackle all of the issues identified in the inventory during this workshop process. In April 2015, the workshop Organizing Committee reviewed the data issue inventory to prioritize the issues to address during this workshop process. The Organizing Committee's approach to prioritization was to tackle key process issues and as many straight forward technical issues as possible.

In order to address the diverse issues that arise at DWs, a large number of people participated in this workshop. To effectively manage the workshop and make it run efficiently, there were two hierarchical levels of workshop participation. Workshop participants were assigned to a Best Practice Panel (BPP) and/or one of five Topical Technical Groups (TTG; life history, commercial, recreational, indices, and catch at size/age).

The workshop was divided into a series of Technical Group breakout sessions and plenary sessions. During the breakout sessions, TTG members discussed the identified data issues and potential solutions and developed preliminary best practice recommendations. The BPP participated in all plenary sessions while the TTG's only participated in the plenary sessions where issues relevant to their group were discussed. In the plenary sessions, TTG members presented a brief overview of the data issue, potential solutions, and preliminary best practice recommendations. The BPP and TTG(s) had further discussion on the issue, as necessary, and together developed the final best practice recommendations.

The workshop began Monday afternoon with all workshop participants in a plenary session to review the Terms of Reference and charge to the Technical Groups. The remainder of Monday afternoon through Wednesday morning was spent with TTG's rotating between breakout and individual plenary sessions held with the BPP. By Wednesday morning, all five TTGs held at least one plenary session with the BPP and the issues that needed input from multiple groups were identified.

A plenary session with all workshop participants was held Wednesday afternoon to begin addressing issues that needed input from multiple groups. Workshop participants also started working on a key process issue: identifying when data inputs and outputs need to be submitted during the data stage of an assessment. To tackle this issue, the group did an exercise using a visual facilitation tool. Initially TTG's moved back into breakout sessions and were asked to write down all data inputs and outputs relative to their group on separate pieces of paper and to number them in the order they needed to occur. The BPP collected the data inputs and outputs from each TTG and grouped them into three timing categories: before the DW, during the DW, and after the DW. The inputs/outputs were hung on the wall in these three categories and roughly placed in the order they needed to occur. Similar items or items that needed to occur in the same timeframe were grouped together and draft timings were assigned to each group. Workshop participants reviewed and revised the timeline Thursday morning and in the afternoon TTG's held plenary sessions with the BPP to discuss remaining technical issues.

A final group plenary session with all workshop participants was held Friday morning where workshop chair, Paul Rago, led the participants through discussions on procedures and approaches to follow when deviating from best practices; identifying a process to address future revision and evaluation of workshop recommendations and best practices; discussions on

when/how the best practices will be implemented; and discussions on what to do if data deadlines are not met. The workshop concluded with Jessica Stephen giving a brief presentation on perspectives from SERO focusing on suggestions to make SEDAR reports more useful for Fishery Management Plan Amendment Analyses.

After the workshop, three additional webinars were held to discuss prioritization of proposed workshops, further refine the SEDAR Data Timeline, and finalize workshop report sections.

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## **1. Introduction**

### **1.1 Workshop Time and Place**

The SEDAR Procedural Workshop 7 – Data Best Practices was held June 22-26, 2015 in Atlanta, GA. A planning webinar was held May 21, 2015 and post-workshop webinars were held July 7, August 10, and September 1, 2015.

### **1.2 Terms of Reference**

1. Develop inventory of SEDAR Data Workshop datasets and common or recurring data and analysis issues and identify issues to be discussed during the workshop process. (NOTE: This ToR will be addressed during the planning stages of the workshop using the focus group approach and/or by the Organizing Committee.)
2. Review past assessments and document how the identified data and analysis issues were addressed in the past. Identify and document potential additional methods to address these issues. (NOTE: This ToR will be addressed prior to the workshop, so the information is available to address the other ToRs during the workshop.)
3. Select data and analysis issues and develop best practices procedures and approaches for addressing those issues in the future.
4. Recommend best practice procedures and approaches for data preparation and analysis for future assessments, including procedures and approaches to follow when deviating from best practices recommendations.
5. Identify process to address future revision and evaluation of workshop recommendations and Best Practices, considering all unaddressed data issues and the possible creation of a standing data methods working group.
6. Prepare a SEDAR Procedural Workshop report addressing workshop recommendations and decisions that will be used to guide future SEDAR assessments.

### 1.3 List of Participants

#### Appointee

##### BEST PRACTICE PANEL

Paul Rago, Workshop Chair  
 Marcel Reichert  
 Karyl Brewster-Geisz  
 Shannon Calay  
 Jeff Kipp  
 Gary Fitzhugh  
 Steve Turner  
 Erik Williams  
 Richard Appeldoorn  
 Sean Powers

#### Affiliation

NEFSC  
 SAFMC SSC  
 HMS  
 SEFSC – Miami  
 ASMFC  
 SEFSC – Panama City  
 SEFSC - Miami  
 SEFSC – Beaufort  
 CFMC SSC  
 GMFMC SSC

##### LIFE HISTORY TECHNICAL GROUP

Linda Lombardi, Co-leader  
 Marcel Reichert, Co-leader  
 Beverly Barnett  
 Wally Bubley  
 Will Patterson\*  
 Jennifer Potts  
 David Wyanski  
 Sue Lowerre-Barbieri

SEFSC – Panama City  
 SCDNR  
 SEFSC – Panama City  
 SCDNR  
 GMFMC SSC  
 SEFSC - Beaufort  
 SCDNR  
 FL FWCC

##### COMMERCIAL TECHNICAL GROUP

Dave Gloeckner, Co-leader  
 Alan Bianchi, Co-leader  
 Donna Bellais  
 Steve Brown\* / Chris Bradshaw  
 Julie Califf  
 Julie DeFilippi  
 Amy Dukes  
 Daniel Matos  
 Roy Pemberton  
 Jessica Stephen  
 Jackie Wilson

SEFSC – Miami  
 NCDMF  
 GSMFC / GulfFin  
 FL FWCC  
 GADNR  
 ACCSP  
 SCDNR  
 PR DNER  
 USVI DPNR  
 SERO  
 HMS

##### RECREATIONAL TECHNICAL GROUP

Ken Brennan, Co-leader  
 Vivian Matter, Co-leader

SEFSC – Beaufort  
 SEFSC – Miami

Kelly Fitzpatrick  
Eric Hiltz\*  
Jeff Isley  
Kathy Knowlton  
Ron Salz  
Tom Sminkey  
Chris Wilson

SEFSC - Beaufort  
SCDNR  
SEFSC - Miami  
GADNR  
NMFS S&T  
NMFS S&T  
NCDMF

### **INDICES TECHNICAL GROUP**

Kyle Shertzer, Co-leader  
Adyan Rios, Co-leader  
Joey Ballenger  
Mary Christman\*  
Walter Ingram  
Cami McCandless  
Kevin McCarthy  
Adam Pollack  
Tracey Smart  
Ted Switzer

SEFSC – Beaufort  
SEFSC – Miami  
SCDNR  
MCC  
SEFSC - Pascagoula  
NEFSC  
SEFSC - Miami  
SEFSC - Pascagoula  
SCDNR  
FL FWCC

### **CATCH AT SIZE/AGE TECHNICAL GROUP**

Rob Cheshire, Co-leader  
Meaghan Bryan, Co-leader  
Nancie Cummings  
Beverly Sauls

SEFSC – Beaufort  
SEFSC – Miami  
SEFSC - Miami  
FL FWCC

### **STAFF**

Julia Byrd  
John Carmichael  
Julie Neer  
Julie O'Dell  
Mike Errigo  
Ryan Rindone  
John Froeschke  
Jeff Vieser  
Graciela Garcia-Moliner

SEDAR Coordinator  
SEDAR/SAFMC  
SEDAR  
SAFMC  
SAFMC  
GMFMC  
GMFMC  
NMFS S&T  
CFMC

### **Post-Workshop Webinar Observers**

Rusty Hudson, SFA                      Peter Barile, SFA

\*Participated in webinars, but was not able to attend the workshop.

## 1.4 Document List

Document #	Title	Authors	Relevant Technical Group
<b>Data Issue Overview Documents</b>			
**The Data Issue Overview documents served as a starting point for the report sections included in this report. See the report section indicated below for the final recommendations provided by each of the Technical Groups.**			
PW7 - 01	Life History Data Issue Overview Document (See report section 3.3.1)	Life History Technical Group 2015	
PW7 - 02	Commercial Data Issue Overview Document (See report section 3.3.2)	Commercial Technical Group 2015	
PW7 - 03	Recreational Data Issue Overview Document (See report section 3.3.3)	Recreational Technical Group 2015	
PW7 - 04	Indices Data Issue Overview Document (See report section 3.3.4)	Indices Technical Group 2015	
PW7 - 05	Catch at Size/Age Data Issue Overview Document (See report section 3.3.5)	Catch at Size / Age Technical Group 2015	
<b>Technical Group Additional Resources</b>			
PW7 - 06	SEDAR7-AW03: Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates for the Gulf of Mexico in 1981-1997 with For-Hire Survey estimates with application to red snapper landings	Diaz and Phares 2004	Recreational
PW7 - 07	SEDAR16-DW15: Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates from the Southeastern US (NC to FL-east coast) in 1981-2003 with For-Hire Survey estimates with application to King Mackerel landings	Sminkey 2008	Recreational
PW7 - 08	SEDAR 17 South Atlantic Spanish Mackerel Stock Assessment Report	SEDAR 17	Recreational
PW7 - 09	SEDAR 24 South Atlantic Red Snapper Stock Assessment Report	SEDAR 24	Recreational Commercial Indices

PW7 – 10	SEDAR 25 South Atlantic Black Sea Bass Stock Assessment Report	SEDAR 25	Recreational Commercial Life History
PW7 – 11	SEDAR 25 South Atlantic Tilefish Stock Assessment Report	SEDAR 25	Recreational
PW7 – 12	SEDAR 28 South Atlantic Cobia Stock Assessment Report	SEDAR 28 W Panel	Recreational Commercial Indices
PW7 – 13	SEDAR 28 South Atlantic Spanish Mackerel Stock Assessment Report	SEDAR 28	Recreational Commercial
PW7 – 14	SEDAR28-DW12: Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates for the South Atlantic and Gulf of Mexico in 1981-1985 with For-Hire Survey estimates with application to Spanish mackerel and cobia landings	Matter et al. 2012	Recreational
PW7 – 15	SEDAR 31 Gulf of Mexico Red Snapper Stock Assessment Report	SEDAR 31	Recreational Commercial
PW7 – 16	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	Rios et al. 2012	Recreational
PW7 – 17	SEDAR31-DW33: Using a censored regression modeling approach to standardize red snapper CPUE using recreational fishery data affected by a bag limit	Saul and Walter 2012	Indices
PW7 – 18	SEDAR31-AW01: Headboat Discards for Red Snapper in the Gulf of Mexico	Matter and Walter 2013	Recreational
PW7 – 19	SEDAR 32 South Atlantic Blueline Tilefish Stock Assessment Report	SEDAR 32	Recreational Commercial Indices Life History
PW7 – 20	SEDAR32-DW02: MRFSS to MRIP Adjustment Ratios and Weight Estimation Procedures for South Atlantic and Gulf of Mexico Managed Species (PDF and Excel docs)	Matter and Rios 2013	Recreational
PW7 – 21	SEDAR32-AW01: Age and length	SFB 2013 (contact:	CAA/CAS

	composition weighting for U.S. blueline tilefish	E. Fitzpatrick)	
PW7 – 22	SEDAR32-AW02: Age and length composition weighting for U.S. gray triggerfish	SFB 2013 (contact: R. Cheshire)	CAA/CAS
PW7 – 23	SEDAR 33 Gulf of Mexico Gag Stock Assessment Report	SEDAR 33	Recreational Commercial
PW7 – 24	SEDAR 33 Gulf of Mexico Greater Amberjack Stock Assessment Report	SEDAR 33	Recreational Commercial
PW7 – 25	SEDAR 36 South Atlantic Snowy Grouper Stock Assessment Report	SEDAR 36	Recreational
PW7 – 26	SEDAR36-WP01: MRIP Recreational Survey Data for Snowy Grouper in the Atlantic	Matter 2013	Recreational
PW7 – 27	SEDAR36-WP11: Commercial Landings of Snowy Grouper in the U.S. Atlantic, 1950-2012	Baertlein et al. 2013	Commercial
PW7 – 28	SEDAR 38 South Atlantic King Mackerel Stock Assessment Report	SEDAR 38	CAA/CAS Commercial
PW7 – 29	SEDAR 38 Gulf of Mexico King Mackerel Stock Assessment Report	SEDAR 38	CAA/CAS Life History
PW7 – 30	SEDAR38-AW05: Age frequency distributions, age length keys, length at ages, and sex ratios for kin mackerels in the Gulf of Mexico and South Atlantic from 1986-2013	Chih 2014	CAA/CAS
PW7 – 31	SEDAR 39 Atlantic Smoothhound Sharks Stock Assessment Report	SEDAR 39	Recreational
PW7 – 32	SEDAR39-DW03: Preliminary catches of smoothhound sharks	Cortes and Balchowsky	Commercial
PW7 – 33	SEDAR 42 Gulf of Mexico Red Grouper Data Workshop Report	SEDAR 42 DW Panel	Recreational Commercial Indices Life History
PW7 – 34	SEDAR42-DW12: Variations in length frequency distributions and age length keys for red groupers collected in the Gulf of Mexico	Chih 2014	CAA/CAS
PW7 – 35	SEDAR42-DW18: Length and age frequency distributions for red groupers	Chih 2014	CAA/CAS

	collected in the Gulf of Mexico from 1984-2013		
PW7 – 36	SEDAR PW1 Report: Developing Protocols for Submission of Abundance Indices to the SEDAR Process		Indices
PW7 – 37	SEDAR Index Report Card (current version)		Indices
PW7 – 38	SEDARPW2 Report: Evaluating and Modeling Catchability		Indices
PW7 – 39	SEDAR Outline for Data Workshop Report (current version)		Indices
PW7 – 40	Report of the 2012 Meeting of the ICCAT Working Group on Stock Assessment Methods	ICCAT Working Group Methods 2012	Indices
PW7 – 41	Guidelines for presenting CPUE indices of abundance for WCPFC stock assessments	Hoyle et al. / WCPFC 2014	Indices
PW7 – 42	Fitting a surplus-production model with numbers- vs. weight based indices of abundance together with removals data in weight: evaluation on simulated fisheries similar to blue marlin in the Atlantic Ocean	Prager and Goodyear 2001	Indices
PW7 – 43	Report of the 2014 Meeting of the ICCAT Working Group on Stock Assessment Methods	ICCAT Working Group Methods 2015	Indices
PW7 – 44	Stock Assessment and Future Projections of Blue Shark in the North Pacific Ocean	ISC Shark Working Group 2014	Indices
PW7 – 45	Recommended approaches for standardizing CPUE in pelagic fisheries	Hoyle et al. / WCPFC 2014	Indices
PW7 – 46	Constructing stock abundance indices from catch and effort data: Some nuts and bolts	Campbell 2015	Indices
PW7 – 47	Some considerations for CPUE standardization; variance estimation and distributional considerations	Lauretta et al. 2015	Indices
PW7 – 48	NOAA Tech Memo 119: Estimating Natural Mortality in Stock Assessment Applications	Brodziak et al. 2011	Life History
PW7 – 49	Forms of Reproductive Potential Used in SEDAR Assessments (Excel spreadsheet)	Fitzhugh 2015	Life History
PW7 – 50	SEDAR41-DW: Estimates of Historic Recreational Landings of Red Snapper in	Brennan 2014	Recreational

	the South Atlantic Using the FHWAR Census Method (DRAFT)		
PW7 – 51	SEDAR07-DW45: Size frequency distribution of red snapper from dockside sampling of commercial landings in the Gulf of Mexico 1984-2002 (TIP size data)	Diaz et al. 2004	Commercial
PW7 – 52	SEDAR08-DW6: Status of NOAA Fisheries Commercial Landings and Biostatistical Data – Puerto Rico, 1983-Present	Bennett 2004	Commercial
PW7 – 53	SEDAR08-DW7: Status of NOAA Fisheries Commercial Landings and Biostatistical Data – USVI, 1973-Present	Bennett 2004	Commercial
PW7 – 54	SEDAR 8 Caribbean Yellowtail Snapper Stock Assessment Report	SEDAR 8	Commercial
PW7 – 55	SEDAR 15A South Atlantic and Gulf of Mexico Mutton Stock Assessment Report	SEDAR 15A	Commercial
PW7 – 56	SEDAR 19 South Atlantic Red Grouper Stock Assessment Report	SEDAR 19	Commercial
PW7 – 57	SEDAR 19 South Atlantic and Gulf of Mexico Black Grouper Stock Assessment Report	SEDAR 19	Commercial
PW7 – 58	SEDAR16-DW13: Analysis of the king mackerel size and size-frequency samples data available for use in stock assessment	Ortiz 2008	Commercial
PW7 – 59	SEDAR 17 South Atlantic Vermilion Snapper Stock Assessment Report	SEDAR 17	Commercial
PW7-60 through PW7-66 are the process docs below			
PW7 – 67	MRIP Calibration Workshop II – Final Report	Carmichael and Van Voorhees 2014	Recreational
PW7 – 68	MRFSS/MRIP Calibration Workshop Ad-hoc Working Group	Ad-hoc Working Group	Recreational
PW7 – 69	Stock-recruitment resilience of North Pacific striped marlin based on reproductive ecology	Brodziak et al. 2015	Life History
PW7 – 70	Stock assessment of protogynous fish: evaluating measures of spawning biomass used to estimate biological reference points	Brooks et al. 2008	Life History
PW7 – 71	A Standardized Terminology for Describing Reproductive Development in	Brown-Peterson et al. 2011	Life History

	Fishes		
PW7 – 72	Relating angling-dependent fish impairment to immediate release mortality of red snapper ( <i>Lutjanus campechanus</i> )	Campbell et al. 2010	Life History
PW7 – 73	Release mortality in the red snapper ( <i>Lutjanus campechanus</i> ) fishery: a meta-analysis of three decades of research	Campbell et al. 2014	Life History
PW7 – 74	Maternal size, not age, influences egg quality of a wild, protogynous coral reef fish <i>Plectropomus leopardus</i>	Carter et al. 2015	Life History
PW7 – 75	Evolutionary assembly rules for fish life histories	Charnov et al. 2013	Life History
PW7 – 76	Assessing stock reproductive potential in species with indeterminate fecundity: Effects of age truncation and size dependent reproductive timing	Cooper et al. 2013	Life History
PW7 – 77	On changes in some biological parameters in the North Sea sole ( <i>Solea solea</i> L.)	deVeen 1976	Life History
PW7 – 78	Growth models for red snapper in U.S. Gulf of Mexico waters estimated from landings with minimum size limit restrictions	Diaz et al. 2004	Life History
PW7 – 79	Gag grouper, marine reserves, and density-dependent sex change in the Gulf of Mexico	Ellis and Powers 2012	Life History
PW7 – 80	The illusion of plenty: hyperstability masks collapses in two recreational fisheries that target fish spawning aggregations	Erisman et al. 2011	Life History
PW7 – 81	Review of size- and age-dependence in batch spawning: implications for stock assessment of fish species exhibiting indeterminate fecundity	Fitzhugh et al. 2012	Life History
PW7 – 82	Contemporary management issues confronting fisheries science	Frank and Brickman 2001	Life History
PW7 – 83	Spawning aggregations of <i>Lutjanus cyanopterus</i> (Cuvier) on the Belize Barrier Reef over a six year period	Heyman et al. 2005	Life History
PW7 – 84	Models to compare management options for a protogynous fish	Heppell et al. 2006	Life History
PW7 – 85	BOFFFFs: on the importance of conserving	Hixon et al. 2014	Life History

	old-growth age structure in fishery populations		
PW7 – 86	Marine Fish Population Collapses: Consequences for Recovery and Extinction Risk	Hutchings and Reynolds 2004	Life History
PW7 – 87	Exploring the structure of genetic variation and the influences of demography on effective population size in the gag grouper <i>Mycteroperca microlepi</i> (Goode & Bean)	Jue 2006	Life History
PW7 – 88	SEDAR 34 HMS Atlantic Sharpnose Stock Assessment Report	SEDAR 34	Life History
PW7 – 89	Parent-egg-progeny relationships in teleost fishes: an energetics perspective	Kalmer 2006	Life History
PW7 – 90	How to manage data to enhance their potential for synthesis, preservation, sharing, and reuse – a Great Lakes case study	Kolb et al. 2013	Life History
PW7 – 91	Characterizing fish populations: effects of sample size and population structure on the precision of demographic parameter estimates	Kritzer et al. 2001	Life History
PW7 – 92	Population dynamics and potential fisheries stock enhancement: practical theory for assessment and policy analysis	Lorenzen 2005	Life History
PW7 – 93	The relationship between body weight and natural mortality in juvenile and adult fish: a comparison of natural ecosystems and aquaculture	Lorenzen 1996	Life History
PW7 – 94	Emerging issues and methodological advances in fisheries reproductive biology	Lowerre-Barbieri et al. 2011	Life History
PW7 – 95	Reproductive timing in marine fishes: variability, temporal scales, and methods	Lowerre-Barbieri et al. 2011	Life History
PW7 – 96	Assessing reproductive resilience: an example with South Atlantic red snapper <i>Lutjanus campechanus</i>	Lowerre-Barbieri et al. 2015	Life History
PW7 – 97	Essential relationships incorporating the influence of age, size and condition on variables required for estimation of reproductive potential in Atlantic cod <i>Gadus morhua</i>	Marteinsdottir and Begg 2002	Life History

PW7 – 98	A stock-recruitment model for highly fecund species based on temporal and spatial extent of spawning	Maunder and Deriso 2013	Life History
PW7 – 99	Seasonal growth of Kin George whiting ( <i>Sillaginodes punctate</i> ) estimated from length-at-age samples of the legal-sized harvest	McGarvey and Fowler 2002	Life History
PW7 – 100	Variability in total egg production and implications for management of the southern stock of European hake	Mehault et al. 2010	Life History
PW7 – 101	Technical Description of the Stock Synthesis Assessment Program	Methot 2000	Life History
PW7 – 102	The evaluation of reference points and stock productivity in the context of alternative indices of stock reproductive potential	Morgan et al. 2009	Life History
PW7 – 103	Is the Northern European hake, <i>Merluccius merluccius</i> , management procedure robust to the exclusion of reproductive dynamics	Murua et al. 2010	Life History
PW7 – 105	A simulation study of the implications of age-reading errors for stock assessment and management advice	Reeves 2003	Life History
PW7 – 106	Mating systems and the conservation of commercially exploited marine fish	Rowe and Hutchings 2003	Life History
PW7 – 107	The threat of fishing to highly fecund fishes	Sadovy 2001	Life History
PW7 – 108	Fishing groupers towards extinction: a global assessment of threats and extinction risks in a billion dollar fishery	Sadovy de Mitcheson et al. 2013	Life History
PW7 – 109	SEDAR 16 South Atlantic and Gulf of Mexico King Mackerel Stock Assessment Report	SEDAR 16	Life History
PW7 – 110	SEDAR33-AW23: Meta-analysis of release mortality in the gag grouper fishery	Campbell et al. 2013	Life History
PW7 – 111	SEDAR41-DW33: Size Distribution, Release Condition, and Estimated Discard Mortality of Red Snapper Observed in For-Hire Fisheries in the South Atlantic	Sauls et al. 2014 (updated 2015)	Life History
PW7 – 112	Modeling Protogynous Hermaphrodite Fishes Workshop	Shepherd et al. 2013	Life History

PW7 – 113	Evaluating the predictive performance of empirical estimators of natural mortality rate using information on over 200 fish species	Then et al. 2014	Life History
PW7 – 114	Technical documentation of the Beaufort Assessment Model (BAM)	Williams and Shertzer 2015	Life History
PW7 – 115	SEDAR41-DW46: Discards of Red Snapper Calculated for Commercial Vessels with Federal Fishing Permits in the US South Atlantic	McCarthy 2015	Commercial
PW7 – 116	SEDAR 7 Gulf of Mexico Red Snapper Stock Assessment Report	SEDAR 7	Commercial
PW7 – 117	SEDAR28-DW06: Methods for Estimating Shrimp Bycatch of Gulf of Mexico Spanish Mackerel and Cobia	B. Linton 2012	Commercial
PW7 – 118	SEDAR17-DW12: Estimation of Spanish mackerel and vermilion snapper bycatch in the shrimp trawl fisher in the South Atlantic	Andrews 2008	Commercial
PW7 – 119	SEDAR 21 HMS Blacknose Shark Stock Assessment Report	SEDAR 21	Commercial
PW7 – 120	SEDAR 34 HMS Bonnethead Shark Stock Assessment Report	SEDAR 34	Life History
PW7 – 121	SEDAR42-DW13: The use of otolith reference collections to determine ageing precision of red grouper ( <i>Epinephelus morio</i> ) between fisheries laboratories	Palmer et al. 2014	Life History
PW7 – 122	Design and analysis of field studies to estimate catch-and-release mortality	Pollock and Pine 2007	Life History
<b>Process Documents</b>			
PW7 – 60	DRAFT: South Atlantic & Gulf of Mexico Data Workshop Roles (Excel spreadsheet)		Process All Groups
PW7 – 61	DRAFT: Life History Flowchart (two versions)		Process Life History
PW7 – 62	DRAFT: Commercial Flowchart		Process Commercial
PW7 – 63	Recreational Flowchart		Process Recreational

PW7 – 64	DRAFT: Indices Flowchart		Process Indices
PW7 – 65	DRAFT: Pre-Data Workshop Flowchart		Process All Groups
PW7 – 66	DRAFT: South Atlantic Data Workshop Flow Chart		Process All Groups

## 1.5 SEDAR Abbreviations

ABC	Allowable Biological Catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ADMB	AD Model Builder software program
ALS	Accumulated Landings System; SEFSC fisheries data collection program
AMRD	Alabama Marine Resources Division
APAIS	Access Point Angler Intercept Survey; intercept portion of MRIP survey
ASMFC	Atlantic States Marine Fisheries Commission
B	stock biomass level
BAM	Beaufort Assessment Model
BCPUE	bycatch catch per unit effort
BMSY	value of B capable of producing MSY on a continuing basis
BRD	bycatch reduction device
CAA	catch at age
CAS	catch at size
CFMC	Caribbean Fishery Management Council
CHTS	Coastal Household Telephone Survey; effort portion of MRIP survey
CIE	Center for Independent Experts
CPUE	catch per unit of effort
DBSRA	depletion-based stock reduction analysis
DCAC	depletion-corrected average catch
EDA	exploratory data analysis
EEZ	exclusive economic zone
ELB	shrimp trawl location recorders
F	fishing mortality (instantaneous)
FHS	For-Hire Survey; part of the MRIP survey directed at for-hire fisheries
FHWAR	National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Survey
FIN	Fisheries Information Network
FL FWCC	Florida Fish and Wildlife Conservation Commission
FLTT	Florida Trip Ticket

FMP	fishery management plan
FMSY	fishing mortality to produce Maximum Sustainable Yield under equilibrium conditions
FOY	fishing mortality rate to produce Optimum Yield under equilibrium
FXX% SPR	fishing mortality rate that will result in retaining XX% of the maximum spawning production under equilibrium conditions
FMAX	fishing mortality that maximizes the average weight yield per fish recruited to the fishery
F0	a fishing mortality close to, but slightly less than, Fmax
FWRI	(State of) Florida Fish and Wildlife Research Institute
GADNR	Georgia Department of Natural Resources
GLM	general linear model
GMFMC	Gulf of Mexico Fishery Management Council
GSAFF	Gulf and South Atlantic Fisheries Foundation
GSMFC	Gulf States Marine Fisheries Commission
GULF FIN	GSMFC Fisheries Information Network
HMS	Highly Migratory Species
IFQ	Individual Fishing Quota
LDWF	Louisiana Department of Wildlife and Fisheries
M	natural mortality (instantaneous)
MARMAP	Marine Resources Monitoring, Assessment, and Prediction
MDMR	Mississippi Department of Marine Resources
MFMT	maximum fishing mortality threshold, a value of F above which overfishing is deemed to be occurring
MRFSS	Marine Recreational Fisheries Statistics Survey; combines a telephone survey of households to estimate number of trips with creel surveys to estimate catch and effort per trip
MRIP	Marine Recreational Information Program
MSST	minimum stock size threshold, a value of B below which the stock is deemed to be overfished
MSY	maximum sustainable yield

NCDMF	North Carolina Division of Marine Fisheries
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
ORCS	only reliable catch stocks
OY	optimum yield
QA/QC	quality assurance / quality control
SAFMC	South Atlantic Fishery Management Council
SAS	Statistical Analysis Software, SAS Corporation
SCDNR	South Carolina Department of Natural Resources
SEAMAP	Southeast Area Monitoring and Assessment Program
SEDAR	Southeast Data, Assessment and Review
SEFIS	Southeast Fishery-Independent Survey
SEFSC	Southeast Fisheries Science Center, National Marine Fisheries Service
SERO	Southeast Regional Office, National Marine Fisheries Service
SPR	spawning potential ratio, stock biomass relative to an unfished state of the stock
SRHS	Southeast Region Headboat Survey
SSB	Spawning Stock Biomass
SS	Stock Synthesis
SSC	Science and Statistical Committee
SWAS	U. S. Fish and Wildlife Saltwater Angling Survey
TIP	Trip Incident Program; biological data collection program of the SEFSC and Southeast States.
ToR	Terms of Reference
TPWD	Texas Parks and Wildlife Department
VPA	virtual population analysis
Z	total mortality, the sum of M and F

## 2. Workshop Approach

The primary goal of the SEDAR Data Best Practices workshop was to identify common decisions made in SEDAR Data Workshops (DW) and to develop recommended best practices to help support and streamline those decisions for future assessments. This workshop focused on data compilation and analysis, and procedural issues that may help or hinder that work. This workshop did not discuss assessment modeling, as that was deemed too large of a topic to be included along with the data discussions. A separate Assessment Best Practices workshop should be held in the future to develop those practices.

An organizing committee was convened to refine workshop objectives, develop Terms of Reference, identify potential participants, identify briefing materials and necessary advance prep work, and discuss workshop approach and timing.

In order to address the diverse issues that arise at DWs, a large number of workshop participants were needed. To effectively manage the workshop and make it run efficiently, the workshop had two hierarchical levels of workshop participation. Workshop participants were assigned to a Best Practice Panel (BPP) and/or one of five Topical Technical Groups (TTG; life history, commercial, recreational, indices, and catch at size/age).

The BPP included representatives from each Council's Science and Statistics Committee or Cooperator equivalent, representatives from each assessment team, and representatives from key data teams. TTG members included past work group leaders and key data providers.

The workshop proceeded with a series of Technical Group breakout sessions and plenary sessions. During the breakout sessions, TTG members, and interested BPP members when the Panel was not in plenary session, discussed the identified data issues and potential solutions and developed preliminary best practice recommendations. The BPP participated in all plenary sessions while the TTG's only participated in the plenary sessions where issues relevant to their group were discussed. In the plenary sessions, TTG members presented a brief overview of the data issue, potential solutions, and preliminary best practice recommendations. The BPP and TTG(s) had further discussion on the issue, as necessary, and together developed the final best practice recommendations.

## 3. Workshop Findings

### 3.1 Data Inventory (TOR 1)

*Develop inventory of SEDAR Data Workshop datasets and common or recurring data and analysis issues and identify issues to be discussed during the workshop process. (NOTE: This*

*ToR will be addressed during the planning stages of the workshop using the focus group approach and/or by the Organizing Committee.)*

Prior to the procedural workshop, a series of focus group webinars were held in February, March, and April 2015 to develop an inventory of SEDAR Data Workshop common or recurring data and analysis issues. Five focus groups were identified by the workshop's Organizing Committee: life history, commercial, recreational, indices, and catch at size/age. Each focus group was responsible for developing an inventory of common or recurring data workshop issues relevant to their group, prioritizing the identified issues, and identifying whether the issues had straight-forward or more complex solutions (e.g. could potentially be solved via webinar versus in-person workshop). An inventory spreadsheet tool was developed to assist with inventory compilation. Data fields included in the inventory and instructions to submit data are in Appendix 1.

Focus group members were comprised of past work group leaders, key data providers, and assessment analysts. Focus group membership lists are below. There was substantial overlap between the focus group members and workshop participants.

