Proportional Standard Error and Management Uncertainty in Recreational Data Collection on the Atlantic Coast – Year 2

FY 2013 Proposal

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1. Overview

1.1. Sponsor
Mike Cahall

1.2. Focus Group
Survey Design and Evaluation

1.3. Background
The current 'targets' of Proportional Standard Error (PSE) for Recreational Data Collection on the Atlantic and Gulf coasts are based in part on a single workshop conducted by the Atlantic States Marine Fisheries Commission in collaboration with the Virginia Polytechnic Institute in 1999. Later, Dr. Lisa Kline and Maury Osborne built on this work to derive a general target of PSE = 20 which has been the de facto standard ever since. Changes in fisheries management, dictated by both state and federal law, have required substantial changes in data collection, both commercial and recreational. Commercial collection has moved to a universal trip level standard. Recreational data collection is in the midst of a transformation moving from the MRFSS to MRIP. There are ongoing discussions on the best methods to use for data collection as well as appropriate targets in recreational fisheries. One of the missions of the Atlantic Coastal Cooperative Statistics Program (ACCSP) and the Gulf Fisheries Information Network (GulfFin) is to create and manage standards for data collection in commercial and recreational fisheries on the Atlantic and Gulf Coasts. Currently ACCSP is in the process of a substantial revision to these standards. The need for a more solid basis for PSE targets became apparent during this process.

1.4. Project Description
Recognized science and management experts will be asked to collaborate in a series of meetings, both teleconference and face to face, resulting in written recommendations for PSE standards.The original project was based on a series of meetings to work toward a revised recommendation for PSE standards. While developing terms of reference, the Steering Committee The extension of the project is focused on the development of a computational model to evaluate how different levels of PSE affect the stock assessment and management of fisheries. The results and report of the model output will be used to inform a panel of experts in a workshop to develop the written recommendations for PSE standards.Specifically, exploring a range of PSEs for recreational harvest estimates, the effect this uncertainty has on the estimation of important quantities from traditional stock assessment approaches (biomass estimates, exploitation rates, reference points), and how error in stock assessment estimates can impact the management of a stock. This modeling approach is called management strategy evaluation (MSE) and the selected contractor (Wiedenmann, 2012) has experience in the development and application of MSE models for testing harvest control rules used to determine the acceptable biological catch (ABC) in data-rich and –poor situations (Wilberg et al. 2011), as well as for determining the effects of different harvest policies in the summer flounder recreational fishery.

1.5. Public Description

1.6. Objectives
This project proposes to attempt to establish standards for PSE in recreational data collection that are applicable to the various different management needs of state and federal stakeholders, and to extend the earlier discussion of management uncertainty. The goal of this project is to extend the original discussion to include results of a modeling exercise to evaluate the effects of uncertainty in recreational harvest estimates on the assessment process, and how these effects depend on the relative size of the recreational harvest for a stock.

1.7. References
ACCSP Steering Committee Conference call Minutes, 2012. Minutes of three conference calls are available: Minutes_PSE_Steering_26June2012, Minutes_PSE_Steering_2JULY2012, Minutes_PSE_Steering_14AUG2012. Wiedenmann, 2012. Evaluation of the Effects of Uncertainty in Recreational Harvest Estimates on the Assessment and Management Process. Proposal to the Atlantic Coastal Cooperative Statistics Program. John Wiedenmann, Rutgers University. Wiedenmannn, 2012b. MSE Model Synopsis_June2012. Wilberg, M. J., Miller, T. J. and J. Wiedenmann. 2011. Evaluation of acceptable biological catch (ABC) control rules for mid-Atlantic stock. Final report to the Mid-Atlantic Fishery Management Council.

