FY15 PROJECT PROPOSAL SUMMARY PAGE
Continuing, Multi-Year Projects

Proposals are due to the EVOSTC office by September 2, 2014. Please note that the information in your proposal and budget form will be used for funding review. Late proposals, revisions or corrections may not be accepted.

Project Title: Modeling the population dynamics of Prince William Sound herring.

Project Period: February 1, 2012 – January 31, 2017

Primary Investigator(s): Trevor A. Branch, School of Aquatic and Fishery Sciences, University of Washington

Study Location: Prince William Sound / University of Washington

Project Website (if applicable): http://pwssc.org/research/fish/pacific-herring/

Abstract*:
Shortly after the Exxon Valdez oil spill, the Prince William Sound herring populations collapsed and have not yet recovered. We propose a modeling project to (1) revise and update the ASA model used to manage this population, (2) conduct simulations to test which data sources are most important in assessing the current status of this population, and (3) collect data on herring populations worldwide to find out how often these populations collapse under ordinary conditions.

*The abstract should provide a brief overview of the overall goals and hypotheses of the project and provide sufficient information for a summary review as this is the text that will be used in the public work plan and may be relied upon by the PAC and other parties.

Estimated Budget:

EVOSTC Funding Requested* (*must include 9% GA*):

FY12	FY13	FY14	FY15	FY16	TOTAL
$36,907	$87,013	$97,836	$100,407	$104,920	$427,083

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
0	0	0	0	0	0

*If the amount requested here does not match the amount on the budget form, the request on the budget form will considered to be correct.

Date: 18 August 2014

I. EXECUTIVE SUMMARY

Proposal version 8-25-14

The hypotheses and goals outlined in the project abstract have been addressed as outlined here. Progress has continued on revising and updating the ASA stock assessment model for Prince William Sound herring. We have reframed the model from one that minimized sums of squares to a fully Bayesian framework, implemented in AD Model Builder (the underlying basis for most NOAA fisheries stock assessments in Alaska) instead of Excel. There are two key advantages to this approach: a statistically sound way of weighting different datasets using likelihoods; and the estimation of uncertainty around key management parameters including stock status. Preliminary results suggest that the herring population is slowly recovering, with a high probability of being above 22,000 t.

Progress has also been made on the assessment of which data sources are most valuable in assessing the status of the herring population. A modeling framework has been developed where each data set can be excluded, one at a time, and the resulting uncertainty and bias in the estimates of stock status obtained. There is an obvious tradeoff between the cost of obtaining data and the precision of resulting biomass estimates.

The graduate student, Melissa Muradian, employed on the project is planning to defend her MS thesis in Fall 2014 on the previously outlined projects. A new graduate student, John Trochta, will arrive at the University of Washington in Fall 2014 to start his MS thesis on the third component of the project: a meta-analysis of global data on herring populations to estimate the frequency and duration of collapses expected in such populations.

The following scientific papers were coauthored during the past 12 months, related to the stock assessment modeling conducted under funding from EVOST:
1. Ono, K., R. Licandeo, **M. L. Muradian**, C. J. Cunningham, S. C. Anderson, F. Hurtado-Ferro, K. F. Johnson, C. R. McGilliard, C. C. Monnahan, C. S. Szuwalski, J. Valero, K. A. Vert-Pre, A. R. Whitten, and A. E. Punt. 2014. The importance of length and age composition data in statistical age-structured models for marine species. ICES Journal of Marine Science doi:10.1093/icesjms/fsu007.
2. Johnson, K. F., C. C. Monnahan, C. R. McGilliard, K. A. Vert-pre, S. C. Anderson, C. J. Cunningham, F. Hurtado-Ferro, R. R. Licandeo, **M. L. Muradian**, K. Ono, C. S. Szuwalski, J. L. Valero, A. R. Whitten, and A. E. Punt. 2014. Time-varying natural mortality in fisheries stock assessment models: identifying a default approach. ICES Journal of Marine Science doi:10.1093/icesjms/fsu055.