**Life History Focus Group:** Robert Allman, Steve Arnott, Joey Ballenger, Wally Bublely, Tanya Darden, Doug Devries, Trey Driggers, Gary Fitzhugh, Kevin Kolmos, Jeff Isley, Linda Lombardi, Will Patterson, Jennifer Potts, Marcel Reichert, Adyan Rios, David Wyanski

**Commercial Focus Group:** Heather Balchowsky-Baertlein, Neil Baertlein, Donna Bellais, Alan Bianchi, Steve Brown, Shannon Calay, Julie Califf, Enric Cortés, Julie DeFilippi, Any Dukes, Dave Gloeckner, Stephanie McInerny, Graciela Garcia-Moliner, Daniel Matos, Kevin McCarthy, Roy Pemberton, Liz Scott-Denton, Kate Siegfried, Jessica Stephen, Jackie Wilson

**Recreational Focus Group:** Gregg Bray, Ken Brennan, Enric Cortés, Kevin Craig, Kelly Fitzpatrick, John Foster, Graciela Garcia-Moliner, Eric Hiltz, Jeff Isely, Kathy Knowlton, Vivian Matter, Adyan Rios, Beverly Sauls, Tom Sminkey, Chris Wilson

**Indices Focus Group:** Steve Arnott, Joey Ballenger, Wally Bublely, Shannon Calay, John Carlson, Rob Cheshire, Eric Fitzpatrick, Walter Ingram, Cami McCandless, Kevin McCarthy, Adam Pollock, Kyle Shertzer, Tracey Smart, Jessica Stephen, Ted Switzer

**Catch at Size/Age Focus Group:** Robert Allman, Beverly Barnett, Meaghan Bryan, Rob Cheshire, Ching Ping Chih, Dean Courtney, Dave Gloeckner, Vivian Matter, Eric Fitzpatrick, Linda Lombardi, Jennifer Potts

An initial webinar was held with all focus group members on February 24, 2015 to give members a brief overview of the workshop objectives and specific focus groups' tasks and to review and edit the inventory spreadsheet tool. Prior to the individual focus group webinars, members submitted data issues using the inventory tool to SEDAR. SEDAR compiled and distributed draft data issue inventories for each focus group prior to their individual webinars. Individual focus group webinars were held March 18 (Catch at Size/Age), March 24 (Commercial), March 25 (Life History), March 31 (Indices), and April 1, 2015 (Recreational). On these webinars, issues were categorized into three broad groups: technical issues, process issues, and broader data collection issues that were identified as important to SEDAR Data Workshops but not necessarily under the purview of the SEDAR Data Best Practices workshop. Each issue was discussed by the group and all technical and process issues were given a priority and complexity ranking. After the webinar, SEDAR staff sent a webinar summary and updated inventory list to each focus group for review. Feedback was incorporated into the documents and a final master data issue inventory was compiled incorporating issues from all five focus groups. A summarized version of the inventory is in Appendix 2 and the more detailed inventory is available in the corresponding Excel spreadsheet (SEDAR\_PW7\_CompiledDataIssueInventory\_4.3.2015).

Focus group members and the Organizing Committee acknowledged that it would likely not be possible to tackle all of the issues identified in the inventory during this workshop process. The Organizing Committee held a webinar April 17, 2015 to review the data issue inventory and try to prioritize the issues to address during this workshop process. The Organizing Committee's approach to prioritization was to tackle key process issues and as many straight forward (e.g. low hanging fruit) technical issues as possible. They tried to identify the straight forward technical issues using the priority and complexity rankings provided by the focus groups. The issues highlighted in red in the summary data issue inventory (Appendix 2) are those prioritized by the Organizing Committee. However, the Organizing Committee was also supportive of groups tackling additional issues from the inventory as they saw fit and as time allowed.

There was not enough time at the workshop to discuss the broader data collection issues in depth. However, a small group met Thursday afternoon to further discuss some of these issues.

### **3.2 Data Issue Overviews (TOR 2)**

*Review past assessments and document how the identified data and analysis issues were addressed in the past. Identify and document potential additional methods to address these issues. (NOTE: This ToR will be addressed prior to the workshop, so the information is available to address the other ToRs during the workshop.)*

Prior to the workshop, each TTG developed data issue overview documents as part of the workshop briefing materials. These overviews included a brief explanation of each data issue, a list of potential solutions, including those that had been used in past assessments, and a list of additional resources where more detailed information could be found on the issue or potential solutions. The Data Issue Overview documents served as the starting point for Section 3.3 of this report.

To provide context and background for discussion of the process issues, draft DW data flow charts and draft DW roles and responsibilities tables were developed by the SEFSC for each of the primary DW working groups (life history, commercial, recreational, and indices).

### **3.3 Best Practices & Approach When Deviating from Best Practices (TOR 3/4)**

*Select data and analysis issues and develop best practices procedures and approaches for addressing those issues in the future.*

*Recommend best practice procedures and approaches for data preparation and analysis for future assessments, including procedures and approaches to follow when deviating from best practices recommendations.*

#### **3.3.1 Life History**

##### ***Issue 1: Stock Boundary (process)***

Determining the stock boundaries (including mixing zones) is a critical decision that needs to be made early in the SEDAR process (i.e., during scheduling), because the stock boundary for a species provides the basis for how all data is identified (allocated to a particular spatial area) within a particular stock. Guidance is needed on how to determine the stock boundary based on the available data (e.g., what to do if no genetic data are available, what if landings data are available for a region but no biological data are available, should management units be taken into consideration, etc.). When developing guidance, it may be helpful to document how the different datasets can be identified within a particular stock and what specific spatial units will be used (e.g., county or state landed, NMFS Statistical Fishing Grid).

##### **Potential Solutions:**

- Propose a special topic SEDAR workshop(s) to review the current stock boundaries for species by Fishery Management Plans (Gulf of Mexico, South Atlantic, Caribbean and Highly Migratory Species) or by species that have been recently assessed or those on the SEDAR schedule in the next few years. This workshop would provide recommendations for stock boundaries by species. The decision of this special topic workshop would be

reviewed during the SEDAR Data Workshop Data Scoping Call to discuss if any new research is available to warrant a change in the species stock boundary.

- A decision tree could be developed to decide how stock boundaries are specified depending on what type of data (e.g., tag/recapture studies, otolith chemistry, genetics) are available and the jurisdictions of the management councils. These data (biological and management) can then be presented and reviewed early in the SEDAR process (e.g., SEDAR schedule). If compelling new information is available, then the SEDAR Data Workshop panel should change the stock boundary. The stock boundaries need to be agreed upon by the SEDAR Data Workshop panel.

### **Additional Resources**

- PW7-120\_SEDAR16\_final\_SAR.pdf
- PW7-29\_SEDAR\_38\_GulfKingMack\_SAR.pdf
- PW7-33\_SEDAR42\_GoMRedGrp\_DW\_report\_disclaimer\_watermark.pdf
- PW7-19\_S32\_SA-BLT\_SAR\_Final\_11.26.2013.pdf
- PW7-88\_S34\_ATSH\_SAR.pdf
- PW7-120\_S34\_Bonnethead\_SAR.pdf

### **Final Best Practice Recommendations**

- Members of the SEDAR Data Workshop Life History Working Group can review the literature (including peer-reviewed manuscripts and gray literature (state or federal agencies reports, thesis/dissertations, etc.)) to determine if there is evidence to suggest a separation of stock biologically (e.g., tag/recapture studies, otolith chemistry, genetics, movement, migrations, habitat preferences) and present these findings in accordance with the final SEDAR process timeline (22 weeks before Data Workshop).
- Members of all SEDAR Working Groups were in agreement that decisions on Stock Boundaries need to be decided early in the SEDAR process timeline. The proposal of a special topic SEDAR workshop to review the current stock boundaries for species by Fishery Management Plans (Gulf of Mexico, South Atlantic, Caribbean and Highly Migratory Species) was in agreement by all participants. These workshops could be specific for species that have been recently assessed or for those on the current SEDAR schedule. These workshops would provide recommendations for stock boundaries by species. The decisions of these special topic workshops would be reviewed in accordance with the final SEDAR process timeline (22 weeks prior to the SEDAR Data Workshop) to discuss if any new research is available to warrant a change in the species stock boundary.
- For those SEDARs already scheduled (as of July 2015), the available data on stock boundaries should be reviewed as soon as possible, but no later than the SEDAR Data Workshop Data Scoping Calls. The decisions about stock boundaries need to be reviewed by representatives from each of the working groups (i.e., life history, commercial,

recreational, indices), the management council, and NMFS Southeast Regional Office (SERO).

- Members of the SEDAR Data Workshop Commercial Working Group, SEDAR Data Workshop Recreational Working Group, representatives from the management councils and SERO can review the current management boundaries and current fishing practices (i.e., behavior of fleet) to determine if there is evidence to suggest a separation of stock for management purposes and present this information during the SEDAR Data Workshop Data Scoping Call. Estimates from recreational and commercial datasets will follow the stock boundary as best as possible given each dataset's spatial resolution.
- Stock boundary must be determined early in the SEDAR process and included in the ToR. If Fishery Management Council boundaries are used then Monroe County will be split at U.S. Highway 1 in the Florida Keys (jurisdictional boundary between the SAFMC and GMFMC). See commercial working group technical issue – Monroe County for further details.

### **Justification**

Stock boundaries affect how the data are compiled and analyzed for all SEDAR Data Workshop Working Groups. If there is a decision to change the stock boundary during the SEDAR Data Workshop, there could be a delay in all products by all SEDAR Data Workshop Working Groups and possibly a halting of the assessment (e.g., if the new stock boundaries require an update to be changed to one or two benchmark assessments). The delay in the SEDAR Data Workshop products will cause a delay in the SEDAR Assessment Workshop products, the subsequent the Review Workshop, and any publically noticed meetings.

Examples:

- During the SEDAR16 Data Workshop (on day 4 of the week), a recommendation was made to add an additional mixing area for king mackerel (divide the data from the Gulf of Mexico, east and west of the Mississippi River drainage area). This recommendation during the SEDAR Data Workshop necessitated all working groups re-analyze their respective data to meet the new recommendation.
- The South Atlantic white grunt benchmark assessment was postponed as there was evidence that there are two populations, thus requiring a separate benchmark assessment for each population.
- Recommendation and agreement at the HMS SEDAR34 data workshop were to split bonnethead and sharpnose sharks into two stocks each (South Atlantic and Gulf of Mexico). Each species assessments were completed without separate stocks and led to the bonnethead shark assessment not being accepted by the review panel. Note: These assessments, were 'standards' not benchmarks, and the assessment panel was limited to changing major assumptions for model inputs.

**Issue 2: Meristic Conversions (process)**

Meristic relationships between fish metrics (length type, weight type) are required prior to the SEDAR Data Workshop. It is necessary that all meristic data for an upcoming assessment be analyzed for outliers and a decision made about each outlier before meristic conversions are calculated (see Life History Technical Issue: QA/QC and EDA). In addition, it is unclear when meristic conversions need to be updated (based on assessment type – standard, benchmark, update). It is also important that metadata (see Life History Technical Issue: Data Standardization and Metadata) per dataset includes how length (maximum or natural total length, fork length, standard length) and weight (gutted or whole; if gutted, describe gutted type (e.g., head on, head off, etc.) were measured and what units (metric or non-metric) were used.

**Potential Solutions**

Propose a special topic SEDAR workshop to review the current data used for meristic conversions for species by Fishery Management Plans (Gulf of Mexico, South Atlantic, Caribbean, and Highly Migratory Species). The panel members of this special topic SEDAR workshop would provide recommendations for when meristic conversions need to be calculated or updated. Possible reasons why meristic conversions need to be created and/or updated may be based on (but not limited to) the assessment type (standard, benchmark, update), an additional number of years of data (e.g., 10 yr.), a substantial increase in the number of meristic data (e.g., 5000, 10000 records), or when there is a change in the species condition factor. This workshop would make recommendations on the best model usage (linear, non-linear, ln-ln transformed), methods for model comparisons and model diagnostics (Neumann et al. 2012).

**Additional Resources**

- PW7-33\_SEDAR42\_GoMRedGrp\_DW\_report\_disclaimer\_watermark.pdf
- Neumann et al. 2012 standard length weigh.pdf
- PW7-77\_De Veen 1976 change condition sole.pdf

**Final Best Practice Recommendations**

- Propose a special topic SEDAR workshop to review the current data used for meristic conversions for species by Fishery Management Plans (Gulf of Mexico, South Atlantic, Caribbean, and Highly Migratory Species). The panel members of this special topic SEDAR workshop would provide recommendations for when meristic conversions need to be calculated or updated. Possible reasons why meristic conversions need to be created and/or updated may be based on (but not limited to) the assessment type (standard, benchmark, update), an additional number of years of data (e.g., 10 yr.), a substantial increase in the number of meristic data (e.g., 5000, 10000 records), or when there is a change in the species condition factor. This workshop would make recommendations on the best model usage (linear, non-linear, ln-ln transformed), methods for model comparisons and model diagnostics (Neumann et al. 2012).

- Meristic conversions should be reported in both tabular and graphical form (e.g., scatterplot of data, including the observed data and model fit). The data in the table should include the following (see example PW7-33):
  - Years of data collection
  - Data source (e.g., fishery dependent/independent, combined)
  - Metric (length and weight type and units)
  - Model equation
  - Model fitting statistic (e.g.,  $r^2$ )
  - Sample size
  - Range of metric (minimum and maximum)
- Members of the SEDAR Data Workshop Life History Working Group and SEDAR Data Workshop Catch at Size/Age Analyst or Working Group need to work together to make sure all pertinent data (fishery independent and dependent) are used in creating the meristic conversions. This decision should be presented no later than the SEDAR Data Workshop Data Scoping Call.
- For those SEDARs already scheduled (as of July 2015), the available data on meristic conversions should be reviewed no later than the SEDAR Data Workshop Data Scoping Calls, with input from each of the working groups (i.e., life history, commercial, recreational, indices), and discussions whether or not meristics conversions need to be calculated.

### Justification

- Meristic conversions are needed early in the assessment process as various SEDAR Data Workshop Working Groups need this information to commence analyses. Unavailability of the conversions will delay analyses by the other Working Groups, and as such, may delay the assessment.
- Typically, length-length relationships do not vary as much as weight-length relationships but it is good scientific practice to update these regressions at the same time of updating weight-length relationships. It is particularly important to note the type of length (maximum total length, natural total length, fork length, standard length) in the length-length regressions as well as any description of precision error in the measurements (Neumann et al. 2012).
- Change in weight-length relationships, can often indicate a change in the fish condition (e.g., Fulton, relative condition factor, relative weight) and, therefore, the energy reserves and health of the fish stock (Neumann et al. 2012). Changes in the condition of a fish stock may be related to density-dependence, prey availability, fishing effort, and temperature, but regardless of why there is a change in condition – these changes can affect any input of the stock assessment which takes into account the fish body weight (e.g., fecundity, conversion from numbers of fish to weight landed) (de Veen 1976). Changes in fish condition can also affect the results of the stock assessment as well as the

management advice based on those results. As a result, weight-length relationships may need to be investigated more frequently than length-length relationships.

### ***Issue 3: Providing Age Composition Data***

It is rare to have the data input for length and age compositions until after the SEDAR Data Workshop (DW). The inconsistent timing of producing finalized data makes it challenging to complete the compositions until after the DW. A decision is needed to decide what timeframe the composition data should be provided in the SEDAR process. To streamline the SEDAR process, the timeline for providing age and length composition data needs to be developed.

### **Potential Solutions**

- No change; the age compositions data will be available after the DW.
- Provide a description of the age data by (e.g. trip, year, fishery, fishing mode, gear, state).
- The processed life history dataset, which contains biological data such as ages and reproduction parameters, is derived from samples collected by fishery-dependent and fishery-independent sources. The data compiler of the SEDAR Data Workshop Life History Working Group is responsible for providing the final age data to the SEDAR Data Workshop Catch at Size/Age Analyst or Working Group, in accordance with the final SEDAR process timeline (9 weeks before the Data Workshop).

### **Additional Resources**

- N/A

### **Final Best Practice Recommendations**

- The processed life history dataset, which contains biological data such as ages and reproduction parameters, is comprised of samples collected by fishery-dependent and fishery-independent sources. The data compiler or the lead of the SEDAR Data Workshop Life History Group will provide the compiled, QA/QC'd fishery-dependent and fishery independent age data to the analyst(s) assigned the task for generating the length and age compositions for the recreational fishery, the commercial fishery and any fishery-independent sources. The age data will be provided before the Data Workshop (in accordance with the final SEDAR process timeline). These data will be accompanied with summary tables that include the number of trips sampled for age structures and the number of individual fish which were aged (e.g., only those data with ages). These tables will be structured with a breakdown by year, fishery (commercial, recreational), mode of fishing (e.g., CM, CP, SH, HB, PR, SS), gear categories, state, etc.
  - Different recommendation per region:
    - In the South Atlantic, the fishery-independent data come primarily from the Southeast Reef Fish Survey (SERFS). The age and length compositions from

these data are used in the Indices workgroup. The managers of the SERFS data generally provide the age and length compositions to that group, along with summary tables of the number of samples by year and gear.

- In the Gulf of Mexico, the age data set includes both the ages from fishery dependent and fishery independent data sources. However, in the Gulf of Mexico this final data set may not include records that only have meristic data collected (this pertains to both fishery dependent and independent sources). It is the responsibility of the SEDAR Data Workshop Catch at Size/Age Analyst or Working Group to contact the specific contacts of the data sources to obtain all records of meristic data. Additional meristic data may also be available from fishery independent sources, these data need to be sent to the lead data compiler of the Indices Workgroup.
- While these recommendations are specific for species listed as Coastal Migratory Pelagics and Reef Fish under the Fishery Management Plans of the Gulf of Mexico Fishery Management Council (GMFMC), and for species listed as Coastal Migratory Pelagics and for species listed in the Snapper Grouper Complex under the Fishery Management Plans of the South Atlantic Fishery Management Council (SAFMC), the age data for other Fishery Management Plans (e.g., Highly Migratory Species, Caribbean) may follow a similar process or procedure as much as possible, to the extent of its application to those species.
- Note - the length data included with the age samples may be duplicated in fishery dependent datasets of programs that also collect biological samples from the fishery landings such as NMFS Trip Interview Program, Southeast Region Headboat Survey, and Marine Recreational Information Program. The ages from the SEDAR Data Workshop Life History Working Group compiled final data set should be used for further analysis.

### **Justification**

It is important that the age dataset and the final dataset of meristic data are provided to the SEDAR Data Workshop Catch at Size/Age Analyst or Working Group in accordance with the final SEDAR process timeline. Meristic conversions should also be available at this time. This timeframe is important to keep analysis of the vital composition data on schedule.

### ***Issue 4: Data Standardization and Metadata***

Standardization of datasets from different data providers is needed to improve data quality and to reduce the time it takes for SEDAR Data Workshop Working Group members to combine all datasets into a single file for the assessment staff. All data sources need to complete QA/QC on their data prior to submission and should include appropriate metadata.

## Potential Solutions

- Provide a list of required fields including format of data and uniform codes to data providers.
- Require the raw data to have been through QA/QC checks and exploratory data analysis (EDA) before submitting to the life history data compiler.
- Require each data provider to include metadata with the data set.

## Additional Resources

- Brown et al. 2012 data management.pdf
- PW7-90\_Kolb et al 2013 database management.pdf

## Final Best Practice Recommendations

- All data providers are requested to use a standardized data template (for raw data inputs) when providing data to the data compiler of the SEDAR Data Workshop Life History Working group. The list of standardized data templates was constructed by reviewing data variable lists from past SEDARs (for both the South Atlantic and Gulf of Mexico). The standardized data template includes the list of required fields including format of data variables (age and reproduction; not just length composition data) and uniform codes (Table 1). The standardized data template and codes will be provided to all data providers, when data providers are identified in accordance to the final SEDAR process timeline (25 weeks before Data Workshop).
- In addition to the data submission, a metadata description is requested from each data provider (Table 2).
- A long-term goal is to develop an Oracle database for all data providers to use to upload their data sets via an online website. This database would enable data providers to quickly upload their data set using the SEDAR Life History data template, which would standardize the data fields through look-up tables as well as standardize the format of the data fields. If data sets of contributed data are not provided in a format that can be standardized nor efficiently rectified, then those data sets may not be combined or used for the assessment
- If data are received from a data provider that does not meet the described standardization, metadata description and check list of QA/QC and EDA (see Life History Technical Issue: QA/QC and EDA), the data compiler of the SEDAR Data Workshop Life History Working group has the choice of returning the data to the original data provider and request corrections be made before these data are combined with the other age and/or length composition datasets.
- Add to the SEDAR FAQs:
  - Q: How can I submit data to be used in the SEDAR process?
  - A: All SEDAR datasets are requested to be submitted to the appropriate SEDAR Data Workshop Working Group data compiler (Life History, Commercial, Recreational,

Indices) in a standardized template. A report that includes the metadata description and checklist of QA/QC and EDA should accompany each dataset. For Working Group specific standardized data template, please see Table 1.

**Justification**

Life history data from various sources are submitted in a variety of formats and include codes unique to each source. The data are sometimes submitted as raw data which requires data to be formatted so that it can be compiled with other data sets. The data compiler of the SEDAR Data Workshop Life History Working group is not only responsible for the onerous task of aligning and formatting each provider's data, but also has to interpret various codes to get all data into a standardized format. Erroneous data, including misspellings, are also included in these data sets. The compiler then has to go back to each provider for corrections or explanations of their data. The SEDAR process would be more efficient and timely with the requirement for use of a standardization data template, metadata, QA/QC checklist, and EDA.

Table 1. List of field names and descriptions for the data standardization template to be used by data providers. This is a template specific for species listed as Coastal Migratory Pelagics, Reef Fish, and/or Snapper Grouper Complex under the Fishery Management Plans of the GMFMC and SAFMC, the list of fields for other Fishery Management Plans (e.g., Highly Migratory Species, Caribbean) may follow a similar process or procedure as much as possible, to the extent of its application to those species. .

<b>Field Type</b>	<b>Reported Units</b>	<b>Lookup Table Available</b>	<b>Proposed Field Names</b>	<b>Description</b>
Text			SEDAR	Year and SEDAR number (ex: 2015 SEDAR 45 Standard)
Date			SEDAR_Date_Submit	Month, Day, and Year data submitted to SEDAR (ex: 06/24/2015)
Text		Yes	Stock	Stock identification (ex: Gulf of Mexico, South Atlantic, Caribbean)
Text			Data_Provider	Name of Source providing the dataset to SEDAR (ex: NMFS - PCLAB; Gulf States; FWRI Fishery-Independent, etc.)
Text		Yes	Species	Spell out scientific name
Text		Yes	Fishing_Mode	Vessel type listed for fishery-dependent and fishery-independent samples identified to the trip level; Fishing Mode (ex: CM, CP, SH, HB, PR, SS)
Text		Yes	Fishery	Recreational (REC); Commercial (COM); Fishery-Independent (FI)
Text		Yes	Source	Program that collected a sample (ex: SRHS, SERFS, NCDMF, TIP, PCLAB, MSLAB, etc.)
Text			Sampling_Unit_ID	Interview # - identifies a trip within a Source (exception MRIP - angler intercept)
Text			Specimen_ID	Unique identifier for an individual fish within an interview
Text			Barcode_#	Unique identifier for an individual fish
Numeric			Month	Month sample collected
Numeric			Day	Day sample collected
Numeric			Year	Year sample collected

Field Type	Reported Units	Lookup Table Available	Proposed Field Names	Description
Text		Yes	State_Landed	Postal state abbreviations
Text		Yes	County_Landed	Fishery-dependent data only - county landed; else leave blank
Numeric		Yes	Headboat_Area	Headboat Area assigned by the SRHS.
Numeric		Yes	NMFS_Statistical_Grid	Shrimp statistical grid including sub-areas
Numeric	Decimal Degrees		Latitude	Latitude of where fish was caught.
Numeric	Decimal Degrees		Longitude	Longitude of where fish was caught.
Numeric		Yes	Gear_Code	Numeric Gear Code number
Text		Yes	Gear_Name	Text description of the Gear Code
Text		Yes	Gear_Group_Code	Collapsed grouping of the Gear Code (ex: HL, LL, etc.)
Numeric	m		Depth	If fishery-dependent and only one depth recorded, enter depth recorded. If fishery-dependent and a range of depths recorded, do NOT enter depth. If fishery-independent and only one depth recorded, enter depth recorded. If fishery-independent and a range of depths recorded, calculate average depth.
Text		Yes	Jurisdictional_Waters	Refers to water body jurisdiction (State, Federal, High Seas) where fish was caught.
Numeric	Miles		Distance_from_Shore	Record the distance from shore where the fish was caught.
Text		Yes	Bias_Type	Record if the sample was collected using a bias method.
Text		Yes	Smallest_Length_Unit	Record smallest length unit used in measurement (cm, mm, inches)
Numeric	mm		Observed_Maximum_TL	Measured maximum total length (tail pinched)
Numeric	mm		Observed_Natural_TL	Measured natural total length (tail not pinched)
Numeric	mm		Observed_FL	Measured fork length

Field Type	Reported Units	Lookup Table Available	Proposed Field Names	Description
Numeric	mm		Observed_SL	Measured standard length
Numeric	mm		*Predicted_Maximum_TL	Use meristic conversions to calculate - not to be completed by data provider
Numeric	mm		*Predicted_Natural_TL	Use meristic conversions to calculate - not to be completed by data provider
Numeric	mm		*Predicted_FL	Use meristic conversions to calculate - not to be completed by data provider
Numeric	mm		*Predicted_SL	Use meristic conversions to calculate - not to be completed by data provider
Numeric	g		Whole_Weight	Measured whole weight
Numeric	g		Gutted_Weight	Measured gutted weight
Text		Yes	Gutted_Weight_Type	Description of gutted weight recorded (head on; head off, etc.)
Numeric			*Predicted_Whole_Weight	Use meristic conversions to calculate - not to be completed by data provider
Text			Duplicate_Length	Y or N; Refers to whether the length is recorded in another data set.
Numeric			#_of_Annuli	Reader(s) consensus of annuli count
Numeric		Yes	Edge_Type	Reader(s) consensus of edge type
Numeric			Calendar_Age	Final age assigned to an individual fish to place that fish in a calendar year
Numeric			Fractional_Age	Fractional age assigned to an individual fish based on peak spawning date
Text			Sub_Sampled	Y = individual fish was subsampled from a larger set of samples for use in age determination; N = individual fish was not subsampled for use in age determination.
Text		Yes	Macro_Sex	Sex identified by field sampler based on macroscopic appearance of gonad; M, F
Text		Yes	Histo_Sex	Sex assigned after histology reading of gonad tissue;

Field Type	Reported Units	Lookup Table Available	Proposed Field Names	Description
				M, F, T
Text		Yes	Secondary_Sex	Secondary sex characteristics expressed in fish size, shape or color (e.g., copperbelly in gag, adipose fin in tilefish, ); M, F
Text		Yes	Repro_Phase	Reference document (Brown-Peterson 2011); see table in Lowerre-Barbieri et al. 2015.
Text		Yes	Macro_Maturity	Maturity based on macroscopic reading of reproductive tissue; Mature or Immature based on appearance of yolked (VTG) oocytes.
Text		Yes	Histo_Maturity	Maturity based on histology reading; Mature or Immature based on CA + VTG oocytes or based only on VTG.
Text		Yes	Spawner	Yes or no; Spawner vs. non-spawner - refers only to mature fish with spawning markers; leave blank if immature fish
Numeric			Batch_Fecundity_Estimate	# of oocytes in a batch for an individual specimen
Numeric	g		Gonad_Weight_Fresh	Fresh weight of gonad
Numeric	g		Gonad_Weight_Formalin	Weight of gonad preserved in formalin
Numeric	g		Gonad_Weight_Frozen	Frozen gonad weight

\*These data fields will be completed by the data compiler once meristic conversions have been made available.

Table 2. List of metadata descriptions to be accompanied by each data set and to be completed by all data providers. (A form will accompany each data set).

<b>Field</b>	<b>Field Description</b>
Year(s) collected	e.g., 1998-2001
Species	Scientific name
Describe sampling	e.g., random, systematic design, haphazard; fishery dependent (commercial, recreational) or independent Note if samples were collected with Exempted Fishing Permit during sampling
Type of data	Age, length only, reproduction
Spatial coverage	e.g., general geographic description, latitude/longitude, range (include map)
# and type age structures	e.g., otolith, spine, vertebrae
# samples aged	Were all age structures aged? If no, why
Age assignment	If age data, describe how calendar and fractional ages were calculated
Reader agreement	If age data, describe how reader agreement calculated. Provide indices of precision and/or age bias plots
# of reproductive tissues	e.g., were all reproductive tissues staged and how tissues viewed (macroscopic, microscopic, histologically)
Reproductive staging assignment	Describe methods of how reproductive stage (reproductive phase) and maturity assigned and fecundity measured
Funding source	Provide name and copy of final report (submit as DW reference report)
Contact person	Name, phone number and email

***Issue 5: Quality Assurance/Control (QA/QC) and Exploratory Data Analysis (EDA)***

Life history data submissions need to include detailed metadata, have QA/QC and EDA completed prior to submission (remove outliers, etc.), and include details on whether or not samples are representative for catch at size/age (CAS/CAA) summaries. Data submissions need to be accompanied by basic analysis and summary of data.

**Potential Solutions**

- Provide a check list of quality assurance/quality control items for each dataset
- Provide a list of summary tables and basic analysis which need to accompany each dataset
- Develop a standardized diagnostic toolbox for age and length composition data, composed of standardized figures and/or tables to review data.
- Develop standardized diagnostic approaches using R (e.g., FSA, fishmethods packages).

**Additional Resources**

- Bolker 2008 chapter 2 EDA and graphics
- PW7-10\_SEDAR25\_BlackSeaBass\_SAR.pdf
- PW7-33\_SEDAR42\_GoMRedGrp\_DW\_report\_disclaimer\_watermark.pdf

**Final Best Practice Recommendations**

- Each data provider will need to conduct QA/QC of their raw data and complete a list of basic EDA (see Table 5 for list) on his/her own data set. Any outliers found in the data should be corrected or eliminated from the full data set prior to data submission. The corrections or eliminations should be made to the original data source, so that the errors or outliers do not reoccur in future data submissions.
- The checklist of requested QA/QC (Table 3), checklist of summary tables (Table 4), and checklist of EDA (see Table 5) needs to accompany each data set submitted to the data compiler of the SEDAR Data Workshop Life History Working group.
- If data are received from a data provider that does not meet the described standardization, metadata description and check list of QA/QC and EDA (see Life History Technical Issue: Data Standardization and Metadata), the data compiler of the SEDAR Data Workshop Life History Working group has the choice of returning the data to the original data provider and request the check list of QA/QC and EDA be completed.

**Justification**

The SEDAR process would be more efficient and timely with the requirement for use of a standardization data template, metadata, QA/QC checklist, and EDA for each data set. These QA/QC and EDA will help find and fix errors before the data are sent to the data compiler of the SEDAR Data Workshop Life History Working group.

Table 3. Checklist of Quality Assurance/Quality Control to accompany each data set submitted by a data provider. (A form will accompany each data set).

<b>Completed (Y/N)</b>	<b>Item</b>
	Valid field codes* (see standardization data template, look up tables)
	Valid field formats (see standardization data template; e.g., no formulas, leave blank cells - blank)
	Correct spelling
	Meristics reasonable for species (e.g., fork length < total length)
	Required units for meristics (see standardization data template)
	Review outliers (remove) typically these records are <1% of entire dataset
	Undersized fish – describe why in dataset

Table 4. Checklist of Summary Tables to accompany each data set submitted by a data provider. (A form will accompany each data set).

<b>Completed (Y/N)</b>	<b>Tables (# of biological data – age/reproductive data separate)</b>
	Year
	State Landed
	Source
	Fishing_Mode
	Gear_Group_Code
	Fishing_Mode & Gear_Group_Code
	Total # age structures collected and read

Table 5. Checklist of Exploratory Data Analysis (EDA) to accompany each data set submitted by a data provider. (A form will accompany each data set).

