EVOSTC FY17-FY21 INVITATION FOR PROPOSALS
FY18 PROGRAM PROPOSAL SUMMARY PAGE

Proposals requesting FY18 funding are due to shiway.wang@alaska.gov and elise.hsieh@alaska.gov by August 23, 2017. 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.

Program Number and Title

18120111 Herring Research and Monitoring

Team Lead(s) and Affiliation(s)

W. Scott Pegau, Prince William Sound Science Center

Date Proposal Submitted

September 11, 2017

Program Abstract

The overall goal of the Herring Research and Monitoring (HRM) program is to: **Improve predictive models of herring stocks through observations and research**. The program objectives are to:

1) Expand and test the herring stock assessment model used in Prince William Sound.
2) Provide inputs to the stock assessment model.
3) Examine the connection between herring condition or recruitment to physical and biological oceanographic factors.
4) Develop new approaches to monitoring.

The program is made up of seven projects; Modeling and Stock Assessment of Prince William Sound Herring; Surveys and Age, Sex, and Size Collection and Processing; Adult Pacific Herring Acoustic Surveys; Herring Disease Program; Studies of Reproductive Maturity among Age Cohorts of Pacific Herring; Annual Herring Migration Cycle; and HRM Coordination.

Through these projects we expect to address areas of interest outlined within the herring research and monitoring section of the original invitation for proposals. The modeling project and a postdoctoral fellow in the coordination project are envisioned as two integrating projects that use data and information from all of the others. The postdoc will also work with the Gulf Watch Alaska and Data Management programs. The primary beneficiaries of our efforts are expected to be Alaska Department of Fish and Game and Prince William Sound herring fishermen.

Dr. Pegau will serve as the program lead to ensure the proper coordination within the program, with other EVOS funded programs, and as a point person for communications with the EVOSTC. An independent scientific oversight group exists that will provide feedback on the program.

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

FY17	FY18	FY19	FY20	FY21	TOTAL
$1,252.9	$1,578.8	$1,478.9	$1,403.1	$903.7	$6,617.5

Non-EVOSTC Funds to be used, please include source and amount per source:

FY17	FY18	FY19	FY20	FY21	TOTAL
$157.2	$159.7	$160.7	$162.7	$149.7	$790.0

**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.*

1. EXECUTIVE SUMMARY

Please provide a summary of the Program including key hypotheses and overall goals, as submitted in your original proposal. If there are highlights that you would like to include from the Program's FY17 work, please include them here.

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An important break though occurred in the herring disease program in the transition between the first HRM program and the start of this program. The break through being the development of a reliable test to detect antibodies associated with the viral hemorrhagic septicemia virus (VHSV). This is important because outbreaks of VHSV can occur over a short time period with large mortality. By being able to detect the antibodies we can see if fish have had the disease within at least the last year, providing a better measure of potential mortality between sampling events. We were also able to process historical samples to see how the antibody prevalence has changed over time. To date, the prevalence of VHS infections have been similar in Prince William Sound (PWS) and Sitka, but the presence of antibodies indicate much higher levels of VHS in the PWS population compared to Sitka (Fig. 1). The antibody concentrations may indicate why we had a rapid decline in the herring biomass in PWS over the past few years. We don't know when the fish are being exposed to the virus and want to look at the age structure of the prevalence to see if it can help us understand why this disease is more common in PWS.

