Determining Optimum Sample Sizes for the Atlantic For-Hire and Large Pelagics Telephone Surveys

FY 2014 Proposal

Ron Salz, Ana Valentin
Created: 05/13/2015

1. Overview

1.1. Sponsor
Ron Salz

1.2. Focus Group
Survey Design and Evaluation

1.3. Background
The current Atlantic For-Hire Telephone Survey (FHTS) collects data via telephone for recreational fishing effort estimation for charter and head boats. The FHTS is conducted throughout the year and covers the marine waters of the entire Atlantic coast. The Large Pelagics Telephone Survey (LPTS) add-on is a special survey for effort for the hand-gear fishery directed at large pelagic species (LPS) in the offshore marine waters of the Northeast Region (Maine through Virginia) during a 22-week period from June to November. The LPTS add-on is conducted as part of the FHTS. Charter and head boats targeting LPS are required to carry highly migratory species (HMS) permit. Sampling of charter boats and head boats is stratified by state and vessel type. Each week 10% of charter boats and 15% of head boats are selected from the list of active boats for each state. These selected boats are then contacted by telephone for the collection of effort data for that week. Prior to drawing a sample of boats for a given sampling week, the list of active boats for each state is sorted by permit status. A sample of boats is then selected by systematic sampling from the sorted list in order to ensure representative sampling of HMS and non-HMS boats. There exist several questions concerning the sampling method as well as the total sample size (i.e., the sum of sample sizes over all states). First, does the total sample size satisfy the requirement for precision of effort estimate? Second, the current surveys use the same sample size across waves for each state. Alternatively, sample size can be varied across months or waves, or depending on the fishing season. If so, what are the optimal sample sizes for each month or wave? Third, the current sampling method allocates the total sample size to each state proportionally. Alternatively, one can allocate the total sample size to each state using Neyman's method (Cochran 1977). The Neyman allocation method can be used to allocate the total sample size to each state to minimize the variance of effort estimate for a fixed cost or, vice versa, to minimize the cost for a fixed variance per predetermine timeframe (i.e. month or wave). However, Neyman allocation method is harder to implement than the proportional allocation method. So, is Neyman allocation method worth the effort? Non-uniform probability sampling method such as the probability proportional to size (PPS) sampling can produce more efficient parameter estimates than uniform probability sampling method if the size variable is quantified appropriately (Cochran 1977). However, not only is the PPS sampling method harder to implement than the proportional allocation method, it also requires much work to quantify the size variable (i.e., activity level in our case). So, is the PPS sampling method worth the effort? Fourth, what is the minimum sample size required for each state to obtain at least one reported fishing trip in each stratum (e.g., state/mode/area fished) for the effort estimation? This question is important because zero reported fishing trip in a stratum can result in an effort estimate being zero for that stratum even though there has been fishing effort as documented by dockside intercept surveys. Researchers will attempt to explore these questions in this study.

1.4. Project Description
In this study, the researchers will analyze the existing data collected by the FHTS and the LPTS add-on and determine the sample sizes that meet the assumed levels of precision for effort estimate. Researchers will take nonresponse rate into consideration when calculating sample sizes. Researchers will also conduct simulation studies to compare the efficiency of effort estimates among different sampling strategies. Researchers will provide recommendations to improve precision of effort estimates for the current FHTS and LPTS add-on based on the results of simulation studies. In addition, researcher will attempt to explore the question about the minimum sample size required for each state to obtain at least one reported fishing trip in each stratum for the effort estimation. Researchers will focus only on charter boats in this study.

1.5. Public Description

1.6. Objectives
The objectives of this project are:1) Determine optimal sample sizes for the current FHTS and LPTS add-on, 2) Compare alternative allocation methods and propose an appropriate allocation method that improves precision of effort estimates for the current FHTS and LPTS add-on, and 3) Attempt to explore the question about the minimum sample size required for each state to obtain at least one reported fishing trip in each stratum for the effort estimation.

1.7. References
Cochran, W. G. 1977. Sampling techniques, 3rd ed. Wiley, New York. Valliant R., Dever, JA. and Kreuter, F. (2013), entitled "Practical Tools for Designing and Weighting Survey Samples", Springer.

2. Methodology

2.1. Methodology

The study will determine the optimum sample size for each state and month based on the variability of the historical data collected by the FHTS and the LPTS add-on. The study also will compare efficiency of effort estimate between different sampling strategies using simulation studies. The question about the minimum sample size required for each state to obtain at least one reported fishing trip in each stratum for the effort estimation will be explored using simulations or based on the historical data.

2.2. Region
Gulf of Mexico, Mid-Atlantic, North Atlantic, South Atlantic

2.3. Geographic Coverage
Atlantic and Gulf Coast states

2.4. Temporal Coverage
year-round

2.5. Frequency

2.6. Unit of Analysis

2.7. Collection Mode
Telephone survey

3. Communication

3.1. Internal Communication
Face-to-face meeting as needed it

3.2. External Communication
Web conference call as needed it

4. Assumptions/Constraints

4.1. New Data Collection
N

4.2. Is funding needed for this project?
N

4.3. Funding Vehicle
No funds requested

4.4. Data Resources
Data collected by the FHS.

4.5. Other Resources
Availability of Dr. Lai (10%), Dr. Wang (30%), Dr. Salz (5%), Ms. Ahrnsbrak (15%), and Ms. Valentín (40%) from January 30 to September 30, 2014.

4.6. Regulations
None

4.7. Other
None

5. Final Deliverables

5.1. Additional Reports
Final report (planned) - October 31, 2015

5.2. New Data Set(s)
None

5.3. New System(s)
None

6. Project Leadership
6.1. Project Leader and Members

First Name	Last Name	Title	Role	Organization	Email	Phone 1	Phone 2
Rebecca	Ahrnsbrak		Team Member	NOAA Fisheries			
Han-Lin	Lai		Team Member	NOAA Fisheries			
Ron	Salz		Team Member	NOAA Fisheries			
Ana	Valentin		Team Leader	NOAA Fisheries			
Dave	Van Voorhees		Team Member	NOAA Fisheries			
Shizen	Wang		Team Member	NOAA Fisheries (in-house contractor)			

7. Project Estimates
7.1. Project Schedule

Task #	Schedule Description	Prerequisite	Schedule Start Date	Schedule Finish Date	Milestone
1	Project Plan - MRIP FHS/LPS Optimization Sample Size		01/07/2014	01/31/2014	
2	Analysis - MRIP FHS/LPS Optimization Sample Size Project Plan	1	02/01/2014	04/30/2015	
3	Final Report - MRIP FHS/LPS Optimization Sample Size Project Plan	1,2	05/01/2015	10/31/2015	

8. Risk
8.1. Project Risk

Risk Description	Risk Impact	Risk Probability	Risk Mitigation Approach
Technical personnel	Time of completion	Medium	Hire a contractor

9. Supporting Documents