<b>Completed (Y/N)</b>	<b>Exploratory Data Analysis (EDA)</b>
	Scatterplot: length* vs length
	Scatterplot: weight* vs length
	Scatterplot: weight vs age
	Scatterplot: length vs age
	Boxplot^: length
	Boxplot^: weight
	Boxplot^: age
	Mean Size-at-Age^
	Length Frequency by Year (by Fishing_Mode) (e.g., 25 mm bins)

\* length types (maximum total length, natural total length, fork length, standard length) and weight types (whole, gutted)

^ suggested to be completed by Fishing\_Mode and Gear, State, Year

**Issue 6: Natural Mortality**

There are approximately 14 regressions to calculate a point estimate of natural mortality (M). These regressions incorporate the recommended maximum age, predicted growth curve parameters and age at maturity. In addition to point estimates of natural mortality there are various vectors to calculate age-specific natural mortality (e.g., Lorenzen 1996, 2005; Charnov et al. 2013), which may also rely on the recommended point estimate of natural mortality for scaling purposes.

Issue: Are all point estimates of natural mortality necessary to estimate for all species? How should uncertainty in natural mortality be recommended?

Issue: Is there a recommended age-specific vector of mortality? Should this be species specific? Should this be model specific?

Issue: Timing. The data inputs for calculating natural mortality are typically available during or after the data workshop.

**Potential Solutions**

- Use longevity (maximum aged fish) to estimate natural mortality
- Calculate the 14 point estimates of natural mortality using the recommended data inputs (maximum age, growth curve parameters, and age at maturity). Provide the Data Workshop Panel with a range of natural mortality values along with the recommended point estimate from the SEDAR Life History Working Group.
- Calculate the point estimate of natural mortality using the new regression based on additional datasets of empirical data (see Then et al. 2014)
- Provide a reasonable suggestion for sensitivity around natural mortality (e.g., use the variation around the maximum aged fish given multiple reads of the ageing structure)
- Calculate the age-specific vector of natural mortality (e.g., Lorenzen 1996, 2005; Charnov et al 2013). The vector should be appropriately scaled, given the start age of the assessment model and peak spawning or calendar age (see Brodziak et al. 2011).

**Additional Resources**

- PW7-48\_NOAATechMemo119\_NaturalMortality.pdf
- PW7-75\_Charnov et al 2013\_agespecificM.pdf
- PW7-91\_Kritzer et al 2001\_demo\_parameters.pdf
- PW7-93\_Lorenzen1996 weight mortality.pdf
- PW7-92\_Lorenzen 2005 pop dyn.pdf
- PW7-113\_Then et al 2013\_pointestimate\_M.pdf

### Final Best Practice Recommendations

1. Direct estimates of natural mortality ( $M$ ) are best, but in the absence of those, empirical methods are acceptable.
2. Determine a maximum age ( $t_{\max}$ ) based on the oldest specimen aged. Include the oldest aged sample in reference collections to obtain multiple reads to confirm age and provide uncertainty around the maximum age ( $t_{\max}$ ).
3. Calculate the natural mortality point estimate from regressions using a  $t_{\max}$  input.
4. Determine age at full recruitment
5. Determine length at mid-year for age-varying natural mortality assessment
6. Calculate and use an age-varying natural mortality estimate as a model input (i.e. Lorenzen 2005 or Charnov et al. 2013).
7. Examine survival from age at full recruitment to oldest fish to determine if value is biologically reasonable.
  - a. If not reasonable:
    - i. scale cumulative survival from age-varying estimate to cumulative survival of point estimate if not included in the estimator.
    - ii. examine another estimator
8. Determine uncertainty around reading of oldest fish by calculating a CV for inter-reader precision estimates on that specimen.
9. Calculate sensitivities around the base run using the same age-varying natural mortality estimates, but using the upper and lower CV values as the maximum age inputs.
10. The natural mortality analyst of the SEDAR Data Workshop Life History Working Group will be responsible for providing the recommended  $t_{\max}$ , the point estimate of natural mortality, the age-varying natural mortality estimates, and the uncertainties around maximum age (to inform sensitivities around  $M$ ).

### Justification

1. While a direct estimate of natural mortality is preferable, as it is species or population specific, it is data intensive, thus limiting their application to relatively data-rich stocks (Then et al. 2014). Empirical methods are useful in instances when the necessary data available for a direct estimate are not available.
2. Though  $t_{\max}$  is related to sample size and age distribution, most assessments have relatively large sample sizes (>1000) for age estimates and based on the results of Kritzer et al. (2001), there is increased likelihood of including the older fish in the population at these larger sample sizes.
3. A recent comparative study examining empirical natural mortality point estimates (Then et al. 2014) determined  $t_{\max}$  to have the strongest correlation to  $M$  compared to von Bertalanffy growth curve parameters( asymptotic length,  $L_{\infty}$  and growth coefficient,  $k$ ) and temperature.

4. Because many of the original data sources compiled for empirical natural mortality estimators are based on catch-curve analysis, these methods are only applicable for those age classes fully recruited to the fishery. An examination of the catch-curve is required to determine most appropriate method for identifying fully-recruited fisheries (i.e. age mode of catch-curve, age mode of catch curve +1, etc.)
5. The model inputs require a mid-year estimate, thus size at mid-year needs to be determined for age-varying estimates of natural mortality. The model input structure will determine the means of determining mid-year (i.e. year based on calendar or spawning season).
6. Natural mortality varying with age and in turn size is widely accepted (Lorenzen 1996), as such, an age-varying estimate is preferred for assessment model inputs.
7. As catch-curve analysis is the primary means of calculating natural mortality directly and these were used to develop age-varying empirical methods, it is most appropriately applied only to fully-recruited age classes in assessments. Because of this, the survival to the oldest age can be calculated to see if reasonable values are obtained based on the samples collected. This provides a checkpoint to determine the accuracy of the estimate and a potential means to explore other options if that value is unreasonable, such as scaling to the point estimate cumulative survival or using a different empirical method.
8. By determining uncertainty around age estimates using multiple readers for  $t_{\max}$ , this is a means to provide an uncertainty around this point value.
9. The uncertainty incorporated into the  $t_{\max}$  value is used as bounds for sensitivity analyses in the final model.

### ***Issue 7: Ageing Error Matrices***

Age-structure stock assessments in the southeast incorporate ages determined from multiple ageing facilities, multiple agers from each ageing facility, and ages determined by different agers from various time periods. It is important to document the level of precision or bias in age determination. How ageing error is incorporated into the stock assessment model can be specific to the model.

### **Potential Solutions**

- Species-specific reference collection of age structures should be circulated within and among ageing facilities to calculate indices of precision and ageing error matrices in order to incorporate ageing error in age-structure stock assessments (Palmer et al. 2014).

### **Additional Resources**

- PW7-121\_S42\_DW\_13\_RDG\_Precision\_v2.pdf
- PW7-105\_Reeves 2003 age error SA management.pdf
- PW7-101\_SS technical manual.pdf

- PW7-114\_Williams Shertzer 2015 BAM.pdf

### **Final Best Practice Recommendations**

- The data compiler of the SEDAR Data Workshop Life History Working Group should verify that all data sets include the proper metadata description that includes the type of ageing structures used, how ages (calendar, fractional) were calculated, and how agreement between readers was calculated.
- Create and distribute species-specific reference collection of age structures within and among ageing facilities to calculate indices of precision and ageing error matrices. The reference collection should include examples of fish from all age classes, including those ages at the extremes (young, old). The reference collection should be circulated as soon as a species is identified on the SEDAR schedule (2-3 years before Data Workshop).
- South Atlantic - Provide tables of readings (# of annuli, edge type, calendar age) to age and growth analyst of the SEDAR Data Workshop Life History Working Group to calculate an ageing error matrix for inclusion in assessment models.
- Gulf of Mexico - Provide tables of readings (# annuli, edge type, calendar age) to age and growth analyst of the SEDAR Data Workshop Life History Working Group to calculate an ageing error matrix, which involves calculating standard deviations at age (averaged across ageing facilities and time periods, and for specific time periods and primary readers). The ageing error matrix is provided to assessment staff in tables and figures (within a DW working document) for inclusion in assessment models.
- While these recommendations are specific for species listed as Coastal Migratory Pelagics, Reef Fish, and/or Snapper Grouper Complex under the Fishery Management Plans of the GMFMC and SAFMC, the reporting ageing error for other Fishery Management Plans (e.g., Highly Migratory Species, Caribbean) may follow a similar process or procedure as much as possible, to the extent of its application to those species.

### **Justification**

Reporting the bias and imprecision associated with age estimates is helpful not only to the persons involved in ageing, but also to the stock assessment analyst. Errors in ageing can influence any stock assessment input parameter that relies on age (e.g., catch-at-age data, growth model parameters, age at maturity, stock weights at age, etc.). Therefore, ageing error can affect the results of the stock assessment as well as the management advice based on those results (Reeves 2003). Incorporating an ageing error matrix (either as a vector of variability around true age or as a matrix of probability of true age to some other age) into the stock assessment model can help account for the uncertainty in age estimations (Methot 2000; Williams and Shertzer 2015).

**Issue 8: Discard Mortality**

Discard mortality can be described in three levels: immediate, short-term and long-term (Pollock and Pine 2007). Immediate discard mortality (i.e., post release mortality) is measured from observations of fish immediately after being handled during normal fishing operations. Short-term mortality is typically measured in experimental studies, such as when fish are held in confinement (i.e., cage, holding tank) following exposure to capture or simulated capture (i.e., barometric chamber). Long-term mortality is tracked with tagging studies by modeling the recapture rate of marked fish or actively tracking individual fish with acoustic tags. Each of these methods (surface observation, experimental, and tagging) has associated caveats and assumptions that need to be considered when using resulting mortality estimates.

**Potential Solutions**

- Complete a metadata analysis of discard mortality estimates by species (Gulf of Mexico red snapper – Campbell et al. 2014; Gulf of Mexico gag grouper – Campbell et al. 2013).
- For species with no known discard/release mortality research, estimates can be drawn from other species that are caught by similar gear in the same fishery
- Form a separate ad-hoc panel before or during SEDAR data workshop that includes data providers, analysts, and professionals from the fishing industry representing both commercial and recreational sectors to review previous estimates and review new data (collected by on-board observers, research studies) to recommend estimates (see red grouper, SEDAR42).

**Additional Resources**

- PW7-72\_Campbell et al. 2010 RS immediate mortality.pdf
- PW7-73\_Campbell et al. 2014 red snapper meta analysis release mortality.pdf
- PW7-122\_SEDAR33-AW23-Campbell et al. 2013 Meta analysis gag release mortality.pdf
- PW7-111\_SEDAR41\_DW33\_Sauls\_etal.\_RSForHireObserver\_8.3.2014.pdf
- PW7-33\_SEDAR42\_GoMRedGrp\_DW\_report\_disclaimer\_watermark.pdf

**Final Best Practice Recommendations**

- Remove the Discard Mortality from the SEDAR Data Workshop Life History Working Group Terms of Reference.
- Form a separate ‘ad-hoc’ SEDAR Data Workshop Discard Mortality Working Group that includes data providers, analysts, and professionals from the fishing industry representing both commercial and recreational sectors. This working group typically includes members of the other working groups (Life History, Commercial, Recreational, Indices), so coordinating discussions prior to the SEDAR Data Workshop may be more productive. The recommended Terms of Reference for Discard Mortality Rates should be added to this working group (see example Red Grouper, SEDAR42).

- The SEDAR Data Workshop Discard Morality Working Group would be responsible for reviewing previous estimates and review new data (collected by on-board observers, research studies) to make recommendations for discard mortality estimates (by fishing sector, if data available).
- The SEDAR Data Workshop Discard Morality Working Group would be responsible for documenting their recommendations in a SEDAR Data Workshop Working Paper.
- The SEDAR Commercial Working Group proposed two special topic workshops to discuss discard mortality and estimating commercial directed discards (an abridged description is below):
  - Discussions on discard mortality rate and estimating the number of discards for the commercial fishery are major concerns at SEDAR Data Workshops. A workshop is needed to determine if the data collection programs currently available for SEDAR workshops are collecting the data necessary for determining discard mortality rates and what types of analysis can be employed with that data to do those calculations correctly. Discard rates are typically calculated from collection programs and then applied to effort estimates for a total calculation of discards. Currently, there are two sources of discard data: observer programs in the South Atlantic and Gulf of Mexico Snapper-Grouper and Coastal Pelagic fisheries and a sub-sample of commercial fishers that are required to fill out discard information when they turn in their logbooks. However, both of these methods of data collection have some nuances that need to be explored statistically to determine if the method of data collection is appropriate to be used to determine total discards for a directed fishery.

### **Justification**

Due to the wide range in reported discard mortality estimates from the various methods (surface observation, cage studies, hyperbaric chamber simulations, and tag-recapture models), the estimates used to parameterize previous assessment models, and the nature of the potential interacting factors (timing of observation, exclusion of predators, insufficient tag returns, or sample size issues) (Campbell 2010), a comprehensive evaluation of pertinent research is needed. This evaluation involves reviewing the literature, past assessments, information from recreational and commercial working groups, and industry panel members, in order to make reasonable recommendations for discard mortality. As such, this is a broader issue involving expertise and information outside the scope of the SEDAR Data Workshop Life History Working Group. Since a majority of fisheries in the U.S. South Atlantic and Gulf of Mexico are characterized by having a substantially large number of discards (in both the recreational and commercial fisheries), it is important that the recommended discard mortality estimates are representative of the fisheries.

**Issue 9: Growth**

Estimates of growth based on data that are derived mainly from fishery-dependent sources bears caution due to size limits and rare observations at extremes of the size distribution that can bias the resulting parameters of growth (Haddon 2001).

**Potential Solutions**

- Apply a size-modified von Bertalanffy model to predict growth parameters that take into account the non-random sampling due to minimum size restrictions (McGarvey and Fowler 2002; Diaz et al. 2004).
  - This model has been in use in the Gulf of Mexico since 2004 and since 2006 in the South Atlantic. This model has been compiled in Microsoft Excel, R, and ADMB.
  - The ADMB code for this model can predict growth using a choice of the variance structures in the size-at-age data: constant standard deviation with age, constant coefficient of variation with age, variance proportional to the mean, coefficient of variation increases linearly with age, coefficient of variation increases linearly with size. There is also an option for bi-phase growth model (linear: age 0 – 1; non-linear: age 1-maximum age).
- Provide model diagnostic plots (e.g., residual patterns, probability plots) and model objective functions (e.g., negative log-likelihood, AICs) to evaluate the predicted growth parameters.

**Additional Resources**

- Haddon 2001 Chapter 8 Growth.pdf
- PW7-99\_McGarvey and Fowler 2002 size modified.pdf
- PW7-78\_Diaz et al 2004 RS growth models.pdf

**Final Best Practice Recommendations**

- Apply von Bertalanffy growth model to predict growth parameters from age and length data.
- If age and length data shows truncation due to fishery regulations (i.e., minimum size limits), we recommend applying the size-modified growth model that takes into account the non-random sampling due to minimum size restrictions (Diaz et al. 2004, based on McGarvey and Fowler 2002).
- If the growth model does not reliably predict growth at the younger ages, complete further model compilations using alternative parameter starting values (e.g., fixing  $t_{\text{zero}}$ , biphasic model age).
- Compare model fits to data using standard model diagnostics (e.g., residual distribution plots, residuals at age, q-q plots) and model objective functions (i.e., nLL, AIC).

- For those parties (Miami, Beaufort, Panama City) using the size-modified growth model, establish a protocol to keep users updated with ADMB code changes.
- While these recommendations are specific for species listed as Coastal Migratory Pelagics, Reef Fish, and/or Snapper Grouper Complex under the Fishery Management Plans of the GMFMC and SAFMC, predicting growth for other Fishery Management Plans (e.g., Highly Migratory Species, Caribbean) may follow a similar process or procedure as much as possible, to the extent of its application to those species.

### **Justification**

Providing reasonable parameters of the von Bertalanffy growth model is important since these parameters are used within the assessment model to make prediction (e.g., size-at-age data, age/size selectivity). Each of the assessment models (Stock Synthesis and Beaufort Assessment Model) used in the Gulf of Mexico and South Atlantic have the option to either estimate the von Bertalanffy growth model parameters internally or to use the growth model parameters estimated externally directly in the assessment model.

### ***Issue 10: Reproduction Decision Tree***

SEDAR assessments vary in the measure of reproductive potential used and thus the data needed. In addition there is emerging understanding that reproductive resilience will be affected by factors other than stock abundance and fecundity.

Issues:

- (1) There is emerging understanding that the best measure of reproductive potential for a stock will be determined by its reproductive strategy. Based on current knowledge, the four aspects of a reproductive strategy with the greatest impact on productivity are: gender system, fecundity, reproductive value with age, and the spatio-temporal distribution of spawning. Data needs to estimate reproductive potential thus will vary with species but typically are driven by data availability.
- (2) Maturity estimates play an important role in all estimates of reproductive potential and their accuracy can be affected by a number of factors, including: the criterion for identifying maturity (macroscopic staging or histological staging, and the histological developmental stage considered indicative of maturing or mature fish), temporal filtering (using only fish collected during the spawning season), and spatial distribution of sampling. There is also increasing evidence that size and age at maturity can change over time due to fishing pressure.
- (3) The need for standardization of reproductive methodology, to include: histological and macroscopic staging and sex identification, as well as estimates of sexual maturity, fecundity. After standardization of reproductive staging, develop the process to allow for inter-lab calibrations.

## Potential Solutions

### (1) Reproductive potential issue

- a. Solution: Hold a workshop with both reproductive biologists and stock assessment scientists to discuss how reproductive inputs affect fisheries management reference points and highlight future data needs
- b. Solution: Develop a decision tree to recommend the measure of reproductive potential based on the species' reproductive strategy and available data--both of which impact data needs and stock assessment model options.
  - i. Traditionally stock assessments have been based on the assumption that fecundity drives recruitment.
    1. When fecundity data are not available, Spawning Stock Biomass (SSB) is typically used as a proxy, with the only reproductive data needed being an estimate of size and age of female sexual maturity and sex ratios.
      - a. Data needs: SSB for iteroparous species is based on the estimated abundance of mature females at age, mean weight at age, the proportion of females that are mature at a given age, and estimates of natural mortality and fishing mortality to predict survivorship in any given year.
      - b. Sometimes gonad weight is used as better measure of reproductive potential than SSB, in which case gonad weight data are needed.
    2. When a measure of fecundity is available, typically stock fecundity will be estimated based on size-fecundity relationships.
      - a. For species with indeterminate fecundity, this is often a measure of batch fecundity (i.e., the number of eggs released in a spawning event).
    3. An age-based fecundity vector is considered the best measure of fecundity-based reproductive potential. However, we often do not have the data for this measure of reproductive potential.
      - a. Species which are total spawners with determinate fecundity, typically spawn once in a spawning season (e.g., mullet, Striped Bass) and annual fecundity can be estimated based on the number of secondary growth oocytes in the ovary.
      - b. Species with indeterminate fecundity spawn multiple times in a spawning season and to estimate annual fecundity it is necessary to estimate batch fecundity, spawning fraction, and the spawning season duration. Each of these parameters typically shows increasing trends with size and age.

- ii. There is growing awareness that spatio-temporal reproductive behavior (i.e., where and when fish spawn) may impact productivity as much or more than fecundity (Maunder and Deriso, 2013). A spatio-temporal component could be included in the assessment model (see Erisman et al. 2011, Heyman et al. 2005, Sadovy de Mitcheson et al. 2013).
- iii. For sequential hermaphrodites, the best current practices are to use combined (male and female) spawning stock biomass (Brooks et al. 2008, Shepherd et al. 2013).
  - 1. Important caveat: There is a need for a measure of the accuracy of the sex determination method, as sex is often uncertain or measured with error, particularly when using macroscopic or secondary sex staging methods.
  - 2. How fishing impacts these species is dependent on spawning site density and distribution (i.e., aggregation spawners like Gag versus small group spawners like Black Sea Bass and Red Grouper), as sex change is likely socially mediated.

(2) Maturity estimates issue

- a. Solution: Hold a workshop to address factors which affect maturity estimates with the intent to standardize the process used, or at least ensure there is adequate documentation of the sampling design and criterion to assign maturity. This will allow temporal comparisons of maturity schedules for a given species/stock.

(3) Standardization of reproductive methodology

- a. Solution: Begin to evaluate other aspects of reproductive strategies which will impact reproductive resilience (Brodziak et al. 2015, Lowerre-Barbieri et al. 2015).
- b. Solution: There is a need to standardize reproductive staging (see Brown-Peterson et al. 2011) and develop inter-laboratory calibrations.
- c. Solution: There is also a need to address factors which affect uncertainty in estimates of spawning fraction as this greatly affects estimates of annual fecundity in indeterminate species (Fitzhugh et al. 2012, Cooper et al. 2013, Lowerre-Barbieri et al. 2011b).

### Additional Resources

- Forms of reproductive potential used in SEDAR assessments (Excel spreadsheet compiled by G. Fitzhugh; **PW7-49**)
- See literature cited

### Final Best Practice Recommendations (See Figure 1)

- 1) Gonochoristic species
  - a. Traditional measure has been a fecundity-driven concept with the decision for the measure of reproductive potential based on data availability

- i. Decision criterion: data availability (see Potential Solutions (1), part b), with outcomes increasing in resolution
      - A. Outcome 1: Female spawning stock biomass, as a proxy for fecundity
      - B. Outcome 2: Size-based estimates of stock fecundity
      - C. Outcome 3: Age-based fecundity matrix
    - b. Emerging understanding: spatio-temporal reproductive behavior may be as important as fecundity; and larger, older fish make disproportionately greater contribution to reproductive success
      - i. Decision criterion: If fish aggregate in large numbers at relatively few spawning sites and over restricted times
          - A. Outcome 1: A spatio-temporal component could be included in the assessment model
        - ii. Decision criterion: If there is evidence of any of the following: increased reproductive success with age, severe age truncation, or indications of fisheries-induced adaptation
          - A. Outcome 2: Conduct assessment model sensitivity run that includes reduction/elimination of older ages
- 2) Sequential hermaphrodites
  - i. Decision criterion: if there is concern about sperm limitation in protogynous species, the terminal sex must be integrated into reproductive potential estimates
      - A. Outcome 1: Assess the population proportion of the terminal sex and develop a measure of reproductive potential which includes the terminal sex
        - a. Current suggested practices are to use combined biomass
    - ii. Decision criterion: if spawning is not restricted spatio-temporally and sperm limitation is not an issue
      - A. Outcome 2: Follow the decision rules for gonochoristic species

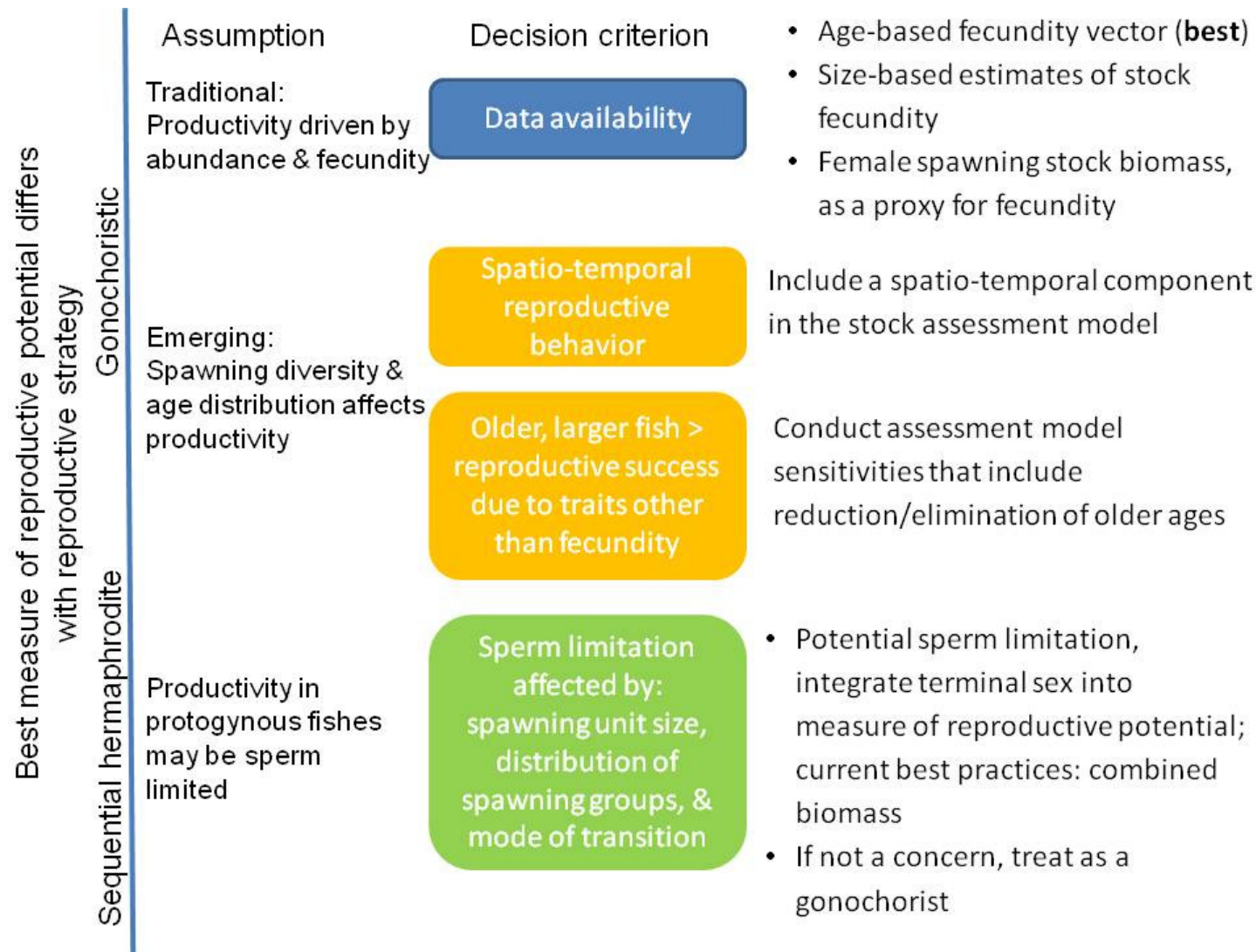
### Justification

Most stock assessments to date in the Gulf of Mexico and South Atlantic have been based on the assumption that egg production (annual fecundity) drives recruitment, for species listed as Coastal Migratory Pelagics, Reef Fish, and/or Snapper Grouper Complex (GMFMC, SAFMC). When fecundity data are not available, SSB is typically used as a proxy, with the only reproductive data needed being an estimate of size and age of female sexual maturity and sex ratios. This stock–recruitment relationship attempts to evaluate how current stock abundance (i.e., SSB) relates to future abundance of catchable fish (Mehault et al. 2010). However, there is

growing awareness that we need to move beyond SSB as the default measure of reproductive potential (Lowerre-Barbieri et al., 2011a). It has been increasingly shown that SSB is an insensitive index of stock reproductive potential (Marshall 2009), and total egg production has been suggested as an alternative index (Marshall 2009, Morgan et al. 2009, Mehault et al. 2010, Murua et al. 2010). A long-held assumption is that higher fecundity confers greater resilience to fishing pressure, but many highly fecund species have been overfished (Sadovy 2001) and there is growing recognition that recruitment is impacted by reproductive traits, other than fecundity, which affect offspring survival (Jakobsen et al. 2009). These factors include egg quality (Carter et al. 2015, Kamler, 2005), where and when fish spawn (Marteinsdottir and Begg 2002, Rowe and Hutchings 2003, Maunder and Deriso 2013), gender system (Heppell et al. 2006, Ellis and Powers 2012, Shepherd et al. 2013), depensation or the Allee effect (Frank and Brickman 2001, Hutchings and Reynolds 2004), and size-specific fishing mortality, which has the potential to remove the largest, oldest fish which may disproportionately contribute to reproductive success (Hixon et al. 2014).

To improve the estimation of reproductive potential in stock assessments, a decision tree was developed to recommend the appropriate measure of reproductive potential based on the species' reproductive strategy and available data--both of which impact data needs and the choice of stock assessment model (Figure 1). In addition, webinars or workshops to address the following methodological issues will also lead to improved estimation of reproductive potential: 1) standardization of methods to estimate maturity, 2) further refinement and implementation of standardized reproductive staging (see Brown-Peterson et al. 2011), 3) development of reproductive staging error matrices, 4) determination and evaluation of other aspects of reproductive strategies which will impact reproductive resilience, and 5) factors which affect uncertainty in estimates of spawning fraction.

Figure 1. Reproduction decision tree to estimate reproductive potential in stock assessments based on the species-specific reproductive strategy and the available data.



**Issue 11: Life History Documentation**

Life history inputs and choices may change during the assessment workshop (or webinar) or may be affected by the type of assessment model applied to the data.

**Potential Solutions**

- During the SEDAR Data Workshop Data Scoping Call: The lead of the SEDAR Data Workshop Life History Working Group will present a summary (e.g., table) of Life History inputs (e.g., length type, measurement units, age structure type, form of reproductive potential, M, growth parameters) from previous assessment. Participants on the call will evaluate the previous Life History inputs to determine if changes are warranted for these inputs.
- During the SEDAR Data Workshop: In a working paper and/or Data Workshop (DW) report, provide details of methods used to estimate life history parameters. As needed, a working paper can be revised during the DW if data and/or analysis are updated, with completion after the DW.
- During the AW: If the assessment panel deviates from recommendations during the DW or expands on the analysis, documenting and communicating these decisions will help the life history panel improve the process and have a clearer understanding of data needs for the stock being considered. A standard assessment report format, including a summary table of life history inputs, would be helpful in accessing information about life history decisions (e.g., if an input has been changed since the DW).

**Additional Resources**

- None

**Final Best Practice Recommendations**

- Allow completion and documentation of any methods or updated analysis occurring throughout the data workshop. If only a brief report or summary is needed, this update can be accomplished within the data workshop report. If more detailed treatment is needed, working documents should be revised shortly after the end of the data workshop.
- Depending on complexity of issues and data inputs, a representative of the life history panel from the Data Workshop should be an “appointed observer” for the Assessment Workshop/Webinars. This would be contingent on scheduling and available staff.
- Adopt a standardized assessment report format which would facilitate identification and understanding of inputs, results and any changes occurring since the data workshop.
- An assessment summary report (as suggested by Jessica Stephen, SERO presentation during SEDAR Best Practices plenary on Friday, June 26, 2015) could be provided by the assessment working group and inserted at the beginning of the stock assessment report. The summary would include the assessment years of reference, list of data sets, stock ID

for the management unit, stock status and determination, projections, summary listing of landings, discards, and indices, and would also include summary of key life history parameters and units, such as:

- Notation of fixed vs estimates of parameters within model
- von Bertalanffy growth parameters and model description
- Age/Length at Maturity<sub>50%</sub> and Transition<sub>50%</sub> - model name and parameters
- Conversions for length-length, weight-length, weight-weight
- Sex-ratio
- Natural mortality and model description
- Form of reproductive potential including units
- Length type used in the assessment
- Length bin definition (e.g. 325 – 334 mm )

Note – the above list may not inclusive of all fields for all species.

### **Justification**

These recommendations are meant to minimize error due to miscommunication and clarify important inputs and decisions to be passed from the Data Workshop to the Assessment Team and subsequent Review Panel. At the onset of the next assessment, a review of information from the previous assessment improves continuity and communications (e.g., data scoping call) and results in more efficient and timely delivery of data to the analysts.

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### 3.3.2 Commercial

#### **Summary**

The Commercial Technical Group addressed six issues that pertained exclusively to the commercial group, but also discussed four issues that required input from multiple groups. All of the issues addressed were identified prior to the workshop. Issues requiring input from the commercial group included corrections for unidentified or mis-identified fish, identification of primary data sources and how to deal with late delivery of data, partitioning of Monroe County landings to the South Atlantic and Gulf of Mexico, estimating uncertainty of landings, estimating commercial directed discards, and estimating shrimp bycatch. The issues requiring input from multiple groups included identification of stock boundary, delivery of length and age

composition, identification of biased age and length samples, and converting catch in numbers to catch in weight and vice versa, as well as converting processed pounds to whole pounds.

***List of Acronyms***

ACCSP-Atlantic Coastal Cooperative Statistics Program, which maintains a warehouse of trip ticket and landings data from ME-FL.

ALS-Accumulated Landings System, which is the NMFS landings information housed at the SEFSC.

CFDBS-Commercial Fisheries Database System, which is NMFS landings information housed at the NEFSC.

CFLP-Commercial Fisheries Logbook Program, which is the logbook program for vessels participating in SE regulated fisheries and is run out of the SEFSC.

CFMC-Caribbean Fishery Management Council responsible for management of federal fisheries in the Caribbean.

FIN-Fisheries Information Network which includes ACCSP and GulfFIN on the east coast.

GMFMC-Gulf of Mexico Fishery Management Council responsible for management of federal fisheries in the US Gulf of Mexico.