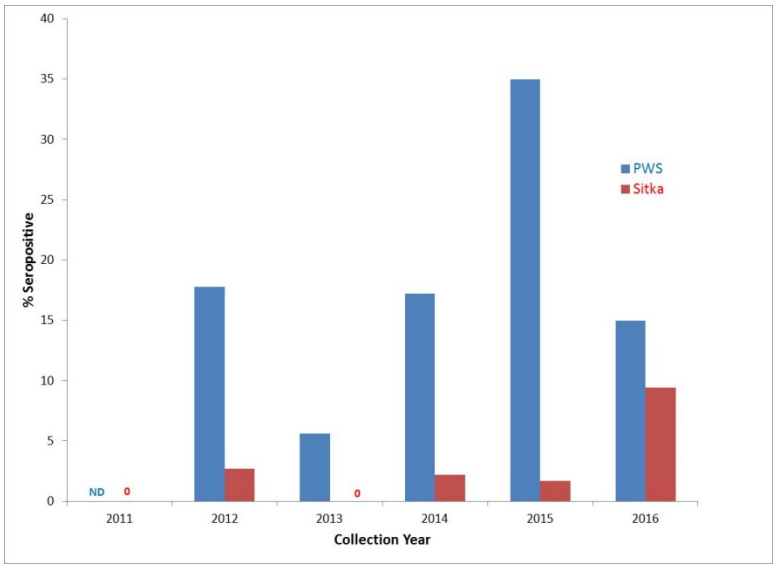

Figure 1. Prevalence of Pacific herring with detectable levels of neutralizing antibodies to VHSV (% seropositive) in Prince William Sound (PWS) and Sitka Sound. ND = No Data from PSW in 2011; '0' indicates 0% seropositive from Sitka Sound in 2011 and 2013.

We are advertising for the postdoctoral researcher that is to address objective three of the program.

Sampling during the spring spawning season was completed as proposed. Preliminary results from the acoustics and aerial spawn surveys suggest that the PWS herring biomass remains at record low levels. The low population level and relatively young age of the existing fish have created some challenges. The young age of the fish made it difficult to collect enough large fish for the acoustic tagging, but we were able to collect the target number of fish. The low adult population made it difficult to find adult herring in July, and we were not successful in obtaining a sample for the study of reproductive maturity.

Manuscripts describing work completed in the earlier version of the HRM program continue to work their way through the review process. A special issue in Deep Sea Research II is due out in late 2017.

2. COORDINATION AND COLLABORATION

A. Within an EVOTC-Funded Program

Provide a list and clearly describe the functional and operational relationships with other EVOSTC-funded program projects. This includes any coordination that has taken or will take place and what form the coordination will take (shared field sites or researchers, research platforms, sample collection, data management, equipment purchases, etc.).

B. With Other EVOSTC-funded Projects

Indicate how your Program design relates to, complements or includes collaborative efforts with other proposed or existing projects funded by the EVOSTC that are not part of a EVOSTC-funded program.

C. With Trustee or Management Agencies

Please discuss if there are any areas which may support EVOSTC trust or other agency work or which have received EVOSTC trust or other agency feedback or direction, including the contact name of the agency staff. Please include specific information as to how the subject area may assist EVOSTC trust or other agency work. If the Program requires or includes collaboration with other agencies, organizations or scientists to accomplish the work, such arrangements should be fully explained and the names of agency or organization representatives involved in the project should be provided. If your proposal is in conflict with another project, note this and explain why.

This is a continuation of the effort that began with the first HRM program. These researchers have worked together on the previous HRM program and have a good working relationship.

Dr. Pegau is the program team leader and is responsible for ensuring a coordinated and focused research program that leverages other assets whenever possible. Within program coordination is primarily be through e-mail and phone communications. In-person meetings of participants are expected to occur once a year for exchange of information and to encourage collaboration between projects. The first meeting is scheduled for November 2017. This meeting is expected to be held the same week, but on different days as the GWA investigator meeting to allow exchange between the groups.

Coordination between projects is also taking place through scheduling of vessels. All the investigators are required to work together to determine vessel type and number of days needed. The primary overlap we have identified is during the spring adult herring surveys. In that case the vessel will be shared by the ADF&G age-sex-length sampling, acoustic survey, disease sampling, and at least in the first year the age-at-maturity project. Because of the limited berthing available we will need to cycle the non-ADF&G projects on the vessel as appropriate.

Coordination is also achieved through the scheduling of projects to ensure results would be available for projects dependent on samples or data from another project. Information gained from the tagging project is expected to have value to age-at-maturity study in helping determine if there is a segregation by age or size class. It will also inform the work to be done by a postdoctoral researcher on identifying how herring are affected by environmental conditions. We expect that the postdoctoral researcher will facilitate further collaboration as that person will need information from each of the projects to address the relationships between herring and the environmental conditions.

