

1. PROJECT EXECUTIVE SUMMARY

Provide a summary of the program including key hypotheses and overall goals, as submitted in your original proposal. Please include a summary and highlights since your last annual report: preliminary results with figures and tables. If there are no preliminary results to present, please explain why (i.e., lab analysis is still in progress). List any publications that have been submitted and/or accepted since you submitted your last proposal and other products in *Section 7*. Prior annual reports will be appended to remind reviewers of progress in previous years.

The current management of the Prince William Sound (PWS) herring stock by the Alaska Department of Fish and Game (ADF&G) includes information from hydroacoustic surveys. Biomass estimates from these surveys provide a measure of the stock abundance and serve as input into the age-structured assessment (ASA) model that is the primary forecasting tool. Seine and cast net sampling conducted on the schools by ADF&G help determine the maturity state of the herring acoustically surveyed in this project.

This project focuses on monitoring the spawning biomass and does not have an underlying hypothesis that it is trying to address. **Our main goal for this proposed project is to produce an estimate of adult biomass of the spawning population of Pacific herring in support of the age-structured assessment (ASA) model.**

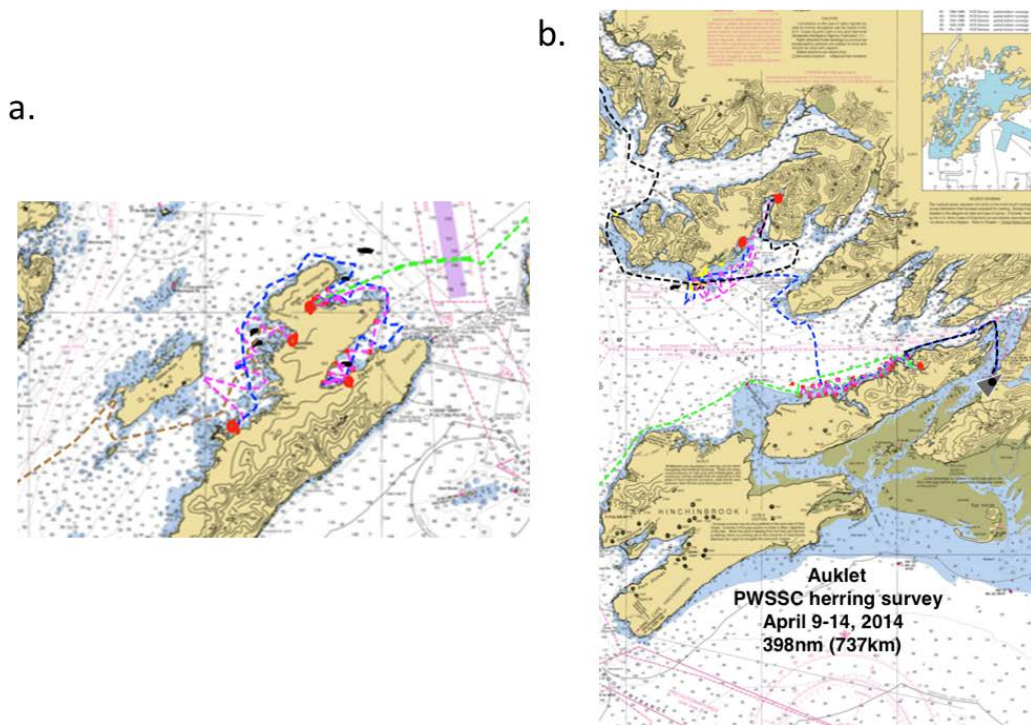


Figure 1. Cruise track for the 2018 spring survey of adult herring biomass. The night-time, acoustic transects appear as broken, zig-zag lines (fuchsia) in bays along the northeast region of Montague Island (a.) and along the northeast coast of Hawkins Island and in Port Gravina (b).