GSMFC-Gulf States Marine Fisheries Commission, which is a compact of state and federal partners managing fishery resources in the Gulf of Mexico.

GulfFIN-Gulf Fisheries Information Network, which is a repository for fishery information collected by state and federal partners in the Gulf of Mexico.

HMS-Highly Migratory Species, which is one the species managed by the NMFS Atlantic Highly Migratory Species Division.

IFQ-Individual Fishing Quota, which primarily refers to the Gulf of Mexico IFQ Program.

NEFOP-Northeast Fishery Observer Program, which covers primarily NE regulated fisheries from ME-NC.

NEFSC-NMFS Northeast Fisheries Science Center, which is headquartered at Woods Hole, MA with field labs in locations from ME-NJ.

NMFS-National Marine Fisheries Service which is an agency under the US Department of Commerce that is charged with regulating federal marine fisheries.

PDC-Pelagic Dealer Compliance, which is a dataset of HMS quota reports from seafood dealers.

POP-Pelagic Observer Program, which is run out of the SEFSC in Miami.

SAFMC-South Atlantic Fishery Management Council responsible for management of federal fisheries in the US South Atlantic.

SBLOP-Shark Bottom Longline Observer Program, which is run out of the SEFSC Panama City lab.

SEFSC-NMFS Southeast Fisheries Science Center, which is headquartered in Miami with field labs in locations from NC-TX.

TIP-Trip Interview Program, which is a dockside sampling program collecting length and age samples, as well as other information about commercial fishing trips.

### ***Issue 1: Unclassified / Mis-identified Fish***

Sometimes landings may not be reported to species and are instead reported as unclassified groupings of fish (e.g. unclassified snapper or grouper). This is typically more of an issue early in the time series before the species was managed. The unclassified landings may be comprised of multiple species. If the landings for the species of interest may be incorporated in significant quantities in the unclassified category, it is important to apportion the unclassified landings into the species of interest. Multiple data sources can be used to apportion unclassified fish and a consistent approach needs to be developed. Methods used to apportion unclassified fish may be species specific, but a decision tree could potentially be developed.

### **Potential Solutions**

- Calculate proportion of species of interest to total of species included in unclassified category (e.g. red grouper to total identified grouper) by year and state. Apply proportions to the unclassified landings with the corresponding year and state. When it is not possible to get yearly proportions, calculate a mean proportion by state using the closest 3 or 5 year time period where landings were reported to species. (SEDAR42 Data Workshop Report: PW7-33)
- For years in which landings are reported to species, calculate the proportion of the species of interest to the total of species included in the unclassified category (e.g. snowy grouper to total identified grouper) by year, gear, and state. When it is not possible to get yearly

proportions, calculate a mean proportion by gear and state using the closest 5 year time period where landings were reported to species. (SEDAR36-WP11: PW7-27)

- Calculate average proportion of species of interest to the total of species included in the unclassified category (e.g. snowy grouper to total identified grouper) by year and gear using either the Trip Interview Program (TIP) or Coastal Fisheries Logbook Program (CFLP) data. Decision on which data source to use to calculate proportions is done on a state level and takes into consideration sample size, length of time series, etc. Apply the proportions to the unclassified landings with the corresponding year, gear, and state. (SEDAR 32 Stock Assessment Report: PW7-19)

### **Final Best Practice Recommendations**

Unclassified landings are defined as an aggregation of species to unclassified and/or higher taxonomic level. The handling of unclassified landings should be done by determining if each approached can be used and moving to the next if not possible. Preferred approach would use information obtained by trained samplers, then information from fishermen if information from samplers is insufficient, and finally, information from dealers if sampler and fisherman information is insufficient.

1. Develop a proportion using TIP data to apply to the unclassified landings.
2. Develop a proportion using CFLP or HMS vessel logbook data to apply to the unclassified landings.
3. Develop a proportion of identified species in the landings to apply to the unclassified landings

For landings north of North Carolina Northeast Fisheries Observer Program (NEFOP) data should be obtained and used to develop a proportion to apply to the unclassified landings. Survey and dockside sampling data can also be used when necessary.

Average proportions should be applied to the historical unclassified landings. Management regulations should be considered when these proportions are applied and adjustments determined and justified as needed. Data gaps by year and state should apply a proportion from adjacent available data.

Mis-identified landings are defined as landings in which the wrong species is identified. Mis-identification issues should be raised and defined prior to the data workshop if suspected.

*South Atlantic:* This is not an issue of major concern in the commercial fisheries regulated by the South Atlantic Fishery Management Council (SAFMC). While there is some mixing of specimens when price differentiation does not exist, the overall occurrence is small. No correction for black and gag grouper has been made. For species managed by the NMFS Atlantic

Highly Migratory Species Division, there are issues of mis-identification, for which Pelagic Observer Program (POP) or Shark Bottom Longline Observer Program (SBLOP) data may be the best source of information to correct for mis-identification.

*Gulf of Mexico:* Mis-identification of species regulated by the Gulf of Mexico Fishery Management Council (GMFMC) has been largely resolved with the implementation of the IFQ. The dealers and fishermen are very careful with identification. There is a situation with older landings and the mis-reporting of black and gag grouper. A small fraction of the black grouper has been converted to gag in the past using the TIP data to apply proportions. TIP, or observer data when a program exists that has coverage for the species in question, should be used to proportion to the correct species. Again, for species managed by the NMFS Atlantic Highly Migratory Species Division, there are issues of mis-identification, for which Pelagic Observer Program (POP) or Shark Bottom Longline Observer Program (SBLOP) data may be the best source of information to correct for mis-identification.

*Caribbean:* The majority of mis-identification issues in species managed by the Caribbean Fishery Management Council (CFMC) are really issues of aggregation; however, there are nomenclature differences between the islands. For example wenchman is a local name for cardinal snapper in Puerto Rico and longspine squirrelfish in St. Croix. Investigation into the usefulness of using TIP data to develop proportions to apply to the landings should continue. The SEFSC staff should compare species lists with the territories to identify differences in nomenclature. Again, for species managed by the NMFS Atlantic Highly Migratory Species Division, there are issues of mis-identification, for which Pelagic Observer Program (POP) data may be the best source of information to correct for mis-identification.

### **Justification**

Unclassified and mis-identified landings should be adjusted for using the procedures as outlined above so that landings estimates are based on known data sources that are as relevant and reliable as possible. Additionally, issues with mis-identification should be identified before the data workshop, so the group can identify which data sources may be best suited for use in correcting the landings.

### ***Issue 2: Duplicate Datasets Available for Commercial Data / Late Delivery***

Multiple data sources are available for many commercial datasets including, landings, area fished, and gear (see list below). Duplicate datasets can be beneficial and used to cross check each other to help determine which datasets are most complete. However, multiple datasets can also be problematic, as the level of detail in one dataset may be coarser than in another dataset that contains information about the variables of interest (trip level vs. aggregated landings). It would be helpful to recommend authoritative data sources when duplicate datasets exist.

Commercial Data Sources Available to SEDAR Data Workshops:

Commercial Landings: State Trip Tickets, ACCSP, GSMFC, Accumulated Landings System (ALS), NMFS General Canvass, Historic NOAA Science & Technology data, E-dealer (HMS only), GulfFIN, Gulf of Mexico IFQ Program, Quota Monitoring?(HMS)

Gear: State Trip Tickets, CFLP, ALS

Area Fished: State Trip Tickets, CFLP

**Potential Solutions**

- Authoritative data for strata is the information collected by state, federal or Fisheries Information Network (FIN) partner for the strata in question.
- After verification of completeness of data in the two east coast FINs (ACCSP and GulfFIN), FIN(s) becomes authoritative data source.
- Ensure authoritative data are complete at FIN so updates can be performed without resubmission of data by all partners.
- Identify differences between data sources and develop methods for incorporating differences.

**Final Best Practice Recommendations**

Overlapping datasets: It should be recognized that not all overlapping datasets are exact duplicates. Some datasets may contain information, such as gear or area, which is not available in another dataset. These differences should be taken into consideration during decision making. For example, the IFQ dataset does not have gear, so gear proportions from the CFLP are applied to the IFQ landings.

*South Atlantic:* ACCSP will be the primary data source for years where states have trip ticket programs. They receive data from the state trip tickets and the SEFSC and validate landings with the states prior to the data workshop. The states will provide corrected or adjusted datasets as necessary. The application of CFLP proportions in Florida and the multiple gear issue in North Carolina are adjustments of particular note.

Prior to trip tickets, ACCSP will be the primary data source to provide the ALS and General Canvass data validated by the states. ACCSP will provide the historic NOAA Science & Technology spreadsheets prior to 1950 and make interpolations as needed.

Landings north of North Carolina will be primarily sourced from ACCSP as necessary. These landings will be validated by the data source(s) as necessary prior to the data workshop.

*Gulf of Mexico:* For IFQ species in the years where the Gulf of Mexico IFQ Program was in place, the gear and area proportions from the CFLP should be applied to the IFQ landings. If the

species does not have an IFQ or for years where the IFQ was not in place back to 1985, GulfFIN will be the primary data source. GulfFIN will provide state landings from Florida for all years, Alabama back to 2002, Texas back to 2010, and Mississippi back to 2012 except for shrimp. ALS landings will be provided back to 1985 by GulfFIN for years/species for which state trip ticket data are not available.

The SEFSC will provide landings prior to 1985. The Science and Technology spreadsheets are used for the data prior to 1962.

*Caribbean:* Landings will be determined from what is currently collected by the SEFSC. Most of that information is being submitted on-line or being called in. There is some discrepancy with sales on the street (but might have been picked up in the TIP sampling). There are no overlapping datasets.

*HMS:* E-dealer reports will be used for 2013 to present. Atlantic and Gulf dealers go through ACCSP and Caribbean dealers go through HMS.

Prior to E-dealer, the South Atlantic and Gulf of Mexico state trip tickets, or ALS landings when trip tickets don't exist, and bi-weekly SEFSC Pelagic Dealer Compliance (PDC) reports should be compared and the higher of the two should be used. In the Northeast and Mid-Atlantic, ACCSP, the NEFSC Commercial Fisheries Database System (CFDBS) and PDC will be compared and the larger of the three should be used.

*SEDAR Updates:* Current recommendations of using the FINs as primary data sources in some cases should be taken into consideration when planning, scheduling and executing updates. ACCSP and GulfFIN staff should be included in the update process so that sufficient time is available for preparation and validation of landings.

Landings not delivered by data deadline: As a process issue, SEDAR data deadlines should be coordinated with the data providers. In cases where deadlines are not met or data are for some reason unexpectedly unavailable from the state trip ticket programs, the following alternatives are recommended.

*South Atlantic and Gulf of Mexico:* Federal electronic dealer reports should be used to provide terminal year landings. Data should be noted as preliminary and possibly incomplete. Procedures as outlined above should be used for years prior to the terminal year.

*Caribbean:* Data from the prior year should be used to approximate the terminal year landings for species managed by the CFMC.

*HMS*: Information for HMS species will be supplied by E-dealer.

### **Justification**

Landings should be sourced from the most comprehensive datasets while still incorporating information from other datasets as needed. Validation of landings ensures provision of the most accurate information possible.

### ***Issue 3: Monroe County***

For many South Atlantic and Gulf of Mexico assessments, stock boundary lines are often determined to be U.S. Highway 1 in the Florida Keys (jurisdictional boundary between the SAFMC and GMFMC). When U.S. Highway 1 is used as a stock boundary, decisions must be made on how to handle/split data in Monroe County, FL. It is important to make sure catch estimates for Monroe County are not included in both Gulf of Mexico and South Atlantic stock assessments. Methods used to handle the Monroe County catch estimates may be species specific, but a decision tree could potentially be developed.

### **Potential Solutions**

- Use CFLP data to portion out South Atlantic Monroe County landings from the Florida trip ticket (FLTT) data since it is believed that fisher reported area fished data are generally more accurate than area fished data reported by dealers. Used in many SEDARs for snapper and grouper species including SEDAR 41, SEDAR 32, and SEDAR 24, among others.
- For species that aren't adequately captured by CFLP, use reliable current FLTT area fished, and use those proportions to separate Gulf and SA back in time.

### **Final Best Practice Recommendations**

The CFLP data should be used to proportion the Florida trip ticket data for both gear and area (see Figure 1-3). With the exception of Florida Bay, area 744 is mostly South Atlantic. Area 748 is an even split in state waters and mostly South Atlantic in federal waters. Area 1 has two subareas, 1.1 and 1.8, that are South Atlantic, with subareas 1.0 and 1.9 as Gulf of Mexico. Area 2 has a Gulf of Mexico subarea, 2.8, and a South Atlantic subarea, 2.9.

If there is a significant inshore component to the fishery, the TIP data should be used to determine if there is a difference between the inshore and offshore components of the fishery.

The five year average of the logbook series most adjacent to the period of interest should be applied to the historical landings from Monroe County.

Stock boundary decisions may not necessitate the need to split Monroe County. If stock boundaries are moved from one assessment to the next and/or in cases where the South Atlantic and Gulf of Mexico have different assessment timing for the same species, communication is

important to ensure that double counting of fish is minimized. Sharks use the Miami-Dade/Monroe county line so the U.S. Highway 1 boundary line is not an issue for shark stocks as the county of landing is used to split South Atlantic and Gulf of Mexico landings.

### **Justification**

CFLP data contain reliably reported areas which should be applied to the landings in the Florida trip tickets to arrive at the most representative dataset. TIP data evaluation will ensure that large inshore fisheries are not misrepresented by use of this methodology.

### ***Issue 4: Uncertainty Estimates for Landings***

In recent SEDAR assessment projects, the commercial work group has been asked to address uncertainty in the data per the Terms of Reference. Since no measure of variance can be calculated for landings, other methods must be used to provide an estimate of uncertainty. A consistent approach is needed to determine the uncertainty of the commercial landings data.

### **Potential Solutions**

- Develop relative coefficients of variance (CV) by year and state based upon the method of data collection. Increased uncertainty should be noted as one goes back in time with improvements in data collection methods leading to smaller CV's over time. (SEDAR 24 PW7-09, SEDAR 41)
- Include mis-identification rates derived from TIP data or lack of speciation in data collections.
- Include variability between reported landings and final landings after adjustments.

### **Final Best Practice Recommendations**

A workshop or meeting should be held to determine specific methods for quantifying uncertainty in commercial landings. Uncertainty should be based on improvements in data collection programs over time. This includes uncertainty from landings developed from species groupings and unclassified landings as described above. The level of uncertainty may be species specific.

Data uncertainty has been ranked and listed from lowest to highest in Tables 1, 2, and 3. Implementation of programs by year and state/territory is also noted.

Programs (increasing uncertainty, decreasing reliability):

1. Trip Tickets (Trip Level) various implementation dates-present
2. Cooperative Statistics (Monthly Summaries) 1978-trip ticket implementation
3. General Canvass (Annual Summaries) 1962-1977
4. Bureau of Commercial Fisheries (Annual Summaries) 1926-1961
5. US Fish and Fisheries Commission (Annual Summaries) 1880-1925

Program implementation by year range and state/territory: (program numbers from list above)

Table 1. Program implementation by year range and state for the US South Atlantic.

Year Range	NC	GA	SC	FL
<b>1950-1961</b>	4	4	4	4
<b>1962-1977</b>	3	3	3	3
<b>1978-1985</b>	2	2	2	2
<b>1986-1993</b>	2	2	2	1
<b>1994-2001</b>	1	2	2	1
<b>2002-2003</b>	1	1	2	1
<b>2004-present</b>	1	1	1	1

\*Program numbers refer to list in the text above.

Table 2. Program implementation by year range and state for the US Gulf of Mexico.

Year Range	TX	LA	MS	AL	FL
<b>1950-1961</b>	4	4	4	4	4
<b>1962-1977</b>	3	3	3	3	3
<b>1978-1985</b>	2	2	2	2	2
<b>1986-1999</b>	2	2	2	2	1
<b>2000-2001</b>	2	1	2	2	1
<b>2002-2007</b>	2	1	2	1	1
<b>2008-2011</b>	1	1	2	1	1
<b>2012-present</b>	1	1	1	1	1

\*Program numbers refer to list in the text above.

Landings in the Caribbean are historically considered to be data poor. The methodology used to estimate unreported landings in Puerto Rico needs to be reviewed.

Table 3. Program implementation by year range and territory for the US Caribbean.

Year Range	PR	USVI
<b>1978-1983</b>		3
<b>1984-1999</b>	3	3
<b>2000-2003</b>	3	2
<b>2004-2011</b>	1	2
<b>2012-present</b>	1	1

\*Program numbers refer to list in the text above.

**Research Recommendation**

A workshop or meeting should be held to determine specific methods for quantifying uncertainty in commercial landings.

**Justification**

The measure of uncertainty used in past assessments is simply a proportion based on the assumed reliability of reporting methodologies under which the data were collected. Past SEDARs (SEDAR 24) have started with a CV of .1 and increased by a unit of .1 for each change in methodology described above. Further research is necessary to determine the appropriate ranges/values.

***Issue 5: Directed Commercial Discards*****Potential Solutions**

- SEDAR 42 (PW7-33) used discard rates from observer program and applied those rates to the effort reported from the CFLP data
- SEDAR 41 (PW7-36) A delta-lognormal modeling approach for reported discard data from permitted fishermen to determine discard rate to be applied to commercial logbook effort data
- SEDAR 41 (PW7-36) used the calculation of a nominal discard rate and applied that to total reported effort.

**Final Best Practice Recommendations**

This topic needs its own workshop to develop best practices.

**Council Managed Stocks*****South Atlantic***

Currently, using the self-reported discards from the CFLP reports to establish a discard rate that is applied to the CFLP effort. Self-reporting of discards should be increased to 100% from the current 20%. An observer program to collect discard information is also needed.

***Gulf of Mexico***

Currently, using the discard rate from observer data applied to effort estimated from logbook. Historic discards are estimated using the ratio of discards to landings and applying that ratio to historic landings to obtain discards before discard reporting. Additional research is needed to develop appropriate methods for estimating discards.

***Caribbean***

Discards are now on the form, but only speciated for lobster. Discards may be low, but some market driven grading may be occurring.

### Atlantic HMS managed stocks

Shark assessments use data from the shark gillnet and longline observer programs and the shark research fishery program to help verify the self-reported discard estimates. Discard rates from observer data are applied to effort.

### **Justification**

There are numerous issues impacting the ability to develop estimates of discards. A workshop is needed to resolve these issues and develop best practices.

### ***Issue 6: Shrimp Fishery Bycatch***

#### **Potential Solutions**

- SEDAR 7 (PW-116) and SEDAR 28 (PW-117) Used a Bayesian modeling procedure to estimate discards in the Gulf of Mexico that used data collected from the shrimp observer program, SEAMAP Survey, shrimp effort estimates from the Shrimp Electronic Logbook Program, and Vessel Operating Units file.
- SEDAR 17 (PW-118) Used a delta GLM model with a lognormal distribution to model discards using sparse observer data for catch rates and effort data from the South Atlantic Shrimp System (SAS).
- SEDAR 21 (PW-119) used a ratio of Atlantic to Gulf of Mexico fishing effort and applied that ratio to calculated Gulf of Mexico discards as a surrogate for shrimp trawl discards in the Atlantic.

#### **Final Best Practice Recommendations**

##### *South Atlantic*

SEDAR Procedural Workshop 6 was held in July of 2014. The report from that workshop has a number of detailed discussions on available data for shrimp in the South Atlantic. Shrimp bycatch is rarely used in SEDAR South Atlantic assessments. When necessary, effort can be obtained from state trip ticket data for available years. A table of this effort can be presented in the data workshop report; however, the analyst will have to model discards from the shrimp fishery.

##### *Gulf of Mexico*

Shrimp bycatch has been used in recent Gulf of Mexico SEDARs. Effort is available from shrimp trawl location recorders (ELB). A table of this effort can be presented in data workshop report; however, the analyst will have to model discards.

**Justification**

The Commercial Work Group can provide the effort as needed for assessments from the trip ticket data and ELB; however, the group will defer to those with more relevant expertise to model the discards from the shrimp fishery.

***Final Best Practice Recommendations for Multiple Group Issues: Commercial Input******Stock Boundary Decisions:***

Must be determined before the data workshop and included in the Terms of Reference. If Council boundaries are used then Monroe County will be split as described above.

***Size and Age Comp Decisions:***

Raw TIP data will be made available approximately two months prior to the data workshop. A working paper describing the TIP sampling program and program changes will be submitted. A working paper that includes sample sizes, number of trips, sampling fractions and nominal length comps will be submitted. The data workshop report can reference the working papers.

***Identification of Biased Samples for Length/Age Comps:***

Bias is identified and coded in the TIP data and will be shared with the Life History group.

***Convert Catch in Numbers to Weight/Convert Catch in Weight to Number:***

Allometric conversions, including length to weight relationships and whole weight to gutted weight relationships, are needed prior to the workshop, so mean sizes can be calculated and applied to landings in weight to obtain landings in number. Nominal length data can be used to calculate the mean weights, which can then be applied to the landings before the end of the data workshop. Allometric conversions are also needed to determine the mean size of discards, so discards in number can be converted discards in weight. ACCSP recently completed a project to collect landed weight to live weight conversions, so inclusion of this information may supplement the allometric conversions available from the life history group.

***Additional Workshops Needed***

- Develop methods for estimating discard mortality
- Estimation of directed commercial discards
- Quantification of uncertainty in commercial landings

\*See Section 3.5.2 for more details on workshops recommended from all working groups.

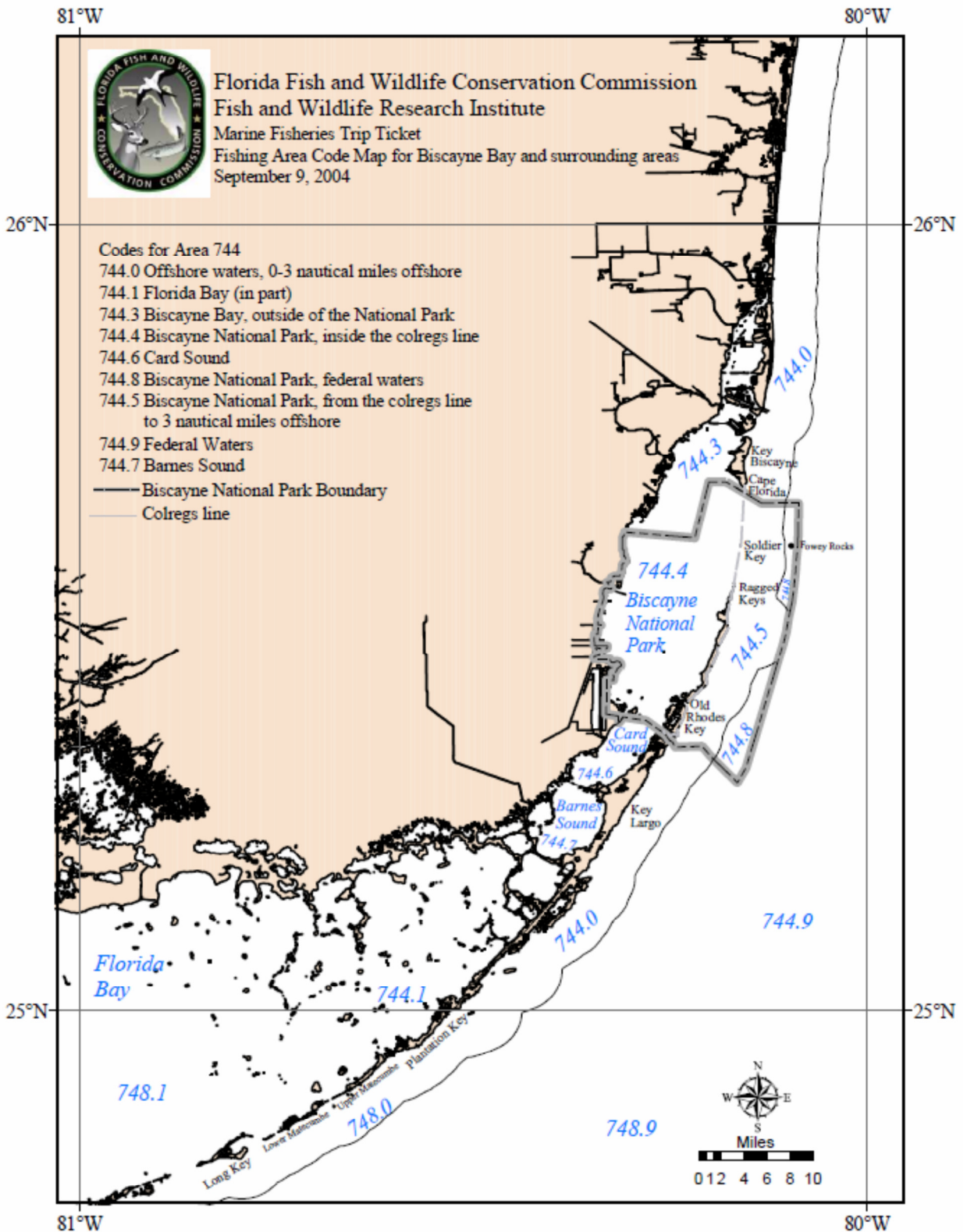


Figure 1. Florida Biscayne Bay fishing areas.

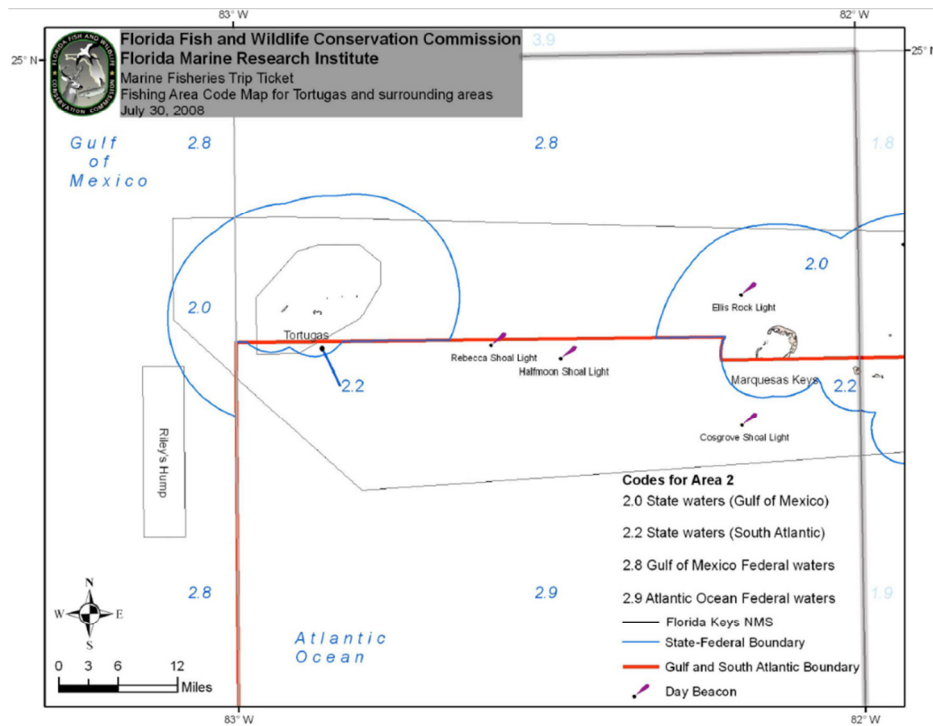


Figure 2. Florida Key West fishing areas.

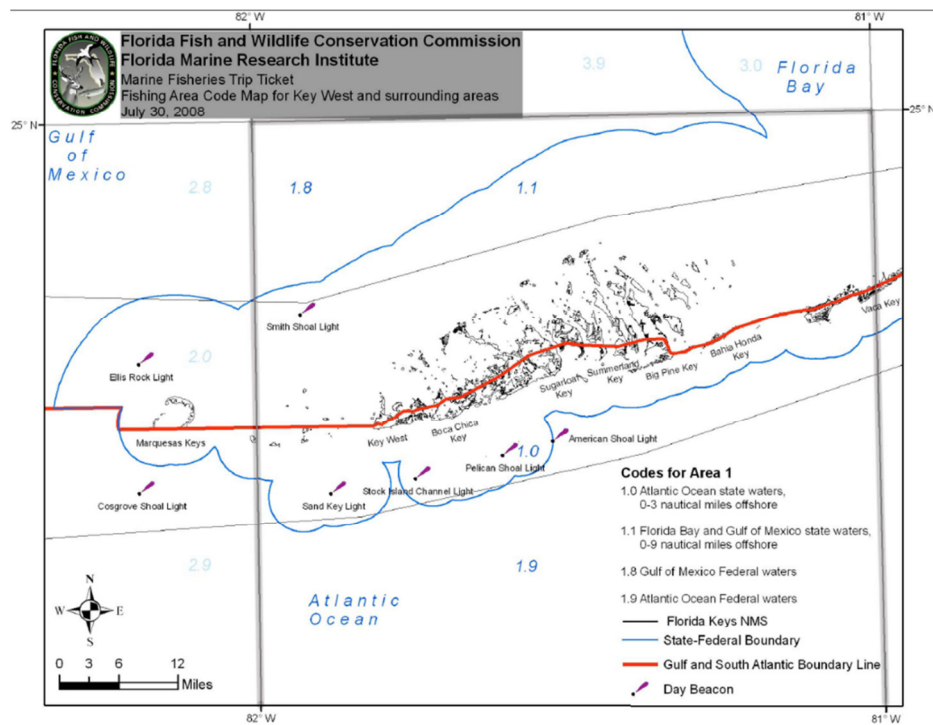


Figure 3. Florida Tortugas fishing areas.

### 3.3.3 Recreational

#### ***Issue 1: MRFSS Separation of Charter/Headboat Estimates 1981-85***

In the South Atlantic (East FL to NC), MRFSS/MRIP estimates for charter and headboat modes were combined into a single mode for estimation purposes from 1981 to 1985. Since the NMFS Southeast Region Headboat Survey (SRHS) began in this region in 1981, the MRFSS combined charter/headboat mode must be split such that estimates for the headboat mode from 1981-1985 are not double counted.

#### **Potential Solutions**

- Split MRFSS charter/headboat mode from 1981 to 1985 using a ratio of SRHS headboat angler trip estimates to MRFSS charter boat angler trip estimates for 1986-1990. Mean ratio is calculated by state (or state equivalent to match SRHS areas to MRFSS states) and then applied to the 1981-1985 MRFSS estimates to isolate the headboat component. (SEDAR 28, SEDAR 32, and SEDAR 36)

#### **Additional Resources**

- SEDAR 28, Data Workshop Report – Recreational Section (**PW7-12 & PW7-13**)
- SEDAR 32, Data Workshop Report – Recreational Section (**PW7-19**)
- SEDAR36-WP01 (**PW7-26**)
- MRFSS/MRIP survey documentation and ongoing effort to review and improve survey methods: <http://www.st.nmfs.gov/st1/recreational>

#### **Final Best Practice Recommendations**

Split MRFSS charter/headboat mode from 1981 to 1985 using a ratio of SRHS headboat angler trip estimates to MRFSS charter boat angler trip estimates for 1986-1990. Mean ratio is calculated by state (or state equivalent to match SRHS areas to MRFSS states) and then applied to the 1981-1985 MRFSS estimates to isolate the headboat component.

#### **Justification**

Splitting the combined charter/headboat mode is necessary to

- avoid duplication of headboat landings in the South Atlantic during 1981 to 1985
- have a consistent time series of mode specific estimates
- apply the MRIP re-estimation adjustment to the charter mode separately

This method is based on effort and is therefore not species specific.

***Issue 2: MRFSS 1981, Wave 1, Estimates for Gulf of Mexico & East Florida***

MRFSS began in 1981, wave 2. Starting in 1982, Gulf of Mexico and East Florida estimates were available for waves 1 through 6. 1981, wave 1 catch estimates are needed in the Gulf of Mexico and East Florida for consistency throughout the time series.

**Potential Solutions**

- Estimate Gulf of Mexico and East Florida 1981, wave 1 catch by determining the proportion of catch in wave 1 to catch in all of the other waves for 1982 to 1984 by fishing mode and area. Apply these proportions to estimate wave 1 in 1981 from the estimated catches in other waves of that year. If ratios are highly variable from year to year, the mean wave 1 catch estimates from 1982 to 1984 can be used instead.

**Additional Resources**

- SEDAR 28, Data Workshop Report – Recreational Section (**PW7-12 & PW7-13**)
- SEDAR 32, Data Workshop Report – Recreational Section (**PW7-19**)

**Final Best Practice Recommendations**

Use estimates from 1982 to 1984 to fill in the missing wave 1 estimate from 1981.