With Other EVOSTC-funded Programs and Projects

There was considerable discussion between the GWA and HRM programs during the development of proposals to identify areas of overlap between programs and to ensure data management needs can be met.

We propose to continue our collaborations with the GWA and Data Management programs. The GWA science lead and a person to be designated from the Data management team are included on the HRM email list so they are aware of what is going on in the HRM program. Administratively, the annual work plans and reports will continue to be developed together. We plan to have joint PI meetings to encourage individuals to work with people in the other programs. We will work together to design topics for analysis and development of joint scientific manuscripts and cross-program synthesis proposals. We will work with the Data Management project to ensure timely submission of data and metadata.

The HRM program is collecting detailed information on herring and processes that affect them. GWA monitors the oceanographic conditions that drive the growth and recruitment of the herring. One of the strongest connections between programs is through the HRM postdoctoral researcher whose research effort bridges between the HRM and GWA programs. That effort will be looking at the impacts of biological and physical oceanographic conditions on herring populations in PWS. They will be using the detailed information on herring collected in HRM to test the impacts of bottom-up forcing, using information from the environmental drivers component, and top-down forcing using information from the pelagic component.

The HRM modeling effort includes expanding the model to include environmental drivers and predation components. This creates a connection to the environmental drivers group and the GWA Pelagic Integrated Fall/Winter Predator Prey Surveys that encompass surveys for forage fish, humpback whales, and marine birds.

We will be working with the GWA program on future cross-cutting synthesis proposals. Both programs have identified at least one topic for consideration, but need additional time to focus the efforts before putting a proposal together.

With Trustee or Management Agencies

Alaska Department of Fish and Game is the primary trustee and management agency that the HRM program interacts with. The success of the program is highly dependent on the historical information collected by ADF&G and the expertise within the agency so it is imperative that we work with the agency. We will continue to have an ADF&G person on our scientific oversight group. ADF&G efforts are a primary project with the program to ensure the data needed to understand recovery of herring is collected. Interactions with Steve Moffitt, and now Stormy Haught, in Cordova have provided a close connection between the program and the agency.

With Native and Local Communities

The HRM program has an established working relationship with the Cordova District Fishermen United (CDFU) that provides a means of communication with fishermen in Cordova. This relationship has created better ties between the scientists and fishing community. The HRM program provides annual updates to the herring section of CDFU. That meeting provides the primary means for focused feedback on the research program from the community and for the program to gain local ecological knowledge. Over the years the individual fishermen

and scientists have regular communication in casual situations. These have been important in gaining local knowledge.

Ties to the native communities are limited; however, we have established a contact in the village of Tatitlek. They have an interest in learning about fresh spawn near the village for the collection of roe or fish. Providing observations from the HRM program starts a conversation in which local observation are provided. We envision working with GWA to increase our effort to interact with native communities through community involvement activities.

3. PROJECT DESIGN – PLAN FOR FY18

A. Objectives for FY18

Identify the primary Program objectives for FY18 as submitted in your original proposal.

B. Changes to Project Design

If the Program design has changed from your original proposal, please identify any substantive changes and the reason for the changes. Include any information on problems encountered, if any. This may include logistic or weather challenges, budget problems, personnel issues, etc. Please also include information as to how any problem has been or will be resolved. This may also include new insights or hypotheses that develop and prompt adjustment to the overall Program.

A. The overall goal of the Herring Research and Monitoring (HRM) program is to: **Improve predictive models of herring stocks through observations and research**. The program objectives are to:

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B. For the most part, we intend to continue with the originally proposed approach for addressing each of these objectives. The one change in design is to collect additional samples for disease analysis. The new technique for detecting VHS antibodies shows that there is an elevated level of exposure to VHS in PWS and the additional samples are to help determine if there is an age dependency on the exposure.

