

***Humpback whale predation on herring –Moran (NOAA, NMFS Auke Bay Laboratory, 15120114-N)***

<b>FY15 PROJECT PROPOSAL SUMMARY PAGE</b>					
<b>Continuing, Multi-Year Projects</b>					
<b>Project Title:</b> Long-term Monitoring: Pelagic Monitoring Component – Long-term monitoring of humpback whale predation on Pacific herring in Prince William Sound					
<b>Project Period:</b> February 1, 2015 – January 31, 2016					
<b>Primary Investigator(s):</b> John R. Moran (NOAA) and Janice M. Straley (UAS) <b>Collaborating investigator:</b> Terry Quinn (UAF)					
<b>Study Location:</b> Prince William Sound					
<b>Project Website</b> (if applicable):					
<b>Abstract*:</b> We will evaluate the impact by humpback whales on Pacific herring populations in Prince William Sound. Following protocols established during the winters of 2007/08 and 2008/09(EVOSTC project PJ090804). We will continue to monitor the seasonal trends and abundance of humpback whales in Prince William Sound. Prey selection by humpback whales will be determined through acoustic surveys, visual observation scat analysis and prey sampling. Chemical analysis of blubber samples (stable isotopes and fatty acid analysis) will provide a longer term perspective on whale diet and shifts in prey type. These data will be combined in a bioenergetic model to determine numbers of herring consumed by whales, with the long term goal of enhancing the age structure modeling of population with better estimates of predation mortality.					
<b>Estimated Budget:</b>					
<b>EVOSTC Funding Requested*</b> (must include 9% GA):					
<b>FY12</b>	<b>FY13</b>	<b>FY14</b>	<b>FY15</b>	<b>FY16</b>	<b>TOTAL</b>
\$127.4	\$128.8	\$139.6	\$141.6	\$54.4	\$591.9
<b>Non-EVOSTC Funds to be used:</b>					
<b>FY12</b>	<b>FY13</b>	<b>FY14</b>	<b>FY15</b>	<b>FY16</b>	<b>TOTAL</b>
\$74.7	\$83.5	\$75.0	\$78.5	\$25.0	\$336.7
<b>Date:</b> September 2, 2014					

## **I. EXECUTIVE SUMMARY**

At current herring and whale population levels the loss of pre-spawning herring during the fall and winter months is equivalent to the percentage of herring removed during the final years of the commercial herring fishery. Hence, top down forces (predation and disease) are the likely dominating forces constraining the current recovery. Humpback whales in Prince William Sound have a higher percentage of herring in their diet during the winter months and forage longer on wintering herring shoals than their counterparts in Southeast Alaska. With humpback whale population in the North Pacific increasing at 5-7% annually, there is a need to continue evaluating predation pressure on herring until stocks in Prince William Sound fully recover, and to proceed toward enhancing the age structure model to include a better estimate of predation for a more accurate predictor of the herring population. To date we have completed 13 surveys in Prince William Sound (75 days at sea) and have developed a conceptual model of the relationship between humpback whales and herring in the Sound. Although there is some inter-annual variation in the predation intensity, it appears that humpback whales continue to be major predators on Prince William Sound herring.

## **II. COORDINATION AND COLLABORATION**

### **A. Within a EVOTC-Funded Program**

We share and receive data with the killer whale and forage fish projects. We have provided a berth for a sea bird observer most of our whale surveys. During July of 2014 we rendezvoused with the USGS vessel Alaskan Gyre (forage fish crew) to evaluate the potential for survey collaboration. We have scheduled a joint survey during September of 2014 with the forage fish and winter seabird project to describe the fall movements of whales, fish, and birds into the Sound via Montague Strait.

### **B. With Other EVOSTC-funded Projects**

*Not Applicable.*

### **C. With Trustee or Management Agencies**

Alaska Department of Fish and Game (Steller Sea Lion Program) - Lauri Jemison: We opportunistically collect photographs of branded sea lions during our surveys.

NMFS Auke Bay Laboratories - Bonita Nelson: Assisted student in fulfilling the requirements of the Hollings Scholar Program.