The preferred method to calculate 1981, wave 1:

- determine the annual proportion of catch in wave 1 to catch in all of the other waves for 1982 to 1984 by fishing mode and area
- calculate mean ratio for those years
- apply to the catch from 1981, waves 2-6

If the preferred method results in highly variable ratios from year to year, then the mean wave 1 catch estimates from 1982 to 1984 can be used instead.

**Justification**

This approach is necessary to have a complete estimate for 1981. This recommendation uses the best available data for catch estimates occurring in wave 1 in the early 1980s.

***Issue 3: MRFSS & TPWD Early 1980's Charter & Private Mode***

Texas data from the MRFSS is only available from 1981 to 1985 and is sporadic, not covering all modes and waves. Texas Parks and Wildlife Department (TPWD) data, which covers charter and private modes, are available starting in May 1983. Duplicate datasets are therefore available (MRFSS and TPWD) in the early 1980's for Texas landings estimates and DW. Panelists must determine which dataset to use.

## Potential Solutions

- During waves/years in which the surveys overlap, subtract Texas boat mode estimates from the MRFSS dataset. Then substitute TPWD data for charter and private mode estimates to fill in these modes prior to the start of the TPWD survey in May 1983.

## Additional Resources

- SEDAR 28, Data Workshop Report – Recreational Section (**PW7-12 & PW7-13**)
- SEDAR 31, Data Workshop Report – Recreational Section (**PW7-15**)
- SEDAR 33, Data Workshop Report – Recreational Section (**PW7-23 & PW7-24**)

## Final Best Practice Recommendations

Subtract Texas boat modes from MRFSS dataset and estimate these modes prior to the start of the TPWD survey using mean TPWD estimates from 1983 to 1985 by mode and wave.

- 1981 to 1983, waves 1 and 2 are estimated using 1984 to 1985 estimates.
- 1981 to 1982, waves 3 through 6 are estimated using 1983 to 1985 estimates.

## Justification

This approach is necessary to avoid duplication of boat mode estimates from Texas in these years. This recommendation uses the best available data for catch estimates occurring in the charter and private modes in Texas in the early 1980s.

### *Issue 4: MRFSS For-Hire Survey Calibration for Charter*

Two surveys within MRFSS have been used to generate for-hire estimates: the MRFSS Coastal Household Telephone Survey (CHTS) and the For-Hire-Survey (FHS). The MRFSS CHTS design is based on an intercept survey of anglers and telephone survey of coastal households. A low number of charterboat anglers were contacted in the traditional telephone survey of coastal households, so the FHS was developed to improve charter effort estimates.

In the FHS, directories of charterboats are developed for each state and are continuously updated. Each week, a sample of 10% of the listed charterboats is surveyed by telephone to ask about their fishing effort during the previous week. Validation surveys by field samplers directly observe some charterboat effort on the docks to allow correction of over and under-reporting of trips in the telephone survey. The FHS estimates of catch then follow in the same manner as for the traditional MRFSS, with the mean catch per trip coming from the MRFSS intercept survey. FHS estimates have been phased in as the "official" charterboat estimates starting with LA through FL West Coast in 2000, expanding to FL East Coast in 2003 and to GA through ME in 2005.

The shift from one survey method to another in the time series can cause a shift in the trend of landings so conversion factors need to be estimated to calibrate the traditional MRFSS

charterboat estimates with the FHS. Additionally, in the Gulf of Mexico and South Atlantic, separate conversion factors need to be developed from 1981 to 1985 because during that time MRFSS estimates for charter and headboats were combined into a single mode.

## Potential Solutions

### **Calibration for traditional MRFSS combined charter/headboat mode (South Atlantic and Gulf of Mexico, 1981-1985):**

- Estimate conversion factors by using 1986 to 1990 effort estimates from both MRFSS charter and SRHS in equivalent effort units, an angler trip. SHRS and traditional MRFSS charter boat estimates are combined (summed) into one estimate for each year, wave, and state. The same procedure is repeated for the same headboat estimates and the calibrated (FHS) charter boat estimates. A GLM is used to identify significant factors and to estimate predicted ratios which are used as the conversion factors. The conversion factors are based on effort so they can be applied to all species' landings. For each region (Gulf of Mexico and South Atlantic) ratios of the combined MRFSS charter boat and headboat estimates to FHS charter and headboat estimates are calculated for each year, wave, and state. Some states may need to be combined due to the geographic area definitions in the headboat dataset. (See SEDAR28-DW12 for details.)

### **Calibration for traditional MRFSS charter boat mode**

- Estimate conversion factors using a ratio of FHS/MRFSS effort estimates for each stratum using only the time period where the FHS and traditional MRFSS surveys overlap (years dependent on region; see below) and apply to MRFSS effort estimates. Each stratum is defined by a unique combination of state, year, wave, and fishing area. A GLM is used to identify significant factors and to estimate predicted ratios which are used as the conversion factors. The conversion factors are based on effort so they can be applied to all species' landings.
  - Gulf of Mexico: estimate conversion factors using only the estimates from the period 1998 to 2003 and apply to the 1986 to 1997 MRFSS effort estimates. Ratios are calculated separately for Florida and the other states (AL, LA, MS) because 'fishing area' was defined differently. (SEDAR7-AW01)
  - South Atlantic: estimate conversion factors using only the estimates from 2004 to 2010 and apply to the 1986 to 2003 effort estimates. (SEDAR16-DW15 and SEDAR25 – Data Workshop Report)
  - Mid-Atlantic: estimate conversion factors using only the estimates from 2004 to 2007 and apply to the 1981 to 2003 effort estimates. (SEDAR 17 Data Workshop Report)

## Additional Resources

- SEDAR7-AW03 (Gulf of Mexico conversion factors for 1986-2003; **PW7-06**)

- SEDAR28-DW12 (South Atlantic and Gulf of Mexico conversion factors for 1981-1985; **PW7-14**)
- SEDAR16-DW15 (South Atlantic conversion factors for 1986-2003; **PW7-07**)
- SEDAR 17 South Atlantic Spanish Mackerel, Data Workshop Report – Recreational Section (conversion factors for Mid-Atlantic; **PW7-08**)
- SEDAR 25, Data Workshop Report – Recreational Section (update to South Atlantic 1986-2003 conversion factors; **PW7-10 & PW7-11**)
- SEDAR36-WP01(**PW7-26**)
- MRFSS/MRIP survey documentation and ongoing effort to review and improve survey methods: <http://www.st.nmfs.gov/st1/recreational>

### **Final Best Practice Recommendations**

Use conversion factors based on a ratio of FHS to CHTS charter effort estimates in years they overlap. As long as there is survey based monitoring of the fishery, calibrations will have to be evaluated at various points in the future as survey methods will change over time.

### **Justification**

Due to data collection survey design changes it is necessary to adjust the charter mode estimates to have a consistent time series. This method uses conversion factors that are based on effort estimates and is therefore applicable to all species.

### ***Issue 5: MRFSS/MRIP Re-Estimation Calibration***

The Marine Recreational Information Program (MRIP) was implemented in 2004. The MRIP was developed to generate more accurate recreational catch rates by re-designing the MRFSS sampling protocol to address potential biases including port activity and time of day. Revised catch and effort estimates, based on this improved estimation method, were released on January 25, 2013. These estimates are available for the Atlantic and Gulf Coasts starting in 2004. Since new MRIP estimates are available for a portion of the recreational time series that the MRFSS covers, conversion factors between the MRFSS estimates and the MRIP estimates need to be developed in order to maintain one consistent time series for the recreational catch estimates.

### **Potential Solutions**

- Develop ratio estimators, based on the ratios of the means, for all species to hind-cast catch and variance estimates by fishing mode. Ratio estimators were calculated by species, region, and mode when possible using the estimates from 2004 to 2011. Before applying mode-specific ratio estimators to data from the Gulf of Mexico and South Atlantic regions, the 1981-1985 MRFSS combined charter/headboat mode must be separated. (See SEDAR31-DW25 and SEDAR32-DW02 for details.)

**Additional Resources**

- MRFSS/MRIP Calibration Workshop Ad-Hoc Working Group Report (**PW7-68**)
- SEDAR31- DW25 (**PW7-16**)
- SEDAR32-DW02 (**PW7-20**)
- MRFSS/MRIP survey documentation and ongoing effort to review and improve survey methods: <http://www.st.nmfs.gov/st1/recreational>

**Final Best Practice Recommendations**

Make adjustments for changes in the survey estimation methodology based on recommendations from calibration workshops or S&T/MRIP program. As long as there is survey based monitoring of the fishery, calibrations will have to be evaluated at various points in the future as survey methods will change over time.

**Justification**

Due to estimation methodology changes it is necessary to adjust the catch estimates to have a consistent and comparable time series.

***Issue 6: MRIP Public Use Datasets – Small Domains***

The new MRIP public-use datasets facilitate the production of catch and effort estimates for custom domains including, sub-state geographic and sub-wave temporal domains. Care must be taken to ensure that sufficient sample sizes are available to support estimation at more detailed level domains. Otherwise domain estimates may be highly variable and unstable.

**Potential Solutions**

- Only use established geographical domains. These would include North Carolina domains north and south of Cape Hatteras and the Florida For-Hire Survey sub-state domains (1=Panhandle, 2=Peninsula, 3=Keys, 4=SE FL, 5=NE FL).
- Non-standard Florida domains have only been used once for SEDAR 16 king mackerel, when the mixing zone required East Florida to be split at the Volusia-Flagler county line instead of at the standard FHS Indian River-Brevard county line. SEDAR 38 changed the mixing zone to only Monroe County so this non-standard split is no longer necessary.

**Additional Resources**

- ACCSP/MRIP PSE Workshop Report – Sept. 2014 (in progress)

**Final Best Practice Recommendations**

Only use established geographical domains. These would include North Carolina domains north and south of Cape Hatteras and the Florida For-Hire Survey sub-state domains.

**Justification**

Using established geographical domains avoids highly variable and unstable domain estimates. This also facilitates time series adjustments prior to the MRIP database format (2004+) that allows domain estimation. Prior to 2004, only MRFSS estimates are available which require post-stratification. Post-stratification is a less robust technique than the domain estimation and does not lend itself to using non-standard geographical domains.

***Issue 7: Monroe County***

For many South Atlantic and Gulf of Mexico assessments, stock boundary lines are often determined to be U.S. Highway 1 in the Florida Keys (jurisdictional boundary between the SAFMC and GMFMC). When U.S. Highway 1 is used as a stock boundary, decisions must be made on how to handle/split data in Monroe County, FL. For the recreational datasets, this is typically an issue for the MRFSS/MRIP datasets. It is important to make sure catch estimates for Monroe County are not included in both Gulf of Mexico and South Atlantic stock assessments. Sharks use the Miami-Dade/Monroe county line so there U.S. Highway 1 boundary line is not an issue for shark stocks. Methods used to handle the Monroe County catch estimates may be species specific, but a decision tree could potentially be developed.

**Potential Solutions**

Monroe County MRFSS landings from 1981 to 2003 can be post-stratified to separate them from the MRFSS West Florida estimates. Post-stratification proportionally distributes the state-wide (East FL and West FL) effort into finer scale sub-regions and then produces effort estimates at this finer geographical scale. This is needed for the private and shore modes (all years) and charter boat mode (prior to FHS). FHS charter boat mode estimates are already pre-stratified.

Originally, during the first MRIP re-estimation, Monroe County landings (2004+) could be estimated separately from the remaining West Florida estimates using domain estimation. The Monroe County domain includes only intercepted trips returning to that county as identified in the intercept survey data. Estimates are then calculated within this domain using standard design-based estimation which incorporates the MRIP design stratification, clustering, and sample weights. However, the new MRIP Access Point Angler Intercept Survey (APAIS) calibration does not allow for domain estimation at this time. The recommended approach is to use the annual proportions from the original MRIP domain estimates (panhandle and peninsula over total FLW) and apply those proportions to the new West Florida MRIP APAIS estimates in order to remove Monroe County.

- Do not attempt to partition Monroe County estimates into those from the Atlantic Ocean and those from the Gulf of Mexico. Decide in which region to include the Monroe County estimates by using knowledge of the fish, habitat, and fishery north and south of

U.S. Highway 1. Make sure Monroe County estimates are not included in both regions' assessments. (SEDAR 32 and SEDAR 33)

- Beginning in 2005, the MRIP intercept design began collecting information indicating whether an intercept is capturing fishing occurring on the Atlantic side or the Gulf side of the Florida Keys. This information can be used to determine which side (Atlantic or Gulf) the majority of fishing is occurring.

### **Additional Resources**

- SEDAR 42 Data Workshop Report – Recreational Section (**PW7-33**)
- SEDAR 32 Data Workshop Report – Recreational Section (**PW7-19**)

### **Final Best Practice Recommendations**

If a stock boundary decision is made that separates the Atlantic and Gulf stocks somewhere in the middle of the Florida Keys (e.g. US 1), the MRIP Monroe County estimates need to be separated from the west coast of Florida estimate. Monroe County estimates can be separated using post-stratification (1981-2003) and domain estimation (2004+). MRIP Monroe County estimates are then placed in the appropriate region (South Atlantic or Gulf of Mexico) using information from the intercepts (2005+) and angler knowledge.

### **Justification**

Anglers landing catch in Monroe County can fish in either Atlantic or Gulf of Mexico waters. Therefore, when stock boundary decisions dictate, Monroe County estimates in their entirety need to be allocated to the Atlantic or Gulf of Mexico. It is not recommended that Monroe County estimates be further divided due to insufficient data, including small sample size, uncertainties in area fished, etc.

### ***Issue 8: SRHS Headboat Landings Start Date in South Atlantic***

In the early years of the SRHS, there was only partial geographic coverage in the South Atlantic. The SRHS began in 1972 in North Carolina and South Carolina. In 1976 the survey was expanded to northeast Florida (Nassau-Indian River counties) and Georgia, followed by southeast Florida (St. Lucie-Monroe counties) in 1978. The areas and time periods of partial coverage leave holes in the SRHS landings time series. The area/time periods of partial coverage may be species specific, but a consistent method is needed to fill in holes in landings estimates early in the time series.

### **Potential Solutions**

- Calculate a three year ratio by dividing the total landings for the area with partial coverage by NC and SC combined total landings. Then multiply this ratio by the combined total landings for NC and SC, resulting in the landings for the area/time periods with partial coverage. (See SEDAR 32 Bluefin Tilefish for more details.)

- Calculate a five year ratio by dividing the total landings for a region by NC and SC combined total landings. Then multiply this ratio by the combined total landings for NC and SC, resulting in the landings for the area/time periods with partial coverage. (See SEDAR 32 Blueline Tilefish for more details.)
- Start SRHS time series in 1981 when landings estimates are available for all areas from NC – FL.

### **Additional Resources**

- SEDAR 32 Data Workshop Report – Recreational Section (**PW7-19**)
- SEDAR 25 Data Workshop Report – Recreational Section (**PW7-10 & PW7-11**)

### **Final Best Practice Recommendations**

For certain species, SRHS estimates are available from 1972 in NC and SC, 1976 in GA and NEFL, and 1978 in SEFL. All species were estimated starting in 1981. If partial time series is available prior to 1981, use mean landings ratio from available strata to extend time series as far back as possible.

### **Justification**

This approach is necessary to have complete geographical and temporal coverage of headboat estimates as far back as there are sufficient data. This recommendation allows the use of all available data from the SRHS.

### ***Issue 9: Data Quality in the MRFSS/MRIP Datasets***

Early years of MRFSS data had limited QA/QC and insufficient sampling which may lead to highly variable estimates and unstable parameters. Insufficient sampling includes small sample size, incomplete coverage across survey strata, non-representative cluster sampling, etc.

Interview data from these early intercepts suspected to be erroneous (e.g. lower or higher average weights for a nominal species, very high counts of observed or reported catches, species/mode/area combinations, etc.) may be difficult to definitively evaluate or correct, but likewise, cannot be legitimately deleted from a database without introducing bias. These suspect data may result in anomalously large landings estimates (either in number or weight) for the time series, resulting in an obvious spike that appears out of place in a graphical presentation. Similarly, there may be instances of zero landings due to a missing effort estimate although catch data report landed fish, thereby producing another type of ‘spike’ or anomaly in the time series of landings estimates.

Different regions have used different methodologies to handle these anomalous values but a consistently applied treatment across regions is preferred. The nature of the spike (e.g. rare event species with highly variable inter-annual estimated landings vs individual ‘events’ in an otherwise trending time-series of landings) likely needs to be considered when developing

guidance and/or best practice recommendations. Methods used to handle the anomalous values may be species specific, but a decision tree could potentially be developed.

### Potential Solutions

- For the MRIP values deemed unrealistic, use the geometric mean of the surrounding years to handle the anomalous value. (SEDAR 39)
- For years MRIP values are deemed unrealistic, replace the anomalous values using the ratio of MRIP to headboat landings, based on the geometric mean of landings from the nearby years. (SEDAR 36). In SEDAR 36 this adjustment was made by the assessment panel, not the Data Workshop panel.
- Do not recommend making adjustments to the data since this could introduce a new source of bias. Keep the data and resulting estimates "as is" and take into consideration some appropriate measure of the precision. (SEDAR 28 and 41)

### Additional Resources

- SEDAR 39 Data Workshop Report – Recreational Section (**PW7-31**)
- SEDAR 36 Stock Assessment Report – Data Update Section (**PW7-12 & PW7-25**)
- MRFSS/MRIP survey documentation and ongoing effort to review and improve survey methods: <http://www.st.nmfs.gov/st1/recreational>

### Final Best Practice Recommendations

- Suspected error(s) in the data should be reviewed by S&T.
  - If S&T finds verifiable error(s) in the data then the appropriate corrections will be made by S&T, depending on documentation and feasibility.
  - If S&T finds no verifiable error(s) then suspect data should not be changed or omitted at the Data Workshop due to the potential for introduction of bias. These suspect data should instead be flagged for evaluation by the assessment panel.
    - Identification of suspected errors and their potential causes will continue to occur at the Data Workshop.
    - Further changes preferred by the assessment panel could include modeling or substitutions. These should be fully documented and approved at the Assessment Workshop.
- This recommendation would be followed for any data quality issue in the MRFSS/MRIP dataset, including those arising in rare-event or small scale fisheries.
- This recommendation should also be used for suspected errors in other recreational datasets by coordinating with each data provider.

### Justification

This approach provides a consistent process to address data quality issues that is transparent, fully documented, and does not introduce bias.

***Issue 10: Estimate Texas Discards***

The TPWD recreational survey does not estimate discards. A proxy is needed to estimate recreational discards in Texas for the charter and private modes.

**Potential Solutions**

- Apply MRIP discard ratio by mode (charter and private only) from the entire Gulf of Mexico region and apply to TPWD landings to estimate Texas discards. (SEDAR 28 Spanish Mackerel)
- Apply MRIP discard ratio by mode (charter and private only) from Louisiana and apply to TPWD landings to estimate Texas discards (SEDAR 31 red snapper). This may no longer be a viable option due to changes in the availability of Louisiana discard rates in recent years. In 2014, Louisiana did not participate in the MRIP survey and instead conducted the Louisiana Creel Survey, which does not estimate discards. In 2015 both MRIP and the Louisiana Creel Surveys ran concurrently.
- Evaluate available data and if extremely low catches are evidenced, apply a discard rate of zero. (SEDAR 33 Greater Amberjack and gag)

**Additional Resources**

- SEDAR 28 Spanish Mackerel Data Workshop Report – Recreational Section (**PW7-13**)
- SEDAR 33 Data Workshop Report – Recreational Section (**PW7-23 & PW7-24**)
- SEDAR 31 Red Snapper Data Workshop Report – Recreational Section (**PW7-15**)

**Final Best Practice Recommendations**

The preferred method is to apply the annual MRIP discard ratio (discards/landings) by mode using Louisiana estimates. If the Louisiana estimates are insufficient to produce reliable or realistic discard ratios, then a possible alternative would be to use a Gulf-wide proxy.

**Sub-issue: Loss of MRIP LA data in 2014**

Only the LA Creel Survey produced landings estimates in 2014. In 2015 LA Creel Survey and MRIP ran concurrently. LA Creel Survey is pursuing MRIP certification. Inclusion of discard sampling is currently being negotiated between S&T and the state of Louisiana. Given the potential differences between the eastern and western Gulf of Mexico for some stocks, the Rec TG agrees that this is a high priority issue. The lack of discard estimates from Louisiana would severely limit the information on discard rates in the Western Gulf of Mexico. This is especially critical given that there are no discard estimates from the charter and private modes in Texas.

**Recommendation:**

Prior to the outcome of the potential MRIP certification and subsequent calibration, the issue of LA landings estimates for 2014 (whether to use LA Creel Survey landings estimates or use MRIP LA data from adjacent years) needs to be addressed during the GOM SEDAR Data Scoping process for stock assessments scheduled in the immediate future.

To estimate Texas discards for 2014, a LA discard rate must first be calculated using a ratio or mean ratio from adjacent years from the MRIP LA data, taking into management regulations and season lengths. Final methods will be documented fully in the Data Workshop report.

**Justification**

The TPWD recreational survey does not estimate discards. A consistent method of selecting a proxy is needed to estimate recreational discards in Texas for the charter and private modes.

***Issue 11: SRHS Headboat Discards***

The Southeast Regional Headboat Survey (SRHS) was modified in 2004 to include self-reported discards for each reported trip. These self-reported data are currently not validated within the headboat survey. Prior to 2004, discards were not available in the SRHS. During the initial years in which discard information was collected underreporting is a concern.

An observer survey of the recreational headboat fishery began in the South Atlantic in NC and SC in 2004 and in GA and east FL in 2005. In the Gulf of Mexico, observer surveys were conducted in Alabama from 2004 to 2007 and in West FL from 2005 to 2007 and 2009 to the present. The observer surveys were designed to collect more detailed information on recreational headboat catch, particularly for discarded fish. Headboat vessels are randomly selected throughout the year in each state. Trained biologists board selected vessels with permission from the captain and observe anglers as they fish on the recreational trip.

Recommendations are needed to estimate headboat discards from 2004 to present when SRHS data are available and a proxy is needed to estimate headboat discards prior to 2004.

**Potential Solutions****Discards 2004-present**

- Use SRHS discard estimates for the entire time series they are available (2004 – present).
- Compare the mean discard rate per trip by year and state for matched trips between the SRHS and Headboat At-sea Observer Program trips.
  - If Headboat At-Sea Observer coverage is deemed inadequate, use the SRHS discard data for the time series they are available.

- If the Headboat At-Sea Observer coverage is deemed adequate, use the SRHS data for the years where the At-Sea Observer data validates the SRHS data. Use a proxy (see potential solutions below) to estimate discards when the Headboat At-sea Observer Survey does not validate the SRHS data.
- If SRHS data seem to under or overestimate discard estimates, use discard rates from the SRHS headboats with consistent patterns of reporting from 2004-present and scale the resulting rates using observer data. (SEDAR31-AW01)

### **Discard Proxy**

- Apply the MRFSS/MRIP charter boat discard:landings ratio to estimated headboat landings in order to estimate headboat discards prior to 2004. (SEDAR 25 Data Workshop Report)
- Apply the MRFSS/MRIP private boat discard:landings ratio to estimated headboat landings in order to estimate headboat discards prior to 2004.
- Apply headboat at-sea observer program discard: harvested fish ratio to estimated headboat landings in order to estimate headboat discards prior to 2004.
- Apply the MRIP CH:SRHS discard ratio proxy method. Calculate a ratio of the mean ratio of SRHS discard:landings (2004-present) and MRIP CH discard:landings (2004 – present). Apply this ratio to the yearly MRIP CH discard:landings ratio (1981-2003). This ratio is then applied to the SRHS landings (1981-2003) to estimate headboat discards. (SEDAR 28 Assessment report and SEDAR 42 Data Workshop Report)
- Use a flat ratio based on all or selected years (2004-2012) from the headboat logbook discard time series. (Option presented in SEDAR 24 and recommended for use as sensitivity run.)
- Do not attempt to estimate discards for the headboat sector prior to 2004. Allow the assessment model to account for discards during this time period.
- Do not attempt to estimate discards for the headboat sector prior to 2004. Assume zero discards during this time period. (See SEDAR 32 Blueline Tilefish for details.)
- Use the MRFSS intercept data to calculate the annual discard rates. This option avoids using MRIP estimates to determine the discard rate and therefore is not impacted by changes to the MRIP estimates due to survey design changes, estimation methodology changes, etc. However, the intercept data prior to 2004 does not have the associated sample weights so the resulting discard rates would be biased.

### **Additional Resources**

- SEDAR 32 Data Workshop Report – Recreational Section (**PW7-19**)
- SEDAR 25 Data Workshop Report – Recreational Section (**PW7-10 & PW7-11**)
- SEDAR31-AW01 (**PW7-18**)
- SEDAR 24 Data Workshop Report – Recreational Section (**PW7-09**)

## Final Best Practice Recommendations

### Discards 2004-present

The SRHS discard estimates need to be evaluated to determine which years are representative of the headboat fishing activity. Statistically test for the difference between the SRHS self-reported logbook and the available at-sea observer discard rates (2004+).

- If they are not significantly different then use the SRHS discard estimates.
- If they are significantly different explore
  - scaling the SRHS discard rates to the at-sea discard rates
  - proxy method to estimate HB discards

The at-sea data need to be analyzed to determine the percentage of trips observed. Some species (incidental/rare) and/or geographic areas will not have adequate at-sea coverage. In these cases the following options will be explored:

- Use SRHS discard estimates as is
- Apply proxy method to estimate discards

### Discard Proxy

A proxy is needed to estimate discard ratios prior to the years when the SRHS discard data has been accepted. The preferred discard ratio proxy method uses the mean MRIP CH:SRHS discard ratio.

Step 1. Calculate ratio by state for years where the SRHS discard data has been accepted

$$\frac{\text{mean ratio SRHS discard:landings}}{\text{mean ratio MRIP CH discard:landings}}$$

Step 2. This resulting rate is used to adjust the annual MRIP CH discard:landings ratio back to the beginning of the headboat time series. Using the annual discard rates from MRIP allow changes in management and year class effects to be incorporated.

Step 3. Resulting adjusted annual ratios are then applied to the annual SRHS landings to estimate headboat discards.

In cases where the preferred proxy method fails, alternate proxies will be considered. These may include using discard rates from other MRIP modes.

### Justification

It is necessary to estimate discards when they are not available or when misreporting of discards is suspected. A decision tree approach allows for consistency across regions and species when feasible. This recommendation uses the best available data from recreational monitoring programs.

***Issue 12: Historical Recreational Landings***

During previous SEDAR data workshops there has been considerable time and effort devoted to determining appropriate methods of back-calculating recreational landings for years prior to the start of data collection programs and landings estimates. The Recreational Working Group has been tasked with reviewing all available historical sources of landings to evaluate potential methods. Methods used in past stock assessments include: ratios of commercial landings to recreational landings; estimates from the U.S. Fish and Wildlife Saltwater Angling Survey (SWAS); U.S. Census data as a proxy for recreational fishing effort to produce regression estimates of catch; and the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Survey (FHWAR) method. These approaches resulted in estimates that, in some cases, have generated a great deal of controversy.

There is a need to develop a standardized approach for back calculating historical recreational landings prior to the start of the current recreational survey programs.

**Potential Solutions**

The historic recreational landings time period is defined as pre-1981 for the charter boat, headboat, private boat, and shore fishing modes, which represents the start of the Marine Recreational Fisheries Statistics Survey (MRFSS) and availability of recreational landings estimates.

The FHWAR method was originally used in SEDAR 28 and has been used in SEDARs 31, 32, 33, 38, 41, 42, and 43 with slight modifications in SEDAR 41, 42 and 43. This method uses a combination of information including U.S. angler population estimates and angling effort estimates from 1955 to 1985 FHWAR, along with estimates of recreational effort and landings from the MRFSS 1981 to 1985 and historical fleet size information. The FHWAR method could be used for other species by adjusting the geographic range of the FHWAR surveys to match management boundaries and the associated MRFSS catch and effort data for a particular species.

**Additional Resources**

- SEDAR 28 Data Workshop Report – Recreational Section (PW7-12 & PW7-13)
- SEDAR 31 Data Workshop Report – Recreational Section (PW7-15)
- SEDAR 32 Data Workshop Report – Recreational Section (PW7-19)
- SEDAR 33 Data Workshop Report – Recreational Section (PW7-23 & PW7-24)
- SEDAR 38 Data Workshop Report – Recreational Section (PW7-28 & PW7-29)
- SEDAR 41 Data Workshop working paper (SEDAR41-DW-17; updated draft in progress)
- SEDAR 42 Data Workshop Report – Recreational Section (PW7-33)

### Final Best Practice Recommendations

Use the following data sources to estimate effort (saltwater angler days) in the historical time period.

<b>mode</b>	<b>years</b>	<b>South Atlantic</b>	<b>Gulf of Mexico</b>
<b>charter</b>	1955-1980	FHWAR	FHWAR
<b>private</b>	1955-1980	FHWAR	FHWAR
<b>headboat</b>	1955-1971 (or 1980)	FHWAR	FHWAR
	1972-1980	SRHS, when possible	

To calculate historical recreational landings, use CPUE from MRIP and SRHS using appropriate time series which takes into account management regulations (e.g. size limits, bag limits). Apply that CPUE to the saltwater angler day effort estimates. Recommend continued research and development of this method. Final methods will be documented fully in the Data Workshop report.

### Justification

This is needed to develop a standardized approach for back calculating historical recreational landings. The FHWAR method provides a measure of saltwater fishing effort for both the South Atlantic and Gulf of Mexico prior to the start of the current recreational survey programs. This recommendation uses the best available data from recreational monitoring programs.

### 3.3.4 Indices

#### Introduction

The Index Technical Group tackled eight issues. Issues 1-4 were identified prior to the Best Practices workshop, and Issues 5-8 were identified during the workshop. The issues are 1) index report cards, 2) converting indices from numbers to biomass, 3) inclusion and prioritization of indices for assessments, 4) fishery-dependent index development, particularly effects of

management regulations, 5) timing of critical inputs for index development, 6) working papers, including process and content, 7) content of the Data Workshop report chapter, and 8) procedural expectations for index development and presentation. Each is detailed below, along with recommendations to address them.

### ***Issue 1: Index Report Card Revision / Removal***

The SEDAR Index Report Card was originally designed to inform authors of SEDAR indices of abundance of the minimum requirements for submission and to provide a clear record of the issues discussed and the criteria used in recommending or rejecting particular indices. The idea was to have the Index Working Group complete the report cards together during the Data Workshop as they evaluated the indices up for consideration. Over time the use of the report cards has changed. Some index working group members have noted that the report cards include items that are not relevant to assess the index. In practice, the report cards are rarely used, and are often filled out after the data workshop by the authors generating each index simply to fulfill a ToR. It may be time to eliminate or revise the use of report cards.

### **Additional Resources**

- Index Report Card (current version)
- Guidelines for presenting CPUE indices of abundance for WCPFC stock assessments (WCPFC2014a) – based on list developed by SEDAR in 2009

### **Final Best Practice Recommendations**

- Drop the index report card requirement from the ToRs.
- Redesign the current index report card as a checklist for use when constructing indices and compiling adequate documentation. This could be accomplished at a future technical topics workshop.
- Develop a standing reference document with recommended approaches to standardization (technical methods, diagnostic output, etc.). This could be accomplished at a future technical topics workshop.
  - Until a SEDAR reference document is completed, the Pacific Islands guidelines (WCPFC 2014a) should be used.

### **Justification**

Removing the requirement for filling out the index report card and repurposing it as a checklist/manual would:

- Promote more useful, concise, and consistent evaluation of indices because techniques will be more standardized
- Improve the indices being brought to Data Workshop by outlining preferred analytical approaches
- Provide a type of training tool/teaching guide for preparing indices

- Improve time management during and post Data Workshop

### ***Issue 2: Convert Index to Weight for Surplus Production Model***

Recreational- and fishery-independent indices are typically developed using count data (numbers of fish). Surplus-production models often use indices in weight, as recommended in the ASPIC User's Manual (ASPIC 2015). Converting indices from numbers to weight may not be simple, particularly if there is a change in average size over time, and this issue is usually not considered at Data Workshops. It would be helpful to develop a consistent methodology for converting indices in number to weight.