II. COORDINATION AND COLLABORATION
A. Within a EVOSTC-Funded Program
The stock assessment acts as a synthesis of many of the components of the current program, including age-sampling, disease estimates, and hydroacoustic survey. This year, the graduate student participated in the hydroacoustic surveys, both from the Prince William Sound Science Center and ADF&G. Regular meetings between the PIs on the project ensure information sharing.

B. With Other EVOSTC-funded Projects
None.

C. With Trustee or Management Agencies
The stock assessment revisions and updates are regularly shared with, and collaboratively developed with Steven Moffitt and Rich Brenner from ADF&G. They also worked with the graduate student Muradian to ensure she participated in the spawning survey to better understand how the data are

Proposal version 8-25-14

collected. In addition, Sherri Dressell of ADF&G has provided extensive feedback on research methods, results and conclusions. In the short term, the Bayesian assessment developed here will likely be used as an alternative assessment in deciding how to manage Prince William Sound herring.

III. PROJECT DESIGN – PLAN FOR FY15
A. Objectives for FY15
1. Finalize gathering of time series of abundance and recruitment for herring stocks and other clupeids

2. Attend the Annual Marine Science Symposium, Anchorage, and the annual Cordova meeting with the project PIs.

3. Prepare and submit manuscript combining the stock assessment details and the project to identify the most informative datasets using management strategy evaluation.

B. Changes to Project Design
The main change to the original proposal is that the assessment model (of life history dynamics of herring) will now be included in the scientific manuscript on identifying the most informative datasets using management strategy evaluation. This manuscript is currently in preparation and anticipated to be completed in December 2014. The current student Melissa Muradian has elected not to continue with a PhD on the project and will be graduating in December 2014. This should reduce the time to publication of the manuscript.

A new graduate student, John Trochta, is starting on the project in September 2014, and will focus on continuing the annual stock assessment updates with the new model in addition to starting the third component of the project, the meta-analysis of herring dynamics from global population models and catches. He will need some time in FY2015 to complete required graduate school coursework. During the overlap (Fall 2014) between Muradian and Trochta, Muradian will be funded through being a teaching assistant on a programming course; and will focus on training Trochta in using the assessment model.

IV. SCHEDULE
A. Project Milestones for FY 15
Objective 1.   Prepare and submit manuscript combining the stock assessment details and the project to identify the most informative datasets using management strategy evaluation.
To be met by June 2015.

Objective 2.   Complete required coursework (John Trochta).
Ongoing through end of 2016. (New item since Trochta is a new student.)

Objective 3.   Finalize gathering of time series of abundance and recruitment for herring stocks and other clupeids
Intended for December 2014, to be met by September 2015.

B. Measurable Project Tasks for FY 15
FY 15, 1st quarter (February 1, 2015 - April 31, 2015)
March: Draft manuscript: identification of most informative datasets using management strategy evaluation

Proposal version 8-25-14

FY 15, 2nd quarter (May 1, 2015-July 30, 2015)
May: Annual Cordova meeting with broader project PIs

FY 15, 3rd quarter (August 1, 2015 – October 31, 2015)
September: Finalize gathering of time series of abundance and recruitment for herring stocks and other clupeids [formerly December 2014]
September: Manuscript submission: identification of most informative datasets using management strategy evaluation

FY 15, 4th quarter (November 1, 2015- January 31, 2016)
January: Attend Annual Marine Science Symposium, Anchorage

V. PROJECT PERSONNEL – CHANGES AND UPDATES
None.

VI. BUDGET
A. Budget Forms (Attached)
Provide completed budget forms.

B. Changes from Original Proposal
No change.

C. Sources of Additional Funding
1. During the overlap period between the two graduate students (Muradian and Trochta), funding for Muradian will be supplied by the University of Washington through a teaching assistantship for the programming courses FISH552 and FISH553 we teach our graduate students. One quarter of tuition and salary are supplied from this source.

2. During 2014 one quarter of salary and tuition support was supplied by PI Trevor Branch to cover the unexpected increase in MS student salary mandated by the School of Aquatic and Fishery Sciences. It is anticipated that this will be sufficient to account for the salary increases to the end of the project in 2017.

Proposal version 8-25-14