University of Alaska Fairbanks - Brianna Witteveen: Humpback fluke data sharing

## **III. PROJECT DESIGN – PLAN FOR FY15**

### **A. Objectives for FY15**

- 1) *Population estimates of humpback whales through the use of photographic mark-recapture models.* Knowing the number of whale present in PWS is essential for assessing their impact on the PWS ecosystem.
- 2) *Monitor the seasonal trends of humpback whales in Prince William Sound relative to prey.* EVOSTC project PJ090804 identified an correlation between the movements of whales and herring in PWS
- 3) *Estimate inter-annual trends in humpback whale abundance.* This objective allows us to determine if the conclusion from EVOSTC project PJ090804 are an anomaly or typical whale behavior in PWS.
- 4) *Determine the diet and dietary shifts of humpback whales.* A shift in prey by whales can have profound effects on herring (i.e. in Southeast Alaska, when euphausiids become available pressure on herring by whales is greatly reduced).

- 5) *Estimate predation rates on herring by humpback whales.* This objective quantifies predation pressure on herring for PWS.
- 6) *Incorporate mortality rates into herring age structure models.* This is the management component of the study, to evaluate if predation by whales explains fluctuations in herring populations.

**B. Changes to Project Design**

We are continuing with a previous change, moving the February survey to late March/ early April.

**IV. SCHEDULE**

**A. Project Milestones for FY 15**

**Objectives**

- 1) Population estimates of humpback whales through the use of photographic mark- recapture models. *To be met September 2015.*
- 2) Monitor the seasonal trends of humpback whales in Prince William Sound relative to prey. *To be met September 2015.*
- 3) Estimate inter-annual trends in humpback whale abundance. *To be met September 2015.*
- 4) Determine the diet and dietary shifts of humpback whales. *To be met September 2015.*
- 5) Estimate predation rates on herring by humpback whales. *To be met December 2015.*
- 6) Incorporate mortality rates into herring age structure models. *To be met January 2016.*

**B. Measurable Project Tasks for FY 15 (based on federal fiscal year)**

See Table 1 for survey schedule proposed for FY 2015.

**Table 1. Humpback whale vessel survey schedule for Prince William Sound**

<b>Month</b>	<b>FY12</b>	<b>FY13</b>	<b>FY 14</b>	<b>FY15</b>	<b>FY16</b>
Oct	6 days	6 days	6 days	6 days	Synthesis
Dec	6 days	6 days	6 days	6 days	Synthesis
Apr	6 days	6 days	6 days	6 days	Synthesis
<b>Total vessel days</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>72</b>
Completed humpback whale surveys for Prince William Sound.					
<b>Month</b>	<b>FY12</b>	<b>FY13</b>	<b>FY 14</b>	<b>FY15</b>	<b>FY16</b>
Sep-Oct	6 days	7 days	7 days	-	Synthesis
Nov-Dec	6 days	7 days	7 days	-	Synthesis
Feb	4 days	4 days	-	-	Synthesis
Mar-Apr	4 days	8 days	7 days	-	Synthesis
Jul	3 days	-	5 days	Synthesis	Synthesis
<b>Total vessel days</b>	<b>23</b>	<b>26</b>	<b>26</b>	<b>-</b>	<b>75</b>

**FFY 15, 1st quarter (October 1, 2014-December 31, 2014)**

October: 6 day survey of PWS

December: 6 day survey of PWS

**FFY 15, 2nd quarter (January 1, 2015-March 31, 2015)**

January: Annual Marine science Symposium

April: 6 day survey of PWS

**FFY 15, 3rd quarter (April 1, 2015-June 30, 2015)**

Compile and analyze data.

**FFY 15, 4th quarter (July 1, 2015-September 30, 2015)**

Compile and analyze data.

**FFY 16, 1st quarter (October 1, 2015-December 31, 2015)**

Compile and analyze data. Begin writing final report.

**FFY 16, 2nd quarter (January 1, 2016-March 31, 2016)**

January: Annual Marine science Symposium.

Complete final report

**FFY 16, 3rd quarter (April 1, 2016-June 30, 2016)**

April 30: Submit final report as a draft manuscript for publication to the Trustee Council Office.

## **V. PROJECT PERSONNEL – CHANGES AND UPDATES**

There are no changes to personnel.

## **VI. BUDGET**

Please see included program workbook for budget forms.

### **A. Changes from Original Proposal**

There are no changes from original proposal.

### **B. Sources of Additional Funding**

We have secured additional NOAA funding through FY2015.