### **Additional Resources**

- SEDAR 24 South Atlantic Red Snapper Assessment Report (2010)
- SEDAR 28 South Atlantic Cobia Assessment Report (2013)
- SEDAR 33 Gulf of Mexico Greater Amberjack Assessment Report (2014)
- Fitting a surplus-production model with count- vs. weight-based indices of abundance together with removals (Prager and Goodyear 2001)
- ASPIC User's Manual (ASPIC 2015)

### **Final Best Practice Recommendations**

ASPIC manual recommends indices in biomass for production models (constant  $q$  in production model). The extent to which this conversion is needed is unclear, and we consider this an open topic for research. For now, use the decision tree (provided below) to convert indices developed in numbers to weights as needed and appropriate (preferred methods based on recent assessments).

Decision tree for converting indices in numbers of fish to units of weight:

1. Is Surplus Production model the primary assessment model and does the data set include weights?
  - a. If yes, develop index in weights
  - b. If no, develop index in numbers and consider converting final index to weights (proceed to 2)
2. Is there evidence of a change in mean weight in the data set?
  - a. If no, there is no need to convert to biomass (conversion is absorbed by  $q$ )
  - b. If yes, explore the change in mean weight (proceed to 3)
3. Is the change in mean weight stratum-based (includes area, depth, etc.) or temporal?
  - a. If stratum-based, convert using stratum-specific mean weights
  - b. If temporal due to changes in the population, apply a period-specific mean weight, or a running average
  - c. If temporal due to changes in fishing behavior (e.g. changes in regulations), consider splitting the index into multiple time series

Analysts need to document the methods used for the conversion and justify those methods, as well as, provide the index values and a figure with both the unconverted and converted indices.

### **Justification**

The recommended decision tree for converting indices in number to weight would:

- Provide objective and consistent methods across SEDARs
- Provide interim guidance until the topic is further studied

### ***Issue 3: Common Criteria for Inclusion and Ranking of Indices***

Objective and consistent criteria for evaluating indices are needed in SEDAR Data Workshops. Furthermore, CVs compared across indices may not reflect how well the indices track true population abundance. Additional considerations are needed to aid in prioritizing indices that should be used in the assessment. Currently the criteria for inclusion and ranking of indices are devised separately at each Data Workshop. Guidance on criteria for inclusion and ranking should reflect that the appropriateness of inclusion can depend on the particular structure of the assessment model.

### **Additional Resources**

- A flowchart to facilitate the appropriate application of CPUE to stock assessment models (ICCAT Working Group Methods 2012; PW7-40 –see PDF page 13)

### **Final Best Practice Recommendations**

Use a two-step process in upcoming SEDARs (may require future modifications)

- Step 1: Use ICCAT 2012 Flowchart for determining suitable indices
  - If found unsuitable, go to Step 2 and assign the index to Tier III.
  - If found suitable, go to Step 2 to assign the index to Tier I or II.
- Step 2: Assign recommendation tiers

#### **Tier I. Suitable and Recommended**

- Indices with unique selectivity, geographic extent and time period
- Preferred index among multiple indices with substantially overlapping selectivities, geographic extent and time period

#### **Tier II. Suitable and Not Recommended**

- Indices substantially duplicative of those in Tier I
- Indices with additional concerns or considerations

#### **Tier III. Not Suitable**

In situations when further ranking is necessary we suggest that the AW panel use the table of index Pros and Cons in the Data Workshop Report to inform their decision.

### **Justification**

The recommended two-step process for evaluating indices at SEDAR Data Workshops would:

- Simplify inclusion and prioritization of indices
- Provide an objective and consistent method across SEDARs
- Improve time management during the Data Workshop
- Focus effort on reviewing indices that are identified to have high utility to the assessment (Tier I and Tier II)

### ***Issue 4: Fishery-Dependent Index Development***

For many species in the US South Atlantic, Gulf of Mexico, and Caribbean, fisheries-independent datasets useful for the construction of indices of abundance may be few in number, of short time series, of limited spatial extent, or lacking altogether. Fisheries-dependent data, therefore, are frequently used for stock assessments. Constructing indices from fishery-dependent data presents many challenges.

Prior to the Best Practices Workshop, it was anticipated that the Index Technical Group's discussion would primarily focus on three aspects of fishery-dependent index development: 1) when do regulations make fishery-dependent indices unusable? (e.g., implementation of bag limits, implementation of ACLs, implementation of IFQs), 2) how do changes in fisher behavior affect index development? and 3) how might the availability of fishery-independent indices affect the need for generating fishery-dependent indices?

Concerning the first two aspects identified for consideration, the regions have differed recently in treatment of fishery-dependent indices:

- South Atlantic
  - Fishery-dependent index time series stopped if a quota/ACL was met or if regulations caused substantial changes in fisher behavior (e.g., red snapper closure) (SEDAR 41, SEDAR 36, SEDAR 32)
  - Break the index into separate time-series if non-negligible change in fishing regulations significantly alters fisher behavior or, alternatively, account for changes in selectivity and/or catchability within the assessment model (SEDAR 41)
- Gulf of Mexico
  - Indices developed through the terminal year despite commercial closures occurring in recent years (SEDAR 33)
  - Fishery-dependent index time series stopped if a IFQ was implemented causing substantial changes in fisher behavior (SEDAR 42)

### Additional Resources

- SEDAR Procedural Workshop 1 Report – Developing Protocols for Submission of Abundance Indices to the SEDAR Process
- SEDAR Procedural Workshop 2 Report – Evaluating and Modeling Catchability
- Using a Censored Regression Modeling Approach to Standardize Red Snapper CPUE Using Recreational Fishery Data Affected by a Bag Limit (Saul and Walter 2012)
- Recommended approaches for standardizing CPUE in pelagic fisheries (WCPFC 2014b)
- Constructing stock abundance indices from catch and effort data: Some nuts and bolts (Campbell 2015)
- Some considerations for CPUE standardization; variance estimation and distributional considerations (Lauretta, Walter, and Christman 2015)

### Final Best Practice Recommendations

During the workshop, the Index Technical Group decided to focus on a higher level question: “To what extent is a fishery-dependent index necessary?” However, it was beyond the scope of the current workshop to make firm recommendations. The Index Technical Group thought that further research should be done to guide decisions in different situations. This research would not only be of interest for SEDAR participants, but also to a wider national audience.

The Index Technical Group recommends convening a technical topics workshop to address the following:

- Develop guidelines specific to the Southeast similar to those used in the Pacific Islands (WCPFC 2014a)
- Develop recommended approaches for standardizing fishery-dependent datasets; e.g., identifying effective effort, handling effects of regulations
- Possibly similar to the Pacific Islands (WCPFC, 2014b)
- Develop recommended approaches for standardizing fishery-independent datasets
- Develop common analytical code

The Index Technical Group recognizes it could take some time to organize a technical topics workshop. In the meantime, we make the following recommendations:

- Case 1 - A **reliable** fishery-independent index that tracks the same portion of the population **IS** available
  - Do not develop alternative fishery-dependent index for year(s) associated with non-negligible fishery or management effects
- Case 2 - A **reliable** fishery-independent index that tracks the same portion of the population **IS NOT** available
  - Consideration of the following when developing the fishery-dependent index

<b>Issue</b>	<b>Interim Recommendation</b>
Changes in Sampling Design	Weighted GLM (SEDAR 33, Greater Amberjack, SAR Section 2.6.1)
Non-negligible Effect of Trip/Bag Limits	Censored regressions (SEDAR31-DW-33)
Implementation of IFQ	Split the index (SEDAR42-AW-02)
Non-negligible Effect of Fisher Targeting	Split the index (SEDAR32, SEDAR41)
Closed season with landings only information	Remove year or years (SEDAR33-AW17 ) Remove closed dates from only those years with closures (SEDAR42-AW-03) Remove closed dates from all years associated with closures in any year (SEDAR10-Update 2014)

### **Justification**

Holding a technical topics workshop would:

- Further develop firm recommendations on how and when to construct indices
- Evaluate and compare consequences of current and alternate approaches
- Implement standardization of response to commonalities across species

### ***Issue 5: Timing (process)***

The Index Technical Group discussed prerequisites for index construction. In particular, the group discussed the need for timely availability of management regulation summaries for fishery dependent indices. In addition, final decisions regarding stock structure and terminal year (initial and terminal years in HMS assessments) are needed prior to construction of all indices.

Management summaries have been supplied for use in constructing indices of abundance during SEDAR assessments, however, those histories often lack necessary information or the provided effective dates of management measures are imprecise (e.g., only year implemented was provided). As a result, multiple communications are often necessary for the production of a useful management history. Such delays reduce the time available for the completion of fishery dependent indices prior to the Data Workshop.

Final determination of stock structure, assessment terminal year, and assessment initial year (in the case of HMS shark assessments) have been, in some cases, changed during the Data Workshop. Such changes then require redevelopment of indices during or immediately following the Data Workshop. In some cases, new extractions of databases were needed prior to reconstructing indices.

### **Additional Resources**

Draft management templates are found in Appendix 3.

- Draft template of management history for use in reports
- Draft template of management history to be supplied to analysts
- Draft template of management history look-up tables

### **Final Best Practice Recommendations**

Create a spreadsheet for each sector (recreational/commercial), or if necessary each fleet, which includes all the relevant regulatory changes by year. Three management history templates should be developed: a template for use in workshop reports, a second template to be supplied to analysts, and a final template for management history look-up tables for use in analyses. Determinations of stock structure and time frame of the assessment (initial and terminal years) should be finalized prior to the Data Workshop data scoping call.

### **Justification**

Obtaining necessary information in an accessible format prior to index development would:

- Provides a more efficient use of the analyst's time
- Reduces the likelihood that indices will require redeveloping

### ***Issue 6: Working Papers (process and content)***

A lot of time is spent prior to the Data Workshop developing working papers that are often revised, rewritten, or amended during the Data Workshop. Additionally many working papers have become cluttered with extraneous information, and the relevant information is difficult to find.

### **Additional Resources**

- Guidelines for presenting CPUE indices of abundance for WCPFC stock assessments (WCPFC 2010) – based on list developed by SEDAR in 2009
- Working paper example (SEDAR41-DW52)

### **Final Best Practice Recommendations**

#### Process

- Treat working papers as working papers. Prior to the Data Workshop they are DRAFTS, and submission for distribution should be considered optional.
- Come to Data Workshop with a presentation detailing the following:
  - data source description
  - descriptive statistics (e.g., ages/lengths sampled)
  - spatial and temporal distribution of sampling
  - data filtering

- standardization methods
- results
- diagnostics
  - in many cases, comparison to indices from previous assessment (if applicable) and reasons for any notable differences may be useful
- The presentation can be a “walk-through” of the draft working paper, so that preparing separate slides (e.g., a PowerPoint presentation) with duplicative information is unnecessary.
- Revise methods as needed based on Indices Working Group discussions.
- Finalize working papers during or shortly after the Data Workshop
- Data sets new to SEDAR may require unique consideration.

### Content

- Streamline what goes into a working paper
- A sufficient working paper provides the following:
  - Enough methodological detail so that another analyst could repeat the standardization
  - Enough information, including diagnostics, for sufficient review by the Indices Working Group and reviewers
- Follow the proposed guidelines (WCPFC 2014a) for inclusion of information detailed in the following sections:
  - Background
  - Methods
  - Model diagnostics
    - including comparison to index from previous assessment if applicable
  - Results
- Also include the following based on Indices Working Group proceedings:
  - Notable comments or critique by Indices Working Group
  - Modifications suggested and implemented (if applicable)
  - Research Recommendations from Data Workshop
- Working Paper can be a bulleted list, and can be the basis of the Data Workshop presentation (example provided).

### **Justification**

Streamlining the working papers and finalizing them after the SEDAR Data Workshop would:

- Provide a more efficient use of time by reducing document length and eliminating the need to rewrite documents
- Create more useful documents by improving clarity without loss of relevant content

**Issue 7: Data Workshop Report Chapters**

Data Workshop reports have grown large and unwieldy. They are time consuming to produce and they contain more text/information than is necessary. This is inefficient, and also makes it difficult for reviewers and other readers to glean relevant information. Furthermore, much of the information is duplicative with content that already exists elsewhere in the working papers.

**Final Best Practice Recommendations**

- Data Workshop chapters should contain less text than is current practice. Details, such as diagnostics, should be reported in the working papers. Bulleted lists are encouraged wherever they do not diminish clarity.
- We recommend that the index chapter of the Data Workshop report contain only the following three sections of text:
  1. Introduction, perhaps 1-2 paragraphs, summarizing indices considered and recommendations.
  2. For each index, a bulleted list containing the recommendation for use in assessment (Yes or No), tier assignment (Tier I, Tier II, or Tier III), pros/cons of final index, issues discussed/addressed (See recommendations for Issue 3 regarding tier assignment).
  3. Research recommendations.
- We recommend that the index chapter of the Data Workshop report contain only the following three tables and two figures:
  - Table 1. Summary of indices' characteristics (example below). Only indices considered during the Data Workshop should be included in this table.
  - Table 2. Annual index values and CVs
  - Table 3. Correlations between indices
  - Figure 1. Single map showing geographic coverage of each recommended index
  - Figure 2. Time series of indices (spaghetti plot)

Table 1. Summary of indices' characteristics (fictitious example for demonstration)

Index Characteristics	Index 1	Index 2	Index 3
Recommended (Y/N)	Y		
Supporting Reference	SXX-DWX		
Data Source	SERFS		
Survey/Fishery Type (independent/dependent)	Independent		
Gear/Fleet	Chevron trap		
Spatial distribution (geo, depth,	Lat 27-35 degrees, 30-		

habitat)	120m		
Years	1990-2015		
Months	April-Oct		
Units	Fish/trap*hr		
Biomass/Numbers	Numbers		
Sampling Design (spatial/temporal/any stratification)	random selection of fixed stations		
Standardization Method	Zero Inflated Negative Binomial		
Age Range (yrs.)	2 - 15, mean=5		
Size Range (mm)	20 - 600, mean=150		

### Justification

Streamlining the reports without loss of relevant content would:

- Reduce the quantity of duplicated content
- Provide a more efficient use of time
- Create a more useful document

### ***Issue 8: Procedural Expectations***

Data Workshop participants in the Indices Working Group generally interact during three main occasions; the data scoping call, the pre-Data Workshop webinar, and the Data Workshop.

Procedural expectations could streamline and facilitate each stage of the Data Workshop process. The expectations would also provide clear and consistent guidance to index providers and index work group leaders across SEDARs.

### **Final Best Practice Recommendation**

The recommended procedural expectations for the Index Working Group are described below.

#### Data Scoping Call:

- Identify potential data sources and the respective person of contact for each source
- Drop from consideration data sources with apparent low prospect for index development. Document these data sources in the DW report.

#### Communications with Indices Work Group leader:

- Provide general notes on selectivity, space/time of dataset, and sample sizes
- Discuss preliminary indices to be considered at Data Workshop
- Consider indices to be explored for combination, if applicable

**Pre-Data Workshop webinar:**

- WG leader reports on communications with data contacts
  - Report preliminary indices to be considered at data workshop
  - Report indices to be explored for combination, if applicable
  - Drop from consideration data sources with apparent low prospect for index development

**Data Workshop:**

- The following should be available for each data source that has been previously identified for consideration (e.g., at a pre-Data Workshop webinar). Including a new data source for consideration after the Pre-Data Workshop Webinar would require exceptional circumstances.
  - Presentation detailing the following:
    - data source description
    - descriptive statistics (e.g., ages/lengths sampled)
    - spatial and temporal distribution of sampling
    - data filtering
    - standardization methods
    - results
    - diagnostics
  - Ability to make revisions to the index (bring code and data)
- Finalize working papers during or shortly after the Data Workshop
  - The presentation can be the draft working paper

**Justification**

Clear and consistent procedural expectations for participants in Indices working groups would:

- Improve time management before and during the Data Workshop
- Prevent further effort from being expended on the development of indices with low utility to the assessment
- Facilitate reviewing indices by having contributors focus on the information necessary for thorough evaluation

**3.3.5 Catch at Size/Age*****Introduction***

At the data workshop stage the assessment model choice has not been determined. However, there has usually been an increased effort in processing age structures for species on the SEDAR schedule with some indication that there will be enough age data to inform an age-structured model over at least part of the time. A detailed evaluation of the available length and age data

can aid in the decision of an appropriate model. Comparisons of spatial and temporal trends in sampling, mode/mean of length or age, deviation in lengths and age, etc., can inform assessment analysts about the need for sample weight adjustments and the scale over which lengths should be aggregated for weighting. Since there is typically no size-age composition working group at the SEDAR DW, recommendations for how to treat age and length samples rely on commercial, recreational, and life history data providers.

### ***Issue 1: Inclusion of Length and Age Compositions in DW ToR***

It is rare to have the weighted length and age compositions at the Data Workshop (DW). This makes it a challenge to complete the compositions until after the DW. A well-defined timeframe for the composition data inputs required for analysis and re-weighting should be developed and specified as part of the SEDAR process to ensure the timely completion of these products.

### **Potential Solutions**

- No change; keep weighted length and age compositions in the Data Workshop ToR.
- Limit DW products to specific items. For example these could include: sample size tables for ages and lengths (the resolution of this table will be discussed at the workshop), recommended spatial and temporal scales for weighting commercial and recreational samples, recommended pooling across years or gears where samples are limited, provide lengths, ages, and landings for recommended scales to the assessment analysts, unweighted length and age composition by gear for preliminary assessment modeling, and weighted length and age compositions completed during the pre-assessment data preparation phase of the process (changes and updates section of AW report).
- Some mix of the two or other solutions.

### **Final Best Practice Recommendations**

Procedures for how to aggregate composition data (by defined strata) should be evaluated in terms of sample coverage, sample sizes, and nominal compositions by the appropriate workgroup during the Data Workshop. Recommended procedures should be documented as a final product by each workgroup.

The DW products should include the following list at a minimum:

1. Description of sampling effort temporally and spatially by fleet or gear (e.g., traps, hauls, trips, etc.)
  - a. Temporal variables – Year, month or wave or season
  - b. Spatial variables – State, region, shrimp grids
2. Description of observations (number of lengths or ages) temporally and spatially by fleet or gear (e.g., traps, hauls, trips, etc.)
  - a. Temporal variables – Year, month or wave or season
  - b. Spatial variables – State, region, shrimp grids
3. Summary of nominal composition data by strata

**Justification**

The final weighted composition data are dependent on the final landings from the commercial and recreational groups. Landings data are finalized at the workshop and are not made available to other working groups until the end of the DW. Given that the weighted composition data are dependent on the finalized landings, the final weighted composition data are not expected by or due to the assessment analysts until after the DW.

***Issue 2: Identification of Biased Samples for Length/Age Comps***

Age and length samples can be biased for many reasons. Examples of potential biases included sampling of spawning aggregations, sampling for age-length keys, sampling for maximum age, tournament sampling, market category, etc. Data providers typically remove biased length and age samples when biases, such as those mentioned previously, are known. There should also be a consistent logic used to justify the exclusion of length and age composition data points. This method should be applied consistently across all age and length samples used to inform length or age structure in the assessment. Data providers should consistently report when and how these biases are identified to the appropriate groups (e.g., life history, commercial and recreational workgroups) and the analysts. The identification of which types of bias warrant exclusion should then be discussed with the life history, commercial, and recreational working groups to ensure that the data are treated consistently among the groups.

**Potential Solutions**

- Data providers should explain recognized biases in the database and recommend exclusion of data that cannot be remedied through weighting schemes (this is specific to composition data, LH groups may be able to use biased samples for other information such as growth curves, maximum age, etc.).
- Decisions on exclusion of biased samples should be communicated through reference documents explicitly describing these issues.

**Example:**

- In some cases data input for compositions have had larger sample sizes for ages than lengths due to non-standardized exclusion of data.

**Additional Resources**

NA

**Final Best Practice Recommendations**

A working paper should be submitted prior to the DW describing the sampling protocol of all submitted composition data sets including a description of potential biases (e.g., targeting spawning aggregations, sampling for age-length keys, sampling for maximum age, tournament

sampling, market category, etc.). Once developed, this working paper only needs to be updated if the sampling protocols change or unknown issues become apparent. For the purposes of a SEDAR working paper, descriptions should be limited to a brief summary with references for more detailed documentation (such as procedures manuals, reports, or published manuscripts, if available). If documentation is unavailable, then this working paper should be more detailed and should be considered a reference document for future SEDAR workshops.

The description of sampling protocol should include at a minimum:

- Timeline of known programmatic changes to sampling (if known)
- Experimental design used (e.g., random, stratified random, haphazard)
- Data collected (Variables collected for each fish. (e.g., year, gear, depth, area, length (with units), etc.)
- Map of sampling coverage
- Subsampling protocols for age-data.

Much of this information is also needed by the life history working group when evaluating the age-length datasets. The two groups should work together to ensure that this information is summarized and addresses the needs for both groups.

The data providers should submit a complete, clean data set with the nominal length and age composition data to the appropriate analysts in the life history, commercial and recreational working groups. The Life History Working Group developed a data template at the SEDAR Best Practices workshop for age and growth data and reproductive data. The template that they developed can be modified (i.e., remove columns associated with reproductive data) and used when providing the data to the analysts.

### **Justification**

The main purpose of the recommended working paper is to describe sampling protocols and known biases. This recommendation originates from the need to better inform the appropriate use of the data and decision making for data aggregation and stratification. Once developed this working paper only needs to be updated if the sampling protocols change or unknown issues become apparent. This working paper may be considered a reference document for future SEDAR workshops.

### ***Issue 3: Standardized Bin Size Definition for DW Products***

Typically the decision about bin size is made during the data scoping call (no less than two months prior to the Data Workshop). Having a standardized bin size best practice recommendation would allow data providers to compile their data earlier in the process.

**Potential Solutions**

- Use 1cm length bins for Data Workshop outputs and allow decisions about pooling to be made during the Assessment stage (SEDAR 32, SEDAR 36, SEDAR 41).
- In the US Caribbean, raw length data should be provided to assessment analysts since it is a required input for mean length estimation.

**Final Best Practice Recommendations**

Length composition data should be binned in 1 cm length intervals. This is common practice in Gulf of Mexico and South Atlantic stock assessments. If binning is needed for Caribbean evaluations, 1 cm length bins are recommended.

**Justification**

- Bin size of 1 cm is recommended to allow for appropriate aggregation as determined by assessment analysts.

***Issue 4: Sample Size Units***

A standard approach is needed to measure and report the sample size for length and age composition data used for input in stock assessment models. Often it is difficult to identify a common sample size unit from length collection programs (e.g., trip, haul, etc.), even within a data collection program.

**Potential Solutions**

- Use collection events that most accurately reflect the number of independent samples and provide information on the proportion of collection events that are biased.

**Example:**

- Commercial TIP data is usually collected at the trip level. However the database includes lengths obtained from dealers where a collection could represent several trips. In this case, use the grouped dealer collection as a single sample and provide the annual proportion of dealer to trip collections to inform the assessment discussion.

**Additional Resources**

- SEDAR 25 Assessment Workshop Report (**PW7-10 & PW7-11**)

**Final Best Practice Recommendations**

The preferred sampling unit is a trip. Problems identifying trips should be described in a working paper submitted prior to the DW. The working paper should also provide a data summary including:

- Description of observations (number of lengths or ages) temporally and spatially by fleet or gear (e.g., traps, hauls, trips, etc.)

- Temporal variables – Year, month or wave or season
- Spatial variables – State, region, shrimp grids

**Justification**

This approach allows for appropriate weighting of composition data and reduces issues of non-independence between samples such as individual lengths from a single trip.

***Issue 5: Weighting of Length Compositions***

The fishery-dependent data collection for lengths may be biased due to sampling protocols, state-specific sampling effort, or other non-random methods. One technique to overcome the bias is to weight the length compositions at a spatial or temporal scale at which the bias is expected.

Usually this is unknown and the samples are weighted at the finest scale available without losing data. Weighting may be model specific, so it may be helpful to develop a decision tree so that a consistent approach can be used to decide when and how to weight length composition data.

**Potential Solutions**

- Do not weight length composition data, use raw length compositions.
- Evaluate length data to determine if biased samples are different from unbiased samples if exclusion of biased samples decreases sample size dramatically.
- Weight length data by landings at finest spatial scale available (e.g., gear, state, year, etc.) with a minimum sample size criteria set for the scale chosen. The sample size criteria should be discussed at the DW but is species-specific. The decision on whether this is a DW or AW consideration relies on prior best practice decisions.

**Additional Resources**

- SEDAR42-DW12 (**PW7-34**)
- SEDAR42-DW18 (**PW7-35**)
- SEDAR 38 Data Workshop Report – Commercial and Recreational Sections (**PW7-28 & PW7-29**)
- SEDAR38-AW05 (**PW7-30**)
- SEDAR32-AW01 (**PW7-21**)
- SEDAR32-AW02 (**PW7-22**)

**Final Best Practice Recommendations**

Weight the length composition by the stratum-specific landings developed at the DW. This product will be provided after the DW.

**Justification**

Weighting by the landings allows for the adjustment of non-representative length compositions. The timing allows for development of weighting values.

***Issue 6: Weighting of Age Compositions***

The fishery-dependent data collection for ages may be biased due to sampling protocols, state-specific sampling effort, or other non-random methods. The selection of fish from which to collect ageing structures may be biased, typically towards larger fish, because the selection process is rarely formally randomized. Weighting the age composition data is one way to account for this bias. Weighting may be model or software specific, so it may be helpful to develop a decision tree so that a consistent approach can be used to decide when and how to weight age composition data.

**Potential Solutions**

- Do not weight age composition data.
- Evaluate age data to determine if biased samples are different from unbiased samples and if exclusion of biased samples decreases sample size dramatically.
- Weight age composition by the length composition data to remove bias for selecting larger fish to age. The decision on whether this is a DW or AW consideration relies on prior best practice decisions.

**Additional Resources**

- SEDAR42-DW12 (**PW7-34**)
- SEDAR42-DW18 (**PW7-35**)
- SEDAR 38 Data Workshop Report – Commercial and Recreational Sections (**PW7-28 & PW7-29**)
- SEDAR38-AW05 (**PW7-30**)
- SEDAR32-AW01 (**PW7-21**)
- SEDAR32-AW02 (**PW7-32**)

**Final Best Practice Recommendations**

The age composition data should be weighted by the weighted length composition data.

**Justification**

Weighting by the weighted length compositions data allows for the adjustment of non-representative age compositions. The process of deciding if age compositions are representative based on comparisons of length compositions from aged fish and measured fish can be subjective. If the composition is representative, the weighting would not change the composition.

### ***Overall Recommendations***

- Data collection methodologies should include identification of trips as the sampling unit.
- Analysts should provide feedback to data providers including specific information to better inform stock evaluations (e.g., what level of information is needed for the analysis, the need for more representative sampling).

### **3.3.6 Process**

The SEDAR Data Best Practices Panel and Technical Groups tackled three process issues that potentially affected all Technical Groups together. The issues were 1) Data Workshop Roles & Responsibilities, 2) Data Workshop Timeline & Deadlines, and 3) Data Workbook Templates. Each issue is detailed below along with the corresponding recommendations that were made to address them.

Additional process issues were discussed in individual Technical Groups with input from the Best Practice Panel, and additional Technical Groups as necessary. These issues included: Stock Boundary (Life History: Issue 1), Meristics (Life History: Issue 2), Timing of Critical Inputs for Index Development (Indices: Issue 5), and Working Papers (Indices: Issue 6). Details and the best practice recommendations for these issues can be found within the corresponding sections of this report.

### ***Issue 1: Data Workshop Roles & Responsibilities***

Common data roles required for Data Workshops need to be described and those staffing each SEDAR should ensure all necessary roles are covered. This issue includes describing data roles for each working group, identifying who will fill those roles for each assessment, and identifying who needs each product produced by each role.

The individual Technical Groups developed draft data roles and responsibilities tables as part of the workshop briefing materials. These drafts were reviewed and finalized during the workshop process. The finalized tables are available in Appendix 4 and on the SEDAR website.

### **Final Best Practice Recommendations**

- Use finalized data roles and responsibilities tables as a tool to help identify and assign responsibilities for SEDAR assessments
- Make data roles and responsibilities templates available on the SEDAR website

### **Justification**

Using the data roles and responsibilities tables will:

- Help make clear to all participants who is responsible for data inputs and outputs
- Help ensure all data roles are assigned to individuals for each SEDAR project

- Help ensure all data providers know who they need to submit their data to and who they can contact if they need information on specific data or analyses

### ***Issue 2: Data Workshop Timeline & Deadlines***

Data compilation and analyses for SEDAR assessments are very complex. Some data components and analyses are needed by other working groups in order to move forward with their analyses. Current SEDAR project schedules include only a few key data deadlines. To help improve DW efficiency, the group developed a timeline to identify when data inputs and outputs need to be submitted during the data stage of the assessment.

To develop the timeline, workshop participants went through an exercise using a visual facilitation tool (e.g. the blue sticky wall). Each Technical Group was asked to write down all data inputs and outputs relative to their group on separate pieces of paper and number them in the order they need to occur. Each group was given a different color of paper.

The BPP then grouped the data inputs and outputs into three timing categories: before the DW, during the DW, and after the DW. The inputs/outputs were hung on the wall in these three categories and roughly placed in the order in which they need to occur. Similar items or items that needed to occur in the same timeframe were grouped together and draft timings were assigned to each grouping.

Each Technical Group was asked to review the draft timeline separately. Technical Group leaders and BPP members then came together to discuss changes and further refinement of the timeline. Any changes that were made were approved by all Technical Group leaders. Additional discussion and refinement of the timeline occurred on the Post-Workshop webinars. Workshop panelists noted this timeline was developed for benchmark assessments and would need to be adapted for standard, update, and/or data poor assessment tracks. The final timeline is in Figure 1.

Draft Technical Group flow charts were also developed as part of the supplementary materials for the workshop to assist in these discussions. Not all groups edited and updated these documents to reflect the recommendations from this workshop. The Recreational Technical Group updated their flow chart and it can be found in Appendix 5.