2. Methodology

2.1. Methodology
Under the auspices of the Atlantic Coastal Cooperative Program (ACCSP), a steering committee has been formed and includes Gregg Bray (GSMFC), Gordon Colvin (MRIP), Lisa Desfosse - Chair (NMFS), Katie Drew (ASMFC), Kathy Knowlton (GA), Kevin Sullivan (NH) as members. This committee has been meeting and will continue to meet to determine the processes and methods to be used in achieving the goals of this project including Model Terms of Reference and Workshop Terms of Reference. PSE MODEL TERMS OF REFERENCE: FINAL DRAFT 14 AUG 20121. Develop a statistical catch at age assessment model to examine fisheries management risk of using recreational data with various levels of precision2. Simulate

data for theoretical species of slow, medium, and fast life histories (3 bins)3. Evaluate sensitivity of fisheries with Recreational/Commercial splits between 30 and 90% (3 bins 30-60-90)4. Evaluate sensitivity of assessments on stock units for various PSE levels from 20-60% (initially 20-40-60 possibly expand to include 30% and 50% - 5 bins maximum)5. Evaluate sensitivity of fisheries management for various PSE levels (One scenario fishing at target fishing mortality rate = 1 Bin)a. Project model 12 years into future b. Assessment performed every 2 years6. Write a report summarizing the model formulation, runs, and management risks associated with using data at various resolutions with a range of PSE valuesA contractor has been selected to develop and run the MSE models over the course of several months and present the results to the workshop as a whole in written format. The workshop, composed of between 20 to 25 experts and stakeholders will review the results of the technical group and other related presentations. The Steering Committee and ACCSP staff will create a final report which will include recommendations for acceptable levels of PSE and its incorporation into stock assessments. The workshop results document will be incorporated into an ACCSP Technical Source Document, shared with GulfFin and used as the basis for the recreational PSE standards currently under development.Specific model development methodology details are included below.The MSE model will be developed in AD Model Builder (Fournier, 2011), and will contain three main components. The foundation of the MSE model is the operating model, which determines the population dynamics of the stock and how data are generated. Data generated in the operating model are based on the “true” dynamics within the model with some specified amount of error. The operating model generates data on the recreational and commercial harvests, as well as a fishery-independent index of abundance. These data are used in the assessment model to estimate stock status, and the accuracy of the assessment model will depend on the level of error in the input data. Output from the assessment model is then used in the management model to determine the catch limit based on set of specified rules (i.e. a harvest control rule). The catch limit estimated in the management model is then removed from the population, possibly with some implementation error, and the MSE loop continues for a set number of years. This process is repeated thousands of times for each model specification (e.g. amount of error in the data, population productivity) to account for the variability in the data generation and population dynamics. At the end of each run, the performance of the model is measured for comparison across different model specifications. Operating ModelThe operating model controls the population, fishery, and data-generating dynamics in the MSE, and these dynamics are controlled by parameters specified by the analyst. An age-structured population model will control the underlying population dynamics, with stochastic recruitment following the Beverton-Holt relationship. The parameters governing growth, maturity, and productivity will be flexible, allowing for the exploration of different life histories. The model will have a recreational and commercial fishery harvesting the population, with the relative size of each fishery being flexible. Data generated in the model will be drawn randomly each year from a distribution centered about the true value with some level on error. As with the other model inputs, the amount of error in the estimates of the commercial and recreational harvest, and in the index of abundance can be modified. The flexibility of model inputs allows for multiple runs of the MSE to determine the effects of these inputs on model results. Preliminary runs of the proposed MSE will explore: • 3 life histories spanning different life histories: slow, medium, and fast. A slow life history refers to a slow-growing species with low productivity, while a fast life history refers to a fast-growing species with high productivity. A medium life history falls between these extremes. • 3 levels of uncertainty in recreational harvest estimates (PSEs of 0.2, 0.4, 0.6)• 3 relative sizes of the recreational fishery (25%, 50%, and 75% of the total harvest are from the recreational fishery)Modifications to the number of runs and input ranges will likely occur after initial runs of the model. For example, a wider range of PSEs for the recreational data (e.g. 0.1, 0.2,..,0.7) may be required for the final model runs. Assessment ModelData generated in the operating model are used in the assessment model to determine stock status. The proposed work will utilize a statistical catch-at-age (SCAA) assessment model, with harvest-at-age from both fisheries and an index of abundance at age being the primary inputs. Additional inputs, such as natural mortality and weight- and maturity-at-age will be fixed at the true values in the model. Estimation of important parameters will be done using a maximum likelihood approach. The parameters to be estimated are the mean and annual deviations in recruitment and fishing mortality, the selectivity parameters in the recreational and commercial fisheries and survey, and the catchability coefficient in the survey. Parameter estimates are then used to calculate BRPs, either using the stock-recruit relationship to generate MSY-based BRPs, or using a spawning biomass per-recruit approach to generate proxies (e.g. F35%). Management ModelEstimates of stock status and BRPs from the SCAA assessment model are used by the management model to determine the catch limit in subsequent years. While many harvest control rules may be explored in the MSE framework, doing so requires a greater number of model runs. Because exploring the effectiveness of a particular harvest control rule is not the objective of this project, catch limits will be set by trying to achieve a target fishing mortality rate in each year, Ftarget, that is estimated from the assessment. Performance MeasuresThe specified catch limit is removed from the population (potentially with some implementation error), and the process is repeated over a number of years with multiple assessments. The MSE cycle will be run for a set period (12 years, with an assessment every 2 years) over a number of model iterations (to account for the variability in the population dynamics and error in the data generation). After all the simulations are run for a particular PSE of the recreational harvest, a particular size of the recreational fishery, and a particular life history, the performance of each run is measured to determine the effectiveness at achieving certain goals. It is important to measure the performance of a model run relative to a range of goals, as there may be instances where separate runs result in nearly identical rates of overfishing but different levels of average catch or population growth over time.