4. SCHEDULE

A. Program Milestones for FY18

Specify when critical Program tasks will be completed. Reviewers will use this information in conjunction with annual Program reports to assess whether the Program is meeting its objectives and is suitable for continued funding.

Measurable Program Tasks

Specify, by each quarter of each fiscal year (February 1 – January 31), when critical Program tasks will be completed.

Program Milestones

The program objectives lead to the program milestones.

1) Expand and test the herring stock assessment model used in Prince William Sound.

The proposed program has a series of model expansion and evaluation efforts that are described more fully in the modeling proposals. The major tasks are identified in the Measurable Program Task section.

2) Provide inputs to the stock assessment model.

Inputs are required annually to update the stock assessment. New variables useful to the model will be incorporated as they are determined to be of use.

3) Examine the connection between herring condition or recruitment to physical and biological oceanographic factors.

This is the focus of the postdoctoral fellow and early modeling efforts and will be completed by the end of FY 20.

4) Develop new approaches to monitoring.

This is an ongoing objective. We are proposing efforts in the disease program that span the duration of this proposal. Herring tagging and juvenile acoustic work will be completed by the end of FY 20.

Measurable Program Tasks

FY18 1st Quarter (Feb1- Apr 30)
- Annual ASA model run
- Conduct spring adult herring surveys
- Semi-annual reports to EVOS and NOAA
- Tag herring

FY18 2nd Quarter (May1- Jul 31)
- Ensure data submitted from previous year
- Complete processing fish collections

FY18 3rd Quarter (Aug 1 – Oct 31)
- Semi-annual report to NOAA
- FY 19 proposal submitted to EVOS
- Complete analysis of 2018 plasma samples

FY18 4th Quarter (Nov 1 – Jan 31)
- Complete annual website updates
- Annual PI meeting
- Determine age-at-maturity sampling
- Complete experiments on the effects of salinity on *Ichthyophonus* transmission

5. PROJECT PERSONNEL – CHANGES AND UPDATES

If there are any staffing changes to the Team Leads or any other senior personnel please provide CV's for any new personnel and describe their role in the Program.

Steve Moffitt retired and was replaced by Stormy Haught at Alaska Department of Fish and Game. Stormy is now the lead of the Aerial spawn surveys and Age, sex, length sampling project

6. Budget

A. Budget Forms (Attached)

Provide completed budget forms.

B. Changes from Original Proposal

If your FY18 funding request differs from your original proposal, provide a detailed list of the changes and discuss the reason for each change.

C. Sources of Additional Funding

Identify non-EVOSTC funds or in-kind contributions used as cost-share for the work in this Program. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal.

A. See attached budget for details.

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
PROGRAM BUDGET PROPOSAL AND REPORTING FORM

Budget Category:	Proposed FY 17	Proposed FY 18	Proposed FY 19	Proposed FY 20	Proposed FY 21	TOTAL PROPOSED
Personnel	$515.1	$741.7	$768.2	$786.7	$462.0	$3,273.8
Travel	$37.1	$47.9	$42.8	$40.0	$36.4	$204.1
Contractual	$198.7	$221.9	$203.4	$143.4	$134.0	$901.4
Commodities	$192.6	$160.6	$87.5	$79.4	$78.6	$598.7
Equipment	$5.9	$0.0	$0.0	$0.0	$7.8	$13.7
Indirect Costs (*will vary by proposer*)	$200.1	$276.5	$254.9	$237.7	$110.3	$1,079.5
SUBTOTAL	$1,149.5	$1,448.5	$1,356.8	$1,287.2	$829.1	$6,071.1
General Administration (9% of subtotal)	$103.5	$130.4	$122.1	$115.8	$74.6	$546.4
PROJECT TOTAL	$1,252.9	$1,578.8	$1,478.9	$1,403.1	$903.7	$6,617.5
Other Resources (Cost Share Funds)	$157.2	$159.7	$160.7	$162.7	$149.7	$790.0

B. There is an additional $22.5K requested for sample processing in the disease program ($24.5K with G&A).