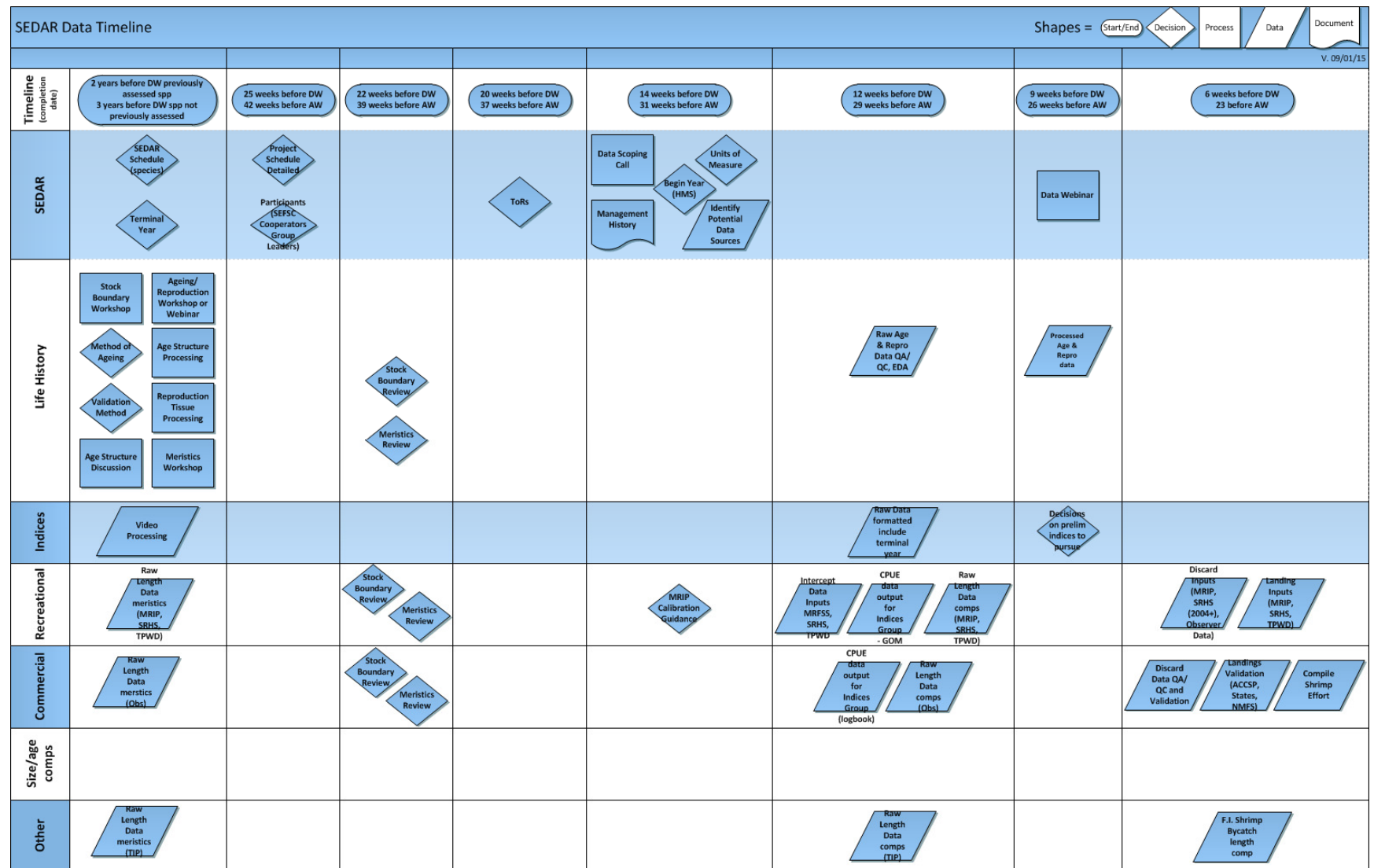


Figure 1a. SEDAR Data Timeline: 2-3 years to 6 weeks before the Data Workshop

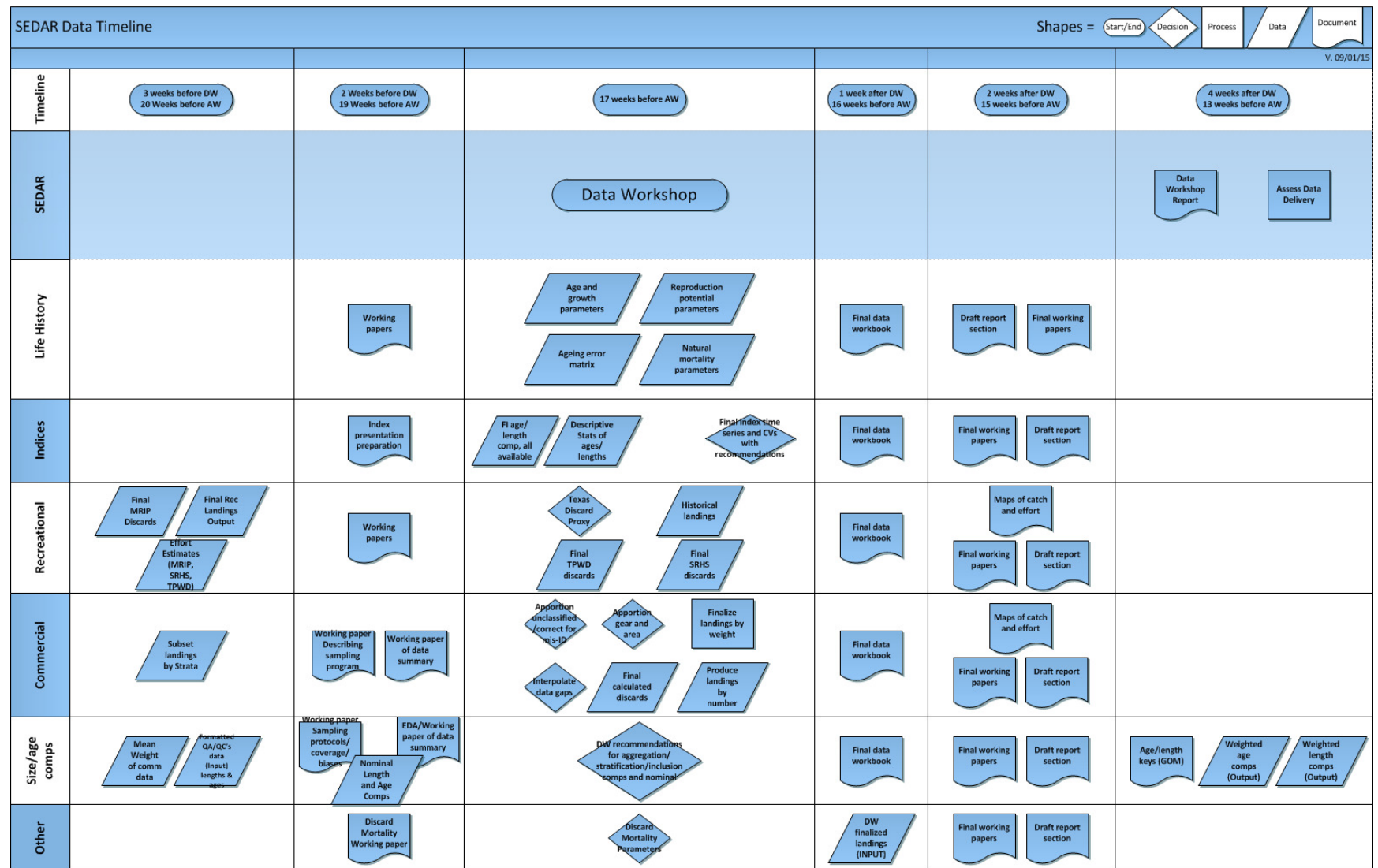


Figure 1b. SEDAR Data Timeline: 3 weeks before the Data Workshop to 4 weeks after the Data Workshop

After completing the timeline, the group discussed what to do if the newly established data deadlines are not met. Key points from this discussion are below.

- Many of the data are interconnected, so if one deadline is not met it can affect many other data sources.
- Need some flexibility when evaluating the impact of a deadline not being met as the impact will be dependent on the data source and where we are in the timeline.
- Critical choke points need to be identified and used as ‘check-in’ points during the process.
- The final data delivery deadline (12 weeks before the assessment workshop) was identified as one of the critical choke-points. At this point, after evaluating the data that have been submitted, a decision needs to be made whether to develop a work around for any missing data or to delay the assessment.
- Data providers must be honest when evaluating whether or not they can meet critical check points.

Additionally, the group briefly discussed how this new structure may change the need for transparency and input at different stages throughout the process. No recommendations were developed regarding this topic, but it may warrant further discussion before implementing this timeline.

### ***Issue 3: Data Workbook Templates***

SEDAR Assessments in the South Atlantic use data workbooks to compile and document final data output from the DW and final data input into the assessment model. Example data workbooks from SEDAR 24 were distributed to workshop participants. The assessment teams responsible for the Gulf of Mexico assessments will develop a similar data workbook template to use in future assessments.

The data workbooks will also help address the Data Input process issue identified by the Life History Technical Group and could potentially help populate assessment summary report tables.

### **3.3.7 Approach to Follow When Deviating from Best Practice Recommendations**

Workshop participants acknowledged that best practice recommendations may not always be followed and discussed the approach to follow when deviating from these recommendations. Key points of the discussion are below.

- Deviating refers to providing data that do not follow the best practice recommendations. It is different than missing the established data deadlines.
- The burden of proof is on the group recommending deviation from the best practice. Documentation and working papers need to be provided in advance of the DW justifying the deviation, so that the DW panel can review the deviation sufficiently.

- Documentation in the DW report should acknowledge the best practice recommendation and provide sufficient justification for the deviation.
- Examples of when groups may deviate from best practice recommendations include: lack of data, resource limitation, or improved methods.
- If a group feels that a new method should be considered for a ‘new’ best practice recommendation, they should indicate that within a DW report and it would be passed on to the Standing Best Practice Panel for review.

### 3.4 Future Revision and Evaluation of Best Practices (TOR 5)

*Identify process to address future revision and evaluation of workshop recommendations and Best Practices, considering all unaddressed data issues and the possible creation of a standing data methods working group.*

Best practice recommendations are being developed to improve efficiency within the SEDAR process, however, it is recognized that there may be multiple ways to resolve a data issue. The best practice recommendation will be used the majority of the time. However, it is important to note the fluid nature of these best practices and it is expected that these recommendations will evolve over time. Recommendations for addressing future revisions and evaluation of best practices are below.

- Establish a SEDAR Data Best Practice Methods working group
  - Similar to the Assessment Methods working group used by ICCAT.
  - Meet annually, or as needed, via webinar(s) or workshop.
  - Chaired by SEDAR or SEFSC personnel.
  - Standing panel with similar representation as the Best Practices Panel from this workshop
  - Others participate as needed, based on the topics to address.
  - Working group chair and/or standing panel would put out a call for topics annually and would be responsible for establishing the draft agenda of topics to discuss each year.
  - Standing panel authorized to revise the SEDAR Data Best Practices report when required. It will be important to make sure report is clearly dated and versioned and that the most recent version is easily accessible on SEDAR website.
- SEDAR project DW panels can provide feedback to help evaluate implementation and use of best practice recommendations. If a group feels that a new method should be considered for a ‘new’ best practice recommendation, they should indicate that within a DW report and it would be passed on to the Standing Best Practice Panel.

- Establish a separate Standing Assessment Best Practice Panel that has some overlapping membership with the Standing Data Best Practices Panel. This panel would be charged with addressing assessment practices.

### 3.5 General Recommendations

#### 3.5.1 Project Management

Data compilation and analyses for SEDAR assessments are very complex and many of the data inputs/outputs are interconnected. To effectively track SEDAR assessment projects, the workshop panel proposed a project manager position dedicated to SEDAR assessment efforts, and preferably based and managed within the SEFSC. The ideal candidate for the position would have logistics and/or project management experience. Development and use of a project management database or software package (e.g. Microsoft Project) was suggested as a useful tool to help manage projects and track critical dependencies and data bottlenecks over time. In the interim, it was suggested that SEDAR Coordinators work collaboratively with the SEFSC and SEDAR project work group leaders to track data at critical choke points throughout the assessment process.

#### 3.5.2 Prioritization of Proposed Workshops

Some of the issues discussed at the SEDAR Data Best Practices workshop were complex and could not be resolved during this workshop process. Technical groups proposed a number of workshops to help resolve these issues. The proposed workshops were compiled into a comprehensive list that was edited and reviewed by workshop participants during the first Post Workshop Webinar on July 7, 2015. Technical Groups provided more details on the scope of each workshop proposed by their group. The workshop scope document (see Appendix 6) was provided to workshop participants in addition to a poll developed to help prioritize the proposed workshops. In the poll, workshop participants were asked to select the three workshops they thought were the highest priority. ‘Uncertainty in Commercial Landings’ and the ‘Meristics’ workshops were not included in the poll because they were not identified by the panelists on the July 7, 2015 webinar. More information on these two workshops can be found in the commercial and life history sections, respectively, of this report.

Thirty-one workshop participants responded to the poll, giving a response rate of approximately 53%. Results from the workshop prioritization poll are below.

Table 1. SEDAR Data Best Practices proposed workshop prioritization poll results. The ‘count’ refers to the number of votes received for each workshop. The ‘percentage’ refers to the percent of respondents who selected that workshop.

<b>Workshop</b>	<b>Count</b>	<b>Percentage</b>
Stock Boundary	25	0.81
Discard Mortality	18	0.58
Estimating Commercial Directed Discards	15	0.48
Indices Construction	14	0.45
Assess Reproductive Inputs Affect Fishery Mgmt Ref Pts.	8	0.26
Reconvene SE US histological workshops	7	0.23
Maturity Estimation Methods	6	0.19

Panelists also noted via the poll or during review of the poll results that it may be possible to combine the following workshops:

- ‘Discard Mortality’ and ‘Estimating Commercial Directed Discards’
- ‘Reconvene SE US Histological Workshops’ and ‘Maturity Estimation Methods’

However, the group also noted that when considering combining these workshops, it will be important to make sure there is overlap in the people who would be needed to address these issues. On the September 1, 2015 Post-Workshop webinar workshop participants also noted that it could be possible to combine the ‘Stock Boundary’ and ‘Meristics’ workshops.

### ***3.5.3 Implementation of Best Practice Recommendations***

Workshop participants recommended that best practices identified here take effect immediately, while also acknowledging that incorporating best practice recommendations will be a rolling process and it may take time to fully implement all of the recommendations. The timing of best practices implementation may vary by Cooperator and/or Technical Group and may be, in part, dependent on the upcoming SEDAR schedule (e.g. Update vs. Benchmark vs. Standard vs. Data Poor assessment tracks). The group recognized it may not be possible to incorporate all recommendations in update assessments and that these recommendations may not be applicable to data-limited assessments.

### ***3.5.4 Best Practices Information on SEDAR Website***

SEDAR Best Practice recommendations need to be easily accessible on the SEDAR website. All Best Practice reports should be clearly dated and versioned. All of the tools and templates developed during this workshop process should be available on the SEDAR website (e.g. data roles and responsibilities tables, life history data standardization template, SEDAR process timeline, etc.).

### ***3.5.5 Management Templates and Database***

During the workshop, the Indices Technical Group developed three management history templates: a template for use in workshop reports, a second template to be supplied to analysts with more detailed information about regulatory changes, and a final template for management history look up tables for use in analyses. The management templates should be created for each sector (e.g. recreational and commercial). The templates were reviewed by workshop participants and feedback was incorporated into the versions included in this report (see Appendix 3). Not all of the individuals who compile the management histories participated in this workshop. So it may be helpful to develop more detailed instructions for each of the management history templates to ensure the necessary information is included in these documents in the future.

Workshop participants also recommended development of a management and regulatory history database. A Panel member noted there have been discussions about this within NMFS where the SEFSC would be responsible for building the database and SERO would be responsible for maintaining it.

### ***3.5.6 Data Source Identification and Workshop Participation***

During the workshop, all participants noted it was important to identify data sources early in the SEDAR Process for each project. All workshop participants acknowledged that identifying data sources can be challenging and that there was not a simple solution to resolve this issue. Currently, SEDAR Coordinators reach out to past SEDAR participants, Cooperators, and SSC's (or the Cooperator equivalent) to try and identify data sources for each project. The group felt that identifying data sources needed to be a collective effort of all SEDAR partners as it is difficult for one partner/group to be aware of all of the research being conducted throughout the Southeast. The group also noted that it was important to have all partners who provide data, including federal, state agency, Commission, and academic representatives participate in Data Workshops.

### ***3.5.7 Recommendations Relevant for All Technical Groups***

During the workshop, there were a number of issues discussed and best practices developed that potentially affect multiple Technical Groups. These issues are detailed within other sections of the workshop report but a brief overview of some of these key issues is listed below.

- **Stock Boundary and Meristics:** All Technical Groups noted that the stock boundary decision and the development of meristic conversion equations need to be made early within the SEDAR Process. The stock boundary decision affects how all of the data are compiled and analyzed by SEDAR working groups. Meristic conversions are needed by various DW working groups to begin analyses in preparation for the DW. All Technical Groups were supportive of holding a Stock Boundary and Meristics workshop(s) well in advance of SEDAR Data Workshops. The workshop(s) would review current stock

boundaries and meristic equations used for species under Fishery Management Plans and provide recommendations for both stock boundaries and meristic equations by species. The recommendations from this workshop would then be reviewed via a ‘Stock Boundary/Meristics’ webinar for each SEDAR project by Data Workshop panelists appointed to that project. See the Data Timeline for more specific timing details.

- **DW Roles and Responsibilities:** All workshop participants supported using the DW Roles and Responsibilities tables to help identify and assign responsibilities for SEDAR assessments.
- **SEDAR Data Timeline:** All workshop participants supported using the SEDAR Data Timeline developed during this process. It was noted that this timeline was developed for benchmark assessments and would likely need to be adapted for standard, update, and/or data limited assessment tracks.
- **Data Workshop Templates:** All workshop participants supported using data workbooks to compile and document final data output from the DW and final data input into the assessment model for at least the South Atlantic and Gulf of Mexico regions.
- **Working Papers:** The Indices Technical Group developed best practice recommendations regarding the process and content of index working papers. Recommendations included treating working papers as drafts prior to the DW, streamlining the information that is included within these documents, and simplifying the presentation of the information (e.g. bulleted lists/tables vs. paragraph format). The details outlined in the Indices report section are specific to their group; however, many other Technical Groups were supportive of these ideas and may be interested in potentially applying some of these recommendations to their groups.
- **Data Workshop Report Chapters:** The Indices Technical Group developed best practice recommendations regarding the Index Chapter in DW reports. Recommendations included streamlining the report chapters and not duplicating information that already exists in working papers. Again, the details outlined in the Indices report section are specific to their group; however, many other Technical Groups were supportive of these ideas and may be interested in potentially applying some of these recommendations to their groups. When working to streamline DW report chapters, it will be important to make sure that all of the information included in the SEDAR DW Report Outline, particularly justification for decisions, can still be found within the report.

## **Appendix 1: Data Issue Inventory Instructions**

## TO ENTER NEW DATA

- Open the Excel file titled 'SEDAR\_PW7\_DataIssuesInventory\_2.25.2015'. Make sure you are using the file dated 2/25/2015! This file has macros and **in order to enter your data into the file you will need to enable the macros.**
- Click the 'DataIssueForm' button on 'Sheet1' to open the form to enter information about your data issue(s).
- The information below will walk you through the data form. This information is also available on 'Sheet1' of the Excel file.
- **Please complete the data form once for each data issue you have identified for your focus group(s).**
- **Data form fields**
  - **Issue** – Select the data issue from the drop down list. (Issues in list are organized by focus group.) If the issue is not included in the list, select 'Other' and please identify the issue in the corresponding text box (located below the drop down menu). You may also use the corresponding text box to further describe the issue if the language in the drop down list does not fully capture it.
  - **Focus Groups Affected** - Check the focus groups that are affected by the identified data issue. Check all applicable boxes.
  - **Regions Affected** – Check the regions that are affected by the identified data issue. Check all applicable boxes.
  - **Is this issue global or specific to a dataset(s)** – Identify if the issue is global (large issue; affects MANY datasets) or specific to a few datasets.
  - **Datasets Involved** – If the identified issue is specific to a few datasets, check the datasets that are involved. Datasets are organized into fishery dependent and fishery independent sections. Check all applicable boxes. If the dataset is not included in the list, please check either the 'Other State Data' and/or 'Other' check boxes and identify or further describe the dataset in the corresponding text box. If you need additional 'Other' checkboxes – note this and identify the datasets in the 'Additional Comments' box. Data Programs that encompass multiple datasets (e.g. SEAMAP) have corresponding text boxes. For datasets/programs that have a corresponding text box (e.g. SEAMAP), please identify the specific dataset (e.g. SEAMAP - South Atlantic Shallow Water Trawl).
  - **How often does this issue come up in SEDAR assessments** – estimate how often this issue is raised at SEDAR Data Workshops.

- **Is the issue solved the same way consistently among stocks/species** – estimate whether this issue is solved consistently the same way for different species at SEDAR Data Workshops.
- **Is the issue solved the same way consistently among regions** - estimate whether this issue is solved consistently the same way in different regions at SEDAR Data Workshops.
- **How important is having a common solution for this issue** - rank how important having a common solution to this issue is in SEDAR assessments. Scale ranges from 1-5 with 1 = VERY Important and 5 = NOT Important.
- **Could this issue be addressed via webinar** – Identify whether or not you think a common solution to this issue could be reached via a webinar(s).
- **Is this issue specific to a model** - Identify whether the issue is specific to a certain model (e.g. surplus production, SRA). If yes, please identify the model in the corresponding text box.
- **What recent SEDAR assessments have dealt with this issue** - Identify the recent SEDAR assessments that you are aware of that have dealt with this issue (e.g. SEDAR 33 Gulf of Mexico Gag).
- **What regions/Cooperators are you typically affiliated with** – Check the region(s)/Cooperator(s) where you typically work. Check all applicable boxes.
- **What is your typical role in SEDAR Data Workshops** - Check the box representing your typical role(s) in SEDAR Data Workshops. Check all applicable boxes. If none of the boxes represent your typical role, check the 'Other' box and describe your role in the corresponding text box. Examples of the listed roles include: 'Provide Raw Data' - provide raw ages, lengths, etc.; 'Provide Processed Data/Analysis' - provide CPUE, growth model, length/age comps, etc.; 'Assessment Analyst' - participate as lead analyst or member of the assessment team.
- **Additional Comments** - Please list any additional comments you feel would be relevant for other focus group members or the Organizing Committee to know about the identified data issue.
- **Please check the data form to make sure the information you have entered accurately represents the identified data issue.**
- If the information in the form is correct, please click the 'Submit' button. This button will transfer the information from your form into a row on the 'Sheet2' worksheet. IF YOU HIT RETURN WHILE YOUR CURSOR IS ON THE SUBMIT BUTTON IT WILL TRANSFER THE DATA TO 'SHEET2'. You are welcome to review the data in this spreadsheet, but please DO NOT alter the information in these cells. If you made a mistake on the data form, simply delete the row representing your data and re-enter it on the form.
- To enter information for another data issue, please make sure the information from your first data sheet has transferred to the spreadsheet. If it has, then simply hit the 'Clear' button to clear the form and enter the data for additional data issue(s). When you click the submit button for your new dataset, it will populate the next row down in the 'Sheet2' spreadsheet.

- To close the form without transferring any of your data to the 'Sheet2' spreadsheet, hit the 'Cancel' button.
- **After you have submitted information on all of the identified data issues, please save as SEDAR\_PW7\_DataIssuesInventory\_YourLastName (e.g. SEDAR\_PW7\_DataIssuesInventory\_Byrd.xlsm) and email to Julia Byrd (julia.byrd@safmc.net). When possible, please try to enter all data sets per focus group from a particular state or lab on one spreadsheet.**

## **Appendix 2: Compiled Summarized Data Issue Inventory**

- The more detailed data issue inventory can be found in the corresponding Excel document titled, 'SEDAR\_PW7\_CompiledDataIssueInventory\_4.3.2015'.

## **SEDAR Data Best Practices**

### **Summary of Compiled Issue Inventory – updated 5/11/2015**

- Please see compiled inventory spreadsheet (Excel document) for more detailed information. Issues are described in greater detail in the spreadsheet and the 'Metadata' worksheet describes the process that was used on focus group webinars.
- This summary only includes technical and process issues. Data Collection issues can be found in the compiled inventory spreadsheet.
- Webinar summaries from each focus group webinar are available upon request.
- Process issues from each focus group were combined into one summary table.
- If an issue is followed by an asterisk \*, it was discussed in multiple focus groups and likely needs cross group discussion.

### **Key Discussion Points from April 17 Organizing Committee (OC) webinar**

- All issues in the inventory were considered important. Any issues not addressed through this workshop should be addressed in the future. Workshop ToR# 5 will help develop process for this.
- The OC's approach to prioritization was to tackle as many straight forward 'low hanging' fruit issues as possible during this workshop process. Generally issues with 'webinar' as meeting type were identified as low hanging fruit issues. Issues in red font are those prioritized for discussion at this workshop. The order that the issues appear in the table does not hold any significance.
- The OC wants to provide the full inventory list to workshop participants / focus group members and are supportive of the focus groups tackling additional issues from the inventory at the workshop as they see fit and time allows.
- OC noted the need to allow flexibility for groups in solving these issues. Groups could potentially recommend best practice(s), could develop decision tree/guidance on how to make decisions based on available data, could determine issue is not suitable for best practice recommendations, could resolve issues differently in different regions, etc.
- The following edits were made to the issue tables below post- OC webinar:
  - Technical issues for each focus group were combined into one table (previously two tables by meeting type)
  - Issues re-sorted so prioritized issues appear first
  - For prioritized issues, more language was added in an attempt to better describe topic; tried to pull 'new' language from Excel document; **language should be reviewed / edited / refined by workshop participants/focus group members**
  - Process issues were moved to the beginning of the document

## PROCESS ISSUES (ALL FOCUS GROUPS COMBINED)

-Meeting type was not specified for all process issues.

Issue	Priority	Focus Group Suggested Meeting Type
<b>Work Group Data Roles/Submissions</b> -Develop tables by work group to identify data needs, individuals responsible for each dataset (could include raw data and analyses), and to whom data needs to be submitted (see S. Turner tables, would like drafts of table prior to workshop)	High	Webinar
<b>Data Deadlines</b> -Identify when the various datasets need to be submitted to help improve DW efficiency (could be incorporated into S. Turner tables - x = days out with 0 = final data to analyst/compiler)	High	Webinar
<b>Develop data workbook templates</b> (e.g. data workbooks in South Atlantic; include format for input and output data)	Added by Organizing Committee	Added by Organizing Committee
SEDAR DW Life History Group Leaders	High	
SEDAR Scheduling	High	
Data Source Identification	Low	

## LIFE HISTORY TECHNICAL ISSUES

Issue	Focus Group Priority Rank	Focus Group Suggested Meeting Type
<b>Meristic Conversion</b> -How often do equations need to be updated	High	Webinar
<b>Reproduction Documentation</b> -Reproduction recommendations need to be clearly documented throughout SEDAR process -Good summary of assessment inputs provides feedback to data providers and enables more efficient work flow moving forward	High	?
<b>Ageing Error Matrices</b> -Standardize method and document	Medium	Webinar
<b>Comps in DW ToR*</b> -Identify data products needed from data providers for development of length and age comps -Discuss timing of age/length comp development	High	In-person
<b>Data Standardization</b> -Develop uniform format for raw life history data	High	In-person
<b>Metadata, QA/QC, Basic analysis</b> -Develop guidance on these topics for LH data submission	High	Webinar follow by in-person
<b>Natural Mortality</b> -Identify most appropriate methods (point and/or age-based) -Discuss consistency in regression use of age-based methods -Determine how/when to scale -Development of uncertainty estimates -Development of sensitivity recommendations	High	Webinar follow by in-person
<b>Stock Boundary Issue*</b> -Guidance on how to make decision based on data available -For commercial may be helpful to include recommendations on how to compile landings north of NC for South Atlantic -May want to consider how/where different datasets can be split	High	In-person
<b>ID/Removal of Biased Samples for Comps*^</b> -Develop standardized method to decide if data usable in length/age comp (including mis-identification) -Identify standard procedure to flag data?		
Discard Mortality*	High	In-person
Growth	High	In-person
Diagnostic Toolbox	High	In-person
Reproduction Decision Tree	Medium	In-person

^Recreational Focus Group discussed the 'ID/Removal of Biased Samples for Comps' issue and noted for recreational data this was more of a problem for ages (not lengths) and noted this was more of an issue for LH group; was identified after LH focus group webinar so group did not discuss

## COMMERCIAL TECHNICAL ISSUES

Issue	Priority	Focus Group Suggested Meeting Type
<b>Comps in DW ToR*</b> -Identify data products needed from data providers for development of length and age comps -Discuss timing of age/length comp development	High	Webinar
<b>ID/Removal of Biased Samples for Comps*</b> -Develop standardized method to decide if data usable in length/age comp (including mis-identification) -Identify standard procedure to flag data?	High	Webinar
<b>Duplicate Dataset Decisions</b> -Multiple data sources available for some data (e.g. landings) -Recommend authoritative data sources	Medium	Webinar
<b>Convert Catch in # to Weight</b> -If multiple conversions available which to use and when -What to do if no conversions available -How to apply conversions -How regulations affect conversion decisions	High	Webinar follow by in-person
<b>Convert Catch in Weight to #</b> -Identified as potential issue for projections	Medium	Webinar
<b>Monroe County</b> -Method to split Monroe County landings -Important to not include Monroe County landings in multiple regions -Likely species specific	Medium	Webinar
<b>Stock Boundary Issue*</b> -Guidance on how to make decision based on data available -For commercial may be helpful to include recommendations on how to compile landings north of NC for South Atlantic -May want to consider how/where different datasets can be split	Medium	Webinar
<b>Unclassified / Mis-identified Fish (e.g. unclassified grouper)</b> -Multiple data sources can be used to apportion unclassified fish -Could potentially develop decision tree to help standardize method -May be species specific	Medium	Webinar follow by in-person
<b>Uncertainty Estimates for Landings</b> -Need for time series landings provided -Could potentially use changes in reporting methods to help inform decisions	Low	Webinar
Determine Historic Landings	High	Webinar
Historic Foreign Fleet Harvest	Low	Webinar
Commercial Discard Estimates	High	In-person
Discard Mortality*	High	In-person
Commercial IFQ*	High	In-person
Shrimp Bycatch Estimation	High	In-person

## RECREATIONAL TECHNICAL ISSUES

-Issues with 'Document – webinar' in the Meeting Type category were ranked as a low priority. The focus group considered them a non-issue because a common method exists and is used in multiple regions. Group thought it would be helpful to document these methods and make into best practice recommendations.

Issue	Priority	Focus Group Suggested Meeting Type
<b>MRIP Separation CH/HB from 1981-85</b>	Low	Document – webinar
<b>MRIP FHS Calibration for CH</b>	Low	Document – webinar
<b>MRIP 1981 wave 1 EFL and GoM estimates</b>	Low	Document – webinar
<b>MRFSS/MRIP Re-estimation Calibration</b> (from first calibration workshop)	Low	Document – webinar
<b>Duplicate Data: MRIP &amp; TPWD early 1980's CH &amp; PR</b>	Low	Document – webinar
<b>Comps in DW ToR*</b> -Identify data products needed from data providers for development of length and age comps -Discuss timing of age/length comp development	High	Webinar
<b>Stock Boundary Issue*</b> -Guidance on how to make decision based on data available -For commercial may be helpful to include recommendations on how to compile landings north of NC for South Atlantic -May want to consider how/where different datasets can be split	High	Webinar
<b>Handling Large Spikes in MRFSS/MRIP Catch</b> -Develop guidance so spikes handled consistently among regions -May need to consider nature of spike when developing guidance -May want to consider development of decision tree	Medium	Webinar
<b>Monroe County</b> -Method to split Monroe County landings -Important to not include Monroe County landings in multiple regions -May be species specific	Medium	Webinar
<b>Estimate Texas Discards</b> -TX WPD survey does not include discard estimates -Develop guidance to estimate discards	Medium	Webinar
<b>MRIP Public Use Datasets – Small Domains ???</b> -Guidance on sufficient sample sizes to support estimation at smaller domains (ACCSP workshop?)	Low	Webinar
<b>Headboat Landings Start Date</b> -Method to fill in holes in landings estimates early in time series	Low	Webinar

<b>Headboat Discards</b> -Identify proxy to estimate headboat discards prior to collection through SRHS -May be species specific -May want to consider development of decision tree	High	In-person
MRFSS/MRIP APAIS Calibration (2)	Medium	?
Mis-Identification Issues	Low	Webinar
Duplicate Data: MRIP & SC Chaterboat Logbook	Low	Webinar (address in future)
Duplicate Data: MRIP & State University with Bio Data	Low	Webinar
Discard Mortality*	High	In-person
Recreational Historic Catch	High	In-person
MRIP Public Use Datasets – Variances	Low	Series of webinars or in-person

-ID/Removal of Biased Samples for Comps – Rec group identified this as more of a problem for age (not length); noted this was more of an issue for LH group

## INDICES TECHNICAL ISSUES

Issue	Priority	Suggested Meeting Type
<b>Index Report Card Revision / Removal</b> -Consider changes and/or whether to continue use of report card	High	Webinar
<b>Convert index to weight for production model</b> -Guidance on how to convert indices developed in numbers to weight -Issue for surplus production models	Medium	Webinar
<b>Common criteria for Inclusion and Ranking of Indices</b> -Guidance for criteria for inclusion of indices -Guidance for criteria to rank indices	High	In-person
<b>Fishery Dependent Index Development</b> -Guidance on when regulations make fishery dependent index unusable -Guidance on how to address changes in fishermen behavior in index development	High	In-person
Common Code for Index	High	Webinar/email exchange follow by in-person
Standardization of Indices	High	In-person
Commercial IFQ* (sidebar at workshop?)	High	In-person
Methods for Combining Indices	Medium	In-person

-The Recreational focus group identified 'MRIP Public Use Datasets: Grouped Catch' issue as a potential issue for Indices group; was identified after Indices focus group webinar so group did not discuss

### CATCH AT SIZE/AGE TECHNICAL ISSUES

-CAS/CAA focus group did not recommend a meeting type for each issue during the webinar. They felt that all issues identified could be resolved through this workshop process.

Issue	Priority
<b>Comps in DW ToR*</b> -Identify data products needed from data providers for development of length and age comps -Discuss timing of age/length comp development	High
<b>ID/Removal of Biased Samples for Comps*</b> -Develop standardized method to decide if data usable in length/age comp (including mis-identification) -Identify standard procedure to flag data?	High
<b>Standardized Bin Size Definition for DW Products</b> -Guidance on bin size for data workshop products	High
<b>Actual Sample Size ('Effective Sample Size')</b> -Guidance on documenting the actual (or 'effective') sample size for composition data	High
<b>Weighting of Length Comps</b> -Guidance on if/when length comps should be weighted and if so, the appropriate method	Medium
<b>Weighting of Age Comps</b> -Guidance on if/when age comps should be weighted and if so, the appropriate method	Medium

## **Appendix 3: Management Templates**

- All management history templates are available in a corresponding Excel document titled, 'Appendix3\_MgmtTemplates\_7.24.2015'.
- Each template is to be completed for both the commercial and recreational sectors.