2.2. Region

Gulf of Mexico, Mid-Atlantic, North Atlantic, South Atlantic

2.3. Geographic Coverage

Atlantic and Gulf Coasts (but results may be applicable elsewhere as well)

2.4. Temporal Coverage
October 11, 2012 through September 28, 2013.

2.5. Frequency
The model development and workshop are scheduled as a one-time event.

2.6. Unit of Analysis

2.7. Collection Mode
Data will be simulated for the model runs, following the attached model proposal.

3. Communication

3.1. Internal Communication
Communications routine meetings, not less than monthly between staff members responsible, and routine conference calls o the steering committee as necessary.

3.2. External Communication
Staff will provide monthly updates via MDMS, The Program Directory wlll provide updates as needed to the Operations Team during regular conference calls.

4. Assumptions/Constraints

4.1. New Data Collection
N

4.2. Is funding needed for this project?

4.3. Funding Vehicle
MRIP, ACCSP

4.4. Data Resources
MRIP and ACCSP

4.5. Other Resources
ACCSP sub-contract model development, runs, and model results report to John Wiedenmann, Rutgers University.

4.6. Regulations

4.7. Other

5. Final Deliverables

5.1. Additional Reports
Reports of the Technical Working Group and Workshop, ACCSP TSD, ACCSP PSE Standard.

5.2. New Data Set(s)

5.3. New System(s)

6. Project Leadership

6.1. Project Leader and Members

First Name	Last Name	Title	Role	Organization	Email	Phone 1	Phone 2
Michael	Cahall		Team Leader	ACCSP	mike.cahall@accsp.org	7038420781	
Geoff	White		Team Member	ACCSP	geoff.white@accsp.org	7038420785	

7. Project Estimates

7.1. Project Schedule

Task #	Schedule Description	Prerequisite	Schedule Start Date	Schedule Finish Date	Milestone
2	Model development contract		12/01/2012	07/31/2013	
4	Deliver Final Report	3	10/01/2013	10/01/2013	Y
3	PSE Workshop	2	08/13/2013	08/15/2013	

7.2. Cost Estimates

Cost Name	Cost Description	Cost Amount	Date Needed
PSE Sensitivity Year 2		$33750.00	05/15/2013
TOTAL COST		$33750.00	

8. Risk

8.1. Project Risk

Risk Description	Risk Impact	Risk Probability	Risk Mitigation Approach
Failure to compete model work on time.	Delay Final Report	Low	Allow for possible slip in schedule

9. Supporting Documents