Template 1 = Management history for use in reports

Template 2 = Management history to be supplied to analysts

Template 3 = Management history look up tables (available ONLY in corresponding Excel document)

# TEMPLATE 1

**Table 2.7.2. Annual Recreational Regulatory Summary**

Note: There was no recreational grouper allocation explicitly specified prior to 2009, but the assumed commercial/recreational allocation of shallow-water grouper was 65%/35%. Therefore, the implied recreational allocation of SWG was the commercial quota\*(0.35/0.65).

Year	Quota ACL (mp gw)	Days Open	1 <sup>st</sup> day closed	Last day closed	Reason for closure	Size Limit (TL, natural or maximum)	Size Limit Effective Date	Bag Limit	Bag Limit Effective Date	Agg. Bag Limit	Agg. Bag Limit Effective Date
Pre-1990	-	-	-	-	-	-	-	-	-	-	-
1990-2003	-	365	-	-	-	20"	1/1/1990	5	1/1/1990	5	1/1/1990
2004	-	366	-	-	-	"	-	2	7/4/2004	"	-
2005	-	304	11/1	12/31	emergency	"	-	1	8/1/2005	3	8/1/2005
2006-2008	-	337	2/15	3/14	spawning	"	-	"	-	5 (0 C&C)	3/1/2006
2009	1.85	337	2/15	3/14	spawning	"	-	2	5/1/2009	4	5/1/2009
2010	1.85	306	2/1	3/31	spawning	"	-	"	-	"	-
2011	1.65	306	2/1	3/31	spawning	"	-	4	8/1/2011	"	-
2012	1.90	306	2/1	3/31	spawning	"	-	"	-	"	-
2013	1.90	306 <sup>a</sup> 365 <sup>b</sup>	2/1 <sup>a</sup>	3/31 <sup>a</sup>	spawning	"	-	"	-	"	-
2014	1.78	217 <sup>a</sup> 276 <sup>b</sup>	2/1 <sup>a</sup> 10/4 <sup>a,b</sup>	3/31 <sup>a</sup> , 12/31 <sup>a,b</sup>	spawning quota reached	"	-	3	5/1/2014	"	-

<sup>a</sup>: In waters > 20 fathoms

<sup>b</sup>: In waters < 20 fathoms

<sup>c</sup>: If no formal management change is adopted, the bag limit will revert back to 4/person/day on Jan 1, 2015.

# TEMPLATE 2

Gulf of Mexico Red Grouper commercial regulatory history

prepared by:

Year	Quota <sup>a</sup> (units)	ACL (units)	Days Open	fishing season	reason for closure	season start date (first day implemented)	season end date (last day effective)	nd length type, indicate maximum	size limit start date	size limit end date	Retention Limit (units)	Retention Limit Start Date	Retention Limit End Date	Aggregate Retention Limit (units)	Aggregate Retention Limit Start Date	Aggregate Retention Limit End Date
1990	6.9 SWG (mp gw)	ACL = Quota	311	open		1-Jan	7-Nov	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed	quota met	8-Nov	31-Dec									
1991	7.5 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1992	8.3 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1993	8.3 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1994	8.3 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1995	8.3 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1996	8.3 SWG (mp gw)	ACL = Quota	366	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1997	8.3 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1998	8.3 SWG (mp gw)	ACL = Quota	365	open		1-Jan	31-Dec	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
1999	8.3 SWG (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed		15-Feb	15-Mar									
				open	spawning season	16-Mar	31-Dec									
2000	8.3 SWG (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2001	8.3 SWG (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2002	8.3 SWG (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2003	8.3 SWG (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2004	5.31 (mp gw)	ACL = Quota	291a	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	none	none
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	14-Nov									
				closed	quota met	15-Nov	31-Dec									
2005	5.31 (mp gw)	ACL = Quota	265	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	none	1-Jan	16-Feb
				closed	spawning season	15-Feb	15-Mar							10,000 lbs gw swg/dwg	17-Feb	8-Jun
				open		16-Mar	10-Oct							7,500 lbs gw swg/dwg	9-Jun	3-Aug
				closed	quota met	11-Oct	31-Dec							5,500 lbs gw swg/dwg	4-Aug	10-Oct
														0 lbs gw swg/dwg	11-Oct	31-Dec
2006	5.31 (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	6,000 lbs gw aggregate swg	1-Jan	31-Dec
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2007	5.31 (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	6,000 lbs gw aggregate swg	1-Jan	31-Dec
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2008	5.31 (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	20" TL	1-Jan	31-Dec	none	none	none	6,000 lbs gw aggregate swg	1-Jan	31-Dec
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2009 <sup>b</sup>	5.75 (mp gw)	ACL = Quota	337	open		1-Jan	14-Feb	18" TL	Jan 1?	31-Dec	none	none	none	6,000 lbs gw aggregate swg	1-Jan	31-Dec
				closed	spawning season	15-Feb	15-Mar									
				open		16-Mar	31-Dec									
2010 <sup>c</sup>	5.75 (mp gw)	ACL = Quota	365	n/a		1-Jan	31-Dec	18" TL	1-Jan	31-Dec	IFQ	none	none	IFQ	n/a	n/a
2011 <sup>d</sup>	5.23 (mp gw)	ACL = Quota	365	n/a		1-Jun	31-Dec	18" TL	1-Jan	31-Dec	IFQ	none	none	IFQ	n/a	n/a
2012 <sup>e</sup>	5.37 (mp gw)	ACL = Quota	366	n/a		1-Jan	31-Dec	18" TL	1-Jan	31-Dec	IFQ	none	none	IFQ	n/a	n/a
2013 <sup>f</sup>	5.33 (mp gw)	ACL = Quota	365	n/a		1-Jun	31-Dec	18" TL	1-Jan	31-Dec	IFQ	none	none	IFQ	n/a	n/a
2014 <sup>g</sup>	5.63 (mp gw)	ACL = Quota	365	n/a		1-Jan	31-Dec	18" TL	1-Jan	31-Dec	IFQ	none	none	IFQ	n/a	n/a

<sup>a</sup>bottom longline in eastern Gulf of Mexico limited to 50 fathoms May 18 through October 28, 2010

<sup>b</sup>bottom longline in eastern Gulf of Mexico limited to 35 fathoms June 1 - Aug 31

red grouper may be landed with red grouper, red grouper multi, and gag grouper multi allocation fish traps phased out between February 7, 1997 to February 7, 2007. No fish traps in use after February 7, 2007.

<sup>f</sup> Prior to 2004, red grouper was included in the shallow-water groupers (SWG) quota. During this time, SWG included: black grouper, gag, red grouper, yellowfin grouper, yellowmouth grouper, rock hind, red hind, speckled hind (only for 1990, moved to deepwater grouper complex in 1991), and scamp.

Note: Harvest from 1990-2009 taken from the SEFSC ACL database; harvest from 2010 to 2013 from IFQ database.

Note: mp = million pounds; gw = gutted weight; swg = shallow water grouper, dwg = deep water grouper

# TEMPLATE 2

are there gear restrictions (e.g., bottom longline depth restrictions); if so, when (day/month/year) did the restrictions go into effect? When were restrictions lifted?

are there changes in trip/bag limits in any year (e.g., trip limit at 10,000 lbs dropped to 7,500 lbs when quota reaches 50%)

are species regulated as part of a species complex (e.g., falls under shallow water grouper trip limits); if so, which species are included in the species complex. Have the species included in that species complex changed; if so, on what date(s) and which species were then included?

Start Date = first day implemented

End Date = last day in effect

size limit length types (e.g., total length) should indicate natural length or maximum length

dates should indicate when management measures came into effect, not date of amendment

## **Appendix 4: Data Workshop Roles and Responsibilities Tables**

- These Data Workshop Roles and Responsibilities Tables are also available in a corresponding Excel document titled, ‘Appendix4\_DataWorkshopRoles\_9.9.2015’.

**Life History Working Group**

[illegible]

[illegible]

## Commercial Working Group

Commercial Working Group		DW Roles Waiting on Product						Final Product				
		Provide product to:	FL Trip Ticket Data Providers ( C )	Workgroup leader ( C )	Discard Analyst ( C )	Size/Age Analyst ( C )	Shrimp Bycatch Analyst ( C )	Commercial Indices (I)	Lead analyst/Data compiler	Data Workshop Report/WP	SEDAR Coordinator	
Role	Products									Recent personnel for this role	SEDAR XX (Fill in info for current SEDAR)	
Workgroup leader	Data Workshop Report Final landings Historical landings Maps of effort Maps of landings								X	X	Neil Baertlein, HMS: Enric Cortes/Heather Baertlein	
SEFSC Landings Provider	ALS landings Historical Landings - NOAA S&T		X								Neil Baertlein, Refik Orhun, HMS: Heather Baertlein	
ACCSP Landings Provider	ACCSP landings		X								ACCSP - Julie DeFilippi	
GulfFIN Landings Provider	GulfFIN landings		X								GulfFIN - Donna Belais	
FL Trip Ticket Landings Provider	FL Trip Ticket landings		X								FL FWC - Steve Brown	
GA Trip Ticket Landings Provider	GA Trip Ticket landings		X								GA DNR - Julie Califf	
NC Trip Ticket Landings Provider	NC Trip Ticket landings		X								NC DMF - Stephanie McInerni, Alan Bianchi	
SC Trip Ticket Landings Provider	SC Trip Ticket landings		X								SC DNR - Amy Dukes	
Commercial Logbook (CFLP) Data providers	Logbook effort	X	X	X			X				Kevin McCarthy, Neil Baertlein	
	Logbook catch	X	X				X					
	Discard logbook			X								
Observer Data providers	GOM Reef fish observer data Discard length comps GOM Shark observer data			X					X	X	Kevin McCarthy, Liz Scott-Denton, John Carlson, Jeff Pulver	
IFQ Data provider	IFQ allocation data			X			X				SERO - Jessica Stephen	
Length Data providers	TIP length data				X				X		Ching-Ping Chih, Larry Beerkircher	
Shrimp Data providers	GOM Shrimp Observer						X				Liz Scott-Denton, James Nance	
	GOM Shrimp Electronic Logbook (ELB)						X					
	Length comp of bycatch							X	X			
Discard Analyst	Total estimated discards								X	X	Kevin McCarthy	
Size/Age Analyst	Length samples sizes									X	Ching-Ping Chih, Rob Cheshire, Eric Fitzpatrick	
	Length Frequency Distributions								X	X		
	Age samples sizes									X		
	Age Frequency Distributions								X	X		
Shrimp Bycatch Analyst	Shrimp Bycatch estimates								X	X	Jeff Isley	

# Recreational Working Group

Recreational Working Group		DW Roles Waiting on Product						Final Product					
		Provide product to:	Rec. Indices analyst (I)	Size/Age analyst (R )	Meristics analyst (LH)	Historical landings analyst (R )	SRHS data provider (R )	SEFSC Miami rec data provider (R )	Lead analyst/Data compiler	Data Workshop Report/WP	SEDAR Coordinator		
Role	Products										Recent personnel for this role	SEDAR XX (Fill in info for current SEDAR)	
Workgroup leader	Data Workshop Report										X	GOM- Vivian Matter; SA-Ken Brennan	
SEFSC Miami recreational data provider	MRFSS CPUE data (GOM) SRHS CPUE data (GOM) TPWD CPUE data (GOM) MRFSS lengths MRFSS sample info (trip sample size, avg wgt) TPWD lengths TPWD sample info (trip sample size, avg wgt) MRFSS/MRIP effort estimates TPWD effort estimates MRIP landing estimates MRIP discard estimates TPWD landing estimates TPWD discard estimates Rec Surveys maps of catch and effort	X X X  X											

**Indices Working Group**

Indices Working Group	Region			DW Roles Waiting on Product			Final Product		Recent personnel for this role	SEDAR XX (Fill in info for current SEDAR)
	HMS	GOM	SA	Provide product to:	Index/Data workshop review panel	Length-weight data (LH)	Workgroup leader (I)	Final index/Lead analyst/Data compiler	Data Workshop Report/WP	SEDAR Coordinator
Role	Products									
Workgroup leader	X	X	X	Data Workshop Report					X	GOM - Adam Pollack, SA - Kyle Shertzer
	X	X	X	Recommended Indices				X	X	GOM - Adam Pollack, SA - WG
Recreational indices provider(s)	X	X		Everglades National Park Survey	X			X	X	GOM/HMS - John Carlson
	X			Large Pelagics Survey	X			X	X	HMS - John Walter/Chris Brown
	X	X	X	MRFSS/MRIP index	X			X	X	HMS- ???; GOM - Adyan Rios, Meaghan Bryan; SA - ACCSP
		X	X	SRHS CPUE index	X			X	X	GOM - Adyan Rios, Meaghan Bryan; SA - Eric Fitzpatrick
		X		TPWD index	X			X	X	
Commercial indices provider(s)	X	X	X	FL Trip Ticket Indices	X			X	X	SA/GOM/HMS - Steve Brown, FL FWC
	X	X	X	Coastal logbook indices	X			X	X	HMS - ???; GOM - Kevin McCarthy, Neil Baertlein; SA - Rob Cheshire
	X			Pelagic longline observer program	X			X	X	HMS - Enric Cortés
	X	X	X	Shark observer indices (BLL, GN)	X			X	X	HMS - John Carlson; GOM - ???; SA - ???
Fishery independent indices provider(s)		X		SEAMAP groundfish trawl index	X			X	X	GOM - Adam Pollack
		X		NMFS SEAMAP video index	X			X	X	GOM - Matt Campbell
		X		NMFS Panama City video index	X			X	X	GOM - Doug DeVires, Walter Ingram
		X		FWRI video index	X			X	X	GOM - Ted Switzer
		X		NMFS bottom longline index	X			X	X	GOM - Adam Pollack
		X		SEAMAP plankton index	X			X	X	GOM - David Hanisko
		X		NMFS small pelagic index	X			X	X	GOM - Adam Pollack
		X		SEAMAP vertical line index	X			X	X	GOM - Matt Campbell
		X		SEAMAP GOM coastal longline index	X			X	X	GOM - Adam Pollack, Eric Hoffmayer
	X	X		GOM combined (MS/SEAMAP/AL) longline index	X			X	X	HMS - John Carlson, Eric Hoffmayer; GOM - ???
	X	X		GOM combined (MS/PC/Mote) gillnet index	X			X	X	HMS - John Carlson, Eric Hoffmayer; GOM - ???
	X			Texas gillnet index	X			X	X	HMS - John Carlson (w/Wally Bubley)
	X		X	SEAMAP SA trawl index	X			X	X	HMS - Enric Cortés; SA- Tracey Smart, Joey Ballenger
	X			NEFSC shark bottom longline index	X			X	X	HMS - Cami McCandless, Lisa Natanson
	*			NEFSC bottom trawl index	X			X	X	HMS - Kathy Sosebee
	*			MADMF bottom trawl index	X			X	X	HMS - Kathy Sosebee
	*			RIDFW bottom trawl index	X			X	X	HMS - Cami McCandless (w/Scott Olszewski)
	*			CT DEEP bottom trawl index	X			X	X	HMS - Cami McCandless (w/Kurt Gottschall)
	*			NJDFW bottom trawl index	X			X	X	HMS - Cami McCandless (w/Jennifer Pyle, Greg Hinks, Linda Berry)
	*			DEDFW bottom trawl index	X			X	X	HMS - Cami McCandless (w/Mike Greco)
	*			NEAMAP trawl survey	X			X	X	HMS - Rob Latour

	X	NMFS COASTSPAN LL index	X	X X	HMS - Cami McCandless (w/Bryan Frazier, Carolyn Belcher, Jim Gelsleichter)
	X	NMFS COASTSPAN GN index	X	X X	HMS - Cami McCandless, (w/Bryan Frazier, Carolyn Belcher, Jim Gelsleichter)
	X	SCDNR/GADNR Red Drum longline index	X	X X	HMS - Cami McCandless, (w/Bryan Frazier, Carolyn Belcher)
	X	SCDNR trammel net survey	X	X X	HMS - Cami McCandless (w/Bryan Frazier)
	X	GADNR trawl survey	X	X X	HMS - Cami McCandless,( w/Carolyn Belcher)
	X	VIMS shark longline survey	X	X X	HMS - Rob Latour
	X	UNC shark longline survey	X	X X	HMS - Cami McCandless, John Hoey
	X	SERFS video index	X	X X	(w/Frank Schwartz)
	X	SERFS other gears (e.g., chevron traps)	X	X X	SA - Nate Bacheler
	X	Other indices	X	X X	SA - Joey Ballenger
Fishery independent length comp data	X X X		X	X X	Various
	X	SEAMAP groundfish trawl length comp data		X	GOM - Adam Pollack
	X	NMFS SEAMAP video length comp data		X	GOM - Matt Campbell
	X	NMFS Panama City video length comp data		X	GOM - Doug DeVires, Walter Ingram
	X	FWRI video length comp data		X	GOM - Ted Switzer
	X	NMFS bottom longline length comp data		X	GOM - Adam Pollack
	X	NMFS small pelagic length comp data		X	GOM - Adam Pollack
	X	SEAMAP vertical line length comp data		X	GOM - Matt Campbell
	X	SEAMAP GOM coastal longline length comp data		X	GOM - Adam Pollack, Eric Hoffmayer
	X	GOM combined (MS/SEAMAP/AL) longline index		X X	HMS - John Carlson, Eric Hoffmayer
	X	GOM combined (MS/PC/Mote) gillnet index		X X	HMS - John Carlson, Eric Hoffmayer
	X	Texas gillnet index		X X	HMS - John Carlson, Wally Bubley
	X X	SEAMAP SA trawl index		X X	HMS - Enric Cortés; SA- Tracey Smart, Joey Ballenger
	X	NEFSC shark bottom longline index		X X	HMS - Cami McCandless, Lisa Natanson
	*	NEFSC bottom trawl index		X X	HMS - Kathy Sosebee
	*	MADMF bottom trawl index		X X	HMS - Kathy Sosebee
	*	RIDFW bottom trawl index		X X	HMS - Cami McCandless (w/Scott Olszewski)
	*	CT DEEP bottom trawl index		X X	HMS - Cami McCandless (w/Kurt Gottschall)
	*	NJDFW bottom trawl index		X X	HMS - Cami McCandless (w/Jennifer Pyle, Greg Hinks, Linda Berry)
	*	DEDFW bottom trawl index		X X	HMS - Cami McCandless (w/Mike Greco)
	*	NEAMAP trawl survey		X X	HMS - Rob Latour
	X	COASTSPAN LL index		X X	HMS - Cami McCandless (w/Bryan Frazier, Carolyn Belcher, Jim Gelsleichter)
	X	COASTSPAN GN index		X X	HMS - Cami McCandless, (w/Bryan Frazier, Carolyn Belcher, Jim Gelsleichter)
	X	SCDNR/GADNR Red Drum longline index		X X	HMS - Cami McCandless, (w/Bryan Frazier, Carolyn Belcher)
	X	SCDNR trammel net survey		X X	HMS - Cami McCandless (w/Bryan Frazier)
	X	GADNR trawl survey		X X	HMS - Cami McCandless,( w/Carolyn Belcher)
	X	VIMS shark longline survey		X X	HMS - Rob Latour
	X	UNC shark longline survey		X X	HMS - Cami McCandless, John Hoey
	X	SERFS other gears (e.g., chevron traps)		X	(w/Frank Schwartz)
	X X X	Other length comp data		X	SA - Joey Ballenger
Fishery independent length-weight data	X		X	X	Various
	X	SEAMAP groundfish trawl length-weight data	X		GOM - Adam Pollack

				X	NMFS bottom longline length-weight data	X		GOM - Adam Pollack	
				X	NMFS small pelagic length-weight data	X		GOM - Adam Pollack	
				X	SEAMAP vertical line length-weight data	X		GOM - Matt Campbell	
				X	SEAMAP GOM coastal longline length-weight data	X		GOM - Adam Pollack, Eric Hoffmayer	
			X		SEAMAP SA trawl index	X		HMS - Enric Cortés; SA- Tracey Smart, Joey Ballenger	
		X	X	X	Other length-weight data	X		Various	

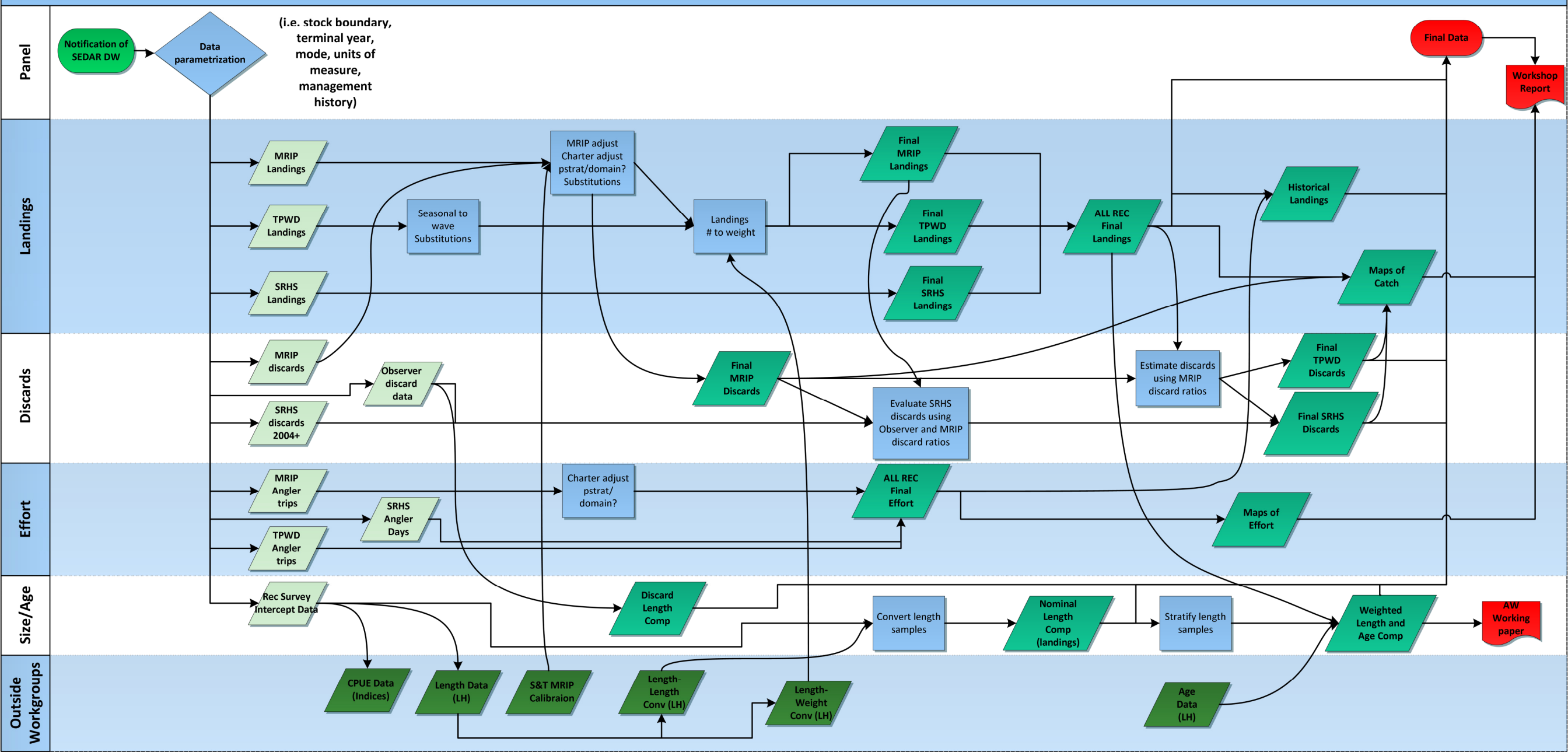
\* Only used for one species (smooth dogfish)

## **Appendix 5: Technical Group Process Flow Charts**

Draft Technical Group flow charts were also developed as part of the supplementary materials for the SEDAR Data Best Practice workshop. Not all groups edited and updated these documents to reflect the recommendations from this workshop. The Recreational Technical Group updated their flow chart and it can be found below.

Recreational Workgroup Data Flow

v. 9/4/15



## **Appendix 6: Proposed Workshop Scope**

## **SEDAR Data Best Practices: Proposed Workshop Details & Prioritization**

Some of the issues discussed at the SEDAR Data Best Practices workshop were complex and could not be resolved during the workshop. Technical groups proposed a number of workshops to help resolve these issues in the future. We would like workshop participants to help prioritize the proposed workshops.

A list of the seven proposed workshops is below. Technical group members provided a brief workshop scope, including a workshop description, proposed participation level, and any other additional information they felt would be informative for prioritization. Please review this document and then participate in the poll (link below) to help prioritize the workshops.

**Please respond to the poll by Monday, August 3, 2015.** Poll results will be sent to workshop participants in early August. If you have any questions, please contact Julia Byrd ([Julia.byrd@safmc.net](mailto:Julia.byrd@safmc.net)).

Link to poll: <https://www.surveymonkey.com/r/WVVZM8Z>

### **1. Stock Boundary Workshop: defining stock boundaries**

Proposed by: Life History Technical Group

Proposed Participation on: Regional level

#### **Workshop Description:**

Determining stock boundaries (including mixing zones) is a critical decision that needs to be made early in the SEDAR process (i.e., at the time of first scheduling) because the stock boundary for a species provides the basis for spatially delimiting the data needed for a particular stock assessment. Guidance is needed on how to determine the stock boundary based on the available data (e.g. what to do if no genetic, tagging or otolith chemistry data are available, what if landings data are available for a region but no biological data are available, should management units be taken into consideration, etc.).

Workshop participants would include member(s) from the life history, commercial, recreational, and indices groups. The overall scope of the proposed workshop would be for participants to review current stock boundaries for species by Fishery Management Plan (FMP; e.g., Snapper Grouper) and review available new research that may suggest a change in the current species stock boundary for species listed in the FMP, including species recently assessed and those on the current SEDAR schedule.

Participants would provide recommendations for stock boundaries by species along with a working document that would describe the data and research results used to delineate the boundaries. The recommendation(s) would be reviewed during the SEDAR Data Workshop Data Scoping Call.

#### **Additional information provided by LH Technical Group:**

- Proposed timeline: first workshop to be held soon after the 2017 SEDAR schedule has been finalized so participants can review current stock boundaries for each species and provide critical SEDAR guidance.
- Ranked by LH Technical Group as Priority 1 out of the workshops they proposed

- Expected attendance: 10 – 15

## **2. Reproduction workshop: maturity estimation methods**

Proposed by: Life History Technical Group

Proposed Participation on: Regional level, but outside (national, international expertise would be welcomed)

Workshop Description:

Fish stock assessment reference points are sensitive to values for fish maturity at size and age; as such maturity is a key parameter of interest. There has been much treatment of fish maturity and some standardization in its use in Europe. Similar recognition of this parameter's importance led to a recent NMFS sponsored workshop in Seattle (MARVLS: Maturity Assessment, Reproductive Variability, and Life Strategies, November 2014). Combined, these European and US efforts to date have focused more on high latitude cold water fishes. But SEDAR experience has resulted in some fairly specific questions regarding estimation of maturity in warm water marine fishes. Mainly, the issues involve choice of earliest oocyte development stage considered indicative of maturity, species specific differences and temporal and spatial filtering of data. Increased discussion and agreement among SE workers about the method of estimating maturity suggest a workshop in the near-term (by 2017) focused on the SE region, yet referencing and coordinating at the national (and perhaps international) level should provide consensus and result in much needed standardization to streamline the SEDAR process.

Additional information provided by LH Technical Group:

- Ranked by LH Technical Group as Priority 1 out of the workshops they proposed
- Proposed timeline: hold workshop before 2017 due to the potential to develop valuable SEDAR guidance
- Expected attendance: 20

## **3. Reproduction workshop: Reconvene Southeast US histological workshops to standardize reproductive staging and develop inter-lab calibrations**

Proposed by: Life History Technical Group

Proposed Participation on: Regional level

Workshop Description:

Beginning in the Southeastern US in 2001 and expanding internationally by 2009, a series of four workshops on gonadal histology of fishes have played a critical role in improving our understanding of fish reproduction. Due to the diversity of reproductive strategies, commonly including hermaphroditism, histological methods are particularly important in warm water marine fishes. Thus, stock assessments and management in the Southeast region have become dependent on production-like histology. As example, SE laboratories conducting histology work now include SCDNR, Florida FWRI, NMFS Panama City, Gulf Coast Research Laboratory, LSU, and LDWF. Because of this increasing production, analogous to otolith processing, there is a need for ongoing training and interaction among

histological readers and those conducting analysis of the derived data. The otolith processing analogy (regular workshops conducted in the Gulf and South Atlantic regions) has shown the benefits of such regular technical workshops, such as improved training of readers, quality control, increased efficiency of laboratory processing, and measures of error that can be used to increase stock assessment resolution.

Additional information provided by LH Technical Group:

- Ranked by LH Technical Group as Priority 2 out of the workshops they proposed
- Would involve regular (annual/biennial) technical workshops for QA/QC
- Expected attendance: 20-30 per workshop

#### **4. Reproduction workshop: assess how reproductive inputs affect fishery management reference points**

Proposed by: Life History Technical Group

Proposed Participation on: National level

Workshop Description:

The degree to which aspects of fish reproduction relate to stock productivity is a renewed and heightened area of scientific inquiry. As evidence; three symposia are devoted to the intersection of fish reproductive biology and stock assessment during the upcoming 2015 AFS National Meeting in Portland. A continuing dialog between biologists and assessment analysts is needed to refine the types and amounts of data required for reproductive-based reference points and to develop the means of incorporating better measures of resiliency into stock assessments.

Additional information provided by LH Technical Group:

- Ranked by LH Technical Group as Priority 3 out of the workshops they proposed
- Possible venue - 2017 AFS symposium in Tampa and developing recommendations for research
- Expected attendance: large group symposium format

#### **5. Discard Mortality Workshop**

Proposed by: Commercial Technical Group

Proposed Participation on: National level

Workshop Description:

A major source of discussion at SEDAR Data Workshops centers on determining the discard mortality rate for the commercial fishery. A few different methods have been developed to estimate discard mortality rates that include using logbook data, modeling approaches, and using estimates that have been developed for other species as surrogates for the species being assessed. A workshop is needed to determine if the data collection programs currently available for SEDAR workshops are collecting the data necessary for determining discard mortality rates and what types of analysis can be employed with that data to do those calculations correctly. A workshop like this is probably useful at a national level.

## **6. Estimating Commercial Directed Discards**

Proposed by: Commercial Technical Group

Proposed Participation on: Regional level

### **Workshop Description:**

Estimating the number of commercial discards for a directed fishery in SEDAR assessments is a large concern. Currently, data collected on commercial logbooks and observer programs is primarily used to do these estimations. Discard rates are typically calculated from those collection programs and then applied to effort estimates for a total calculation of discards. However, the observer program is very sparse in the South Atlantic Snapper-Grouper and Coastal Pelagic fisheries. A sampling of participants from the logbook program are required to fill out discard information when they turn in their logbooks to fill this void. However, this method of data collection has some nuances that need to be explored statistically to determine if the method of data collection is appropriate to be used to determine total discards for a directed fishery. A workshop like this is probably useful at a regional level.

## **7. Indices Construction Workshop (to include IFQ)**

Proposed by: Commercial Technical Group

Proposed Participation on: Regional level, technical expertise outside region would be welcome

### **Workshop Description:**

During the Best Practice workshop, the Index Technical Group noted further research should be done to guide decisions for index construction in different situations. This research would not only be of interest for SEDAR participants, but also to a wider national audience. The Index TG recommended convening a technical topics workshop to address the following:

- Develop guidelines specific to the Southeast similar to those used in the Pacific Islands (WCPFC 2014a)
- Develop recommended approaches for standardizing fishery-dependent datasets; e.g., identifying effective effort, handling effects of regulations
  - Possibly similar to the Pacific Islands (WCPFC, 2014b)
- Develop recommended approaches for standardizing fishery-independent datasets
- Develop common analytical code

Holding this workshop would further develop firm recommendations on how and when to construct indices; evaluate and compare consequences of current and alternate approaches; and implement standardization of response to commonalities across species. More details on this workshop are available in the Index draft report chapter (see Issue #4).