In 2018, we successfully surveyed in Port Gravina, along the shoreline of Hawkins Island near Canoe Pass, and in bays along the northeast end of Montague Island during the spring of 2018 (Figure 1). We were able to perform multiple surveys in Port Gravina (nights of 5 and 6 April). We also extended the survey to other areas relying on shipboard sonar and visual surveys. Based on visual examination of echograms during the survey, we saw only a small number of aggregated schools in Port Gravina, and only small, isolated schools near Canoe Pass on Hawkins Island and bays in the northeast region of Montague Island. Our cruise timing was excellent this spring, as we were able to conduct two separate, night-time surveys prior to the first record of significant spawn near Hell's Hole in Port Gravina (Figure 2). We also conducted an acoustic calibration exercise during 6 April. All the raw acoustic data

has been uploaded to the AOOS research workspace. Once we receive age-structure information from ADF&G we can conduct biomass estimates. We expect to have estimates completed by the third quarter and will share with Trevor Branch for use in the ASA model runs.



Figure 2. Herring spawn observed during our cruise on 7 April 2018 near Hell's Hole in Port Gravina. Our chartered vessel, M/V Auklet, appears in the foreground.

2. PROJECT STATUS OF SCHEDULED ACCOMPLISHMENTS

A. Project Milestones and Tasks

Milestones are annual steps to meet overall project objectives. For each milestone listed, specify the status (completed, not completed) when each was completed and if they are on schedule, as submitted in your most current proposal.

Tasks are annual steps to meet milestones. Specify, by each quarter of each fiscal year, when critical tasks (for example, sample collection, data analysis, manuscript submittal, etc.) were and will be completed.

Please identify any substantive changes and the reason for the changes. *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.*

B. Explanation for not completing any planned milestones and tasks

Please identify any substantive changes and the reason for the changes. If tasks were not completed as scheduled or delayed, please explain why and the anticipated completion date.

C. Justification for new milestones and tasks

Please identify any new milestones and tasks and the reason why they have been added.

A. Project Milestones and Tasks

Project milestone and task progress by fiscal year and quarter, beginning February 1, 2017. Yellow highlight indicates proposed fiscal year Work Plan. Additional milestones and tasks may be added. C = completed, X = not completed or planned. Fiscal Year Quarters: 1= Feb. 1-April 30; 2= May 1-July 31; 3= Aug. 1-Oct. 31; 4= Nov. 1-Jan 31.

Milestone/Task	FY17				FY18				FY19				FY20				FY21			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Administration & Logistics																				
Contracting for ship time	C				C															
Permitting	C				C				X				X				X			
Data Acquisition & Processing																				
Research cruise	C				C				X				X				X			
Post processing			C				C				X			X				X	X	
Data Management																				
Database mgmt./QAQC			C				C				X			X					X	
Metadata (HRM)			C				C				X			X					X	
Workspace upload			C				C				X			X					X	
Analysis & Reporting																				
Analysis and summary			C				C					X			X				X	X
Annual reports					C				X				X				X			
Permit reports			C				C					X			X					
FY work plan (DPD)			C				C				X			X						
FY17-21 Final Report																				X
Conferences and Meetings																				
Annual PI meeting			C				C				X				X					X
Publications?																				
Manuscript							C													
New Milestone																				
New task																				

B. Explanation for not completing any planned milestones and tasks

I am on track to complete milestones for FY19.

C. Justification for new milestones and tasks

Added annual FY work plan and the FY17-21 Final Report as tasks under the Analysis & Reporting milestone. A manuscript describing the response of herring to predators based on acoustics data has been accepted for publication.

3. PROJECT COORDINATION AND COLLABORATION

A. Within an EVOTC-Funded Program

Provide a list and clearly describe the functional and operational relationships with any EVOSTC-funded Program (Herring Research and Monitoring, Long-Term Research and Monitoring or Data Management Programs). 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 proposed project 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 proposed project 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.

Our proposal is closely aligned with the spring spawning survey proposal of ADF&G. Ship time for our acoustic surveys is included in this allied proposal. Further, the ASL sampling (required to partition our total biomass estimate into separate age classes) is included in this allied proposal. Data we generate in our proposed field work will also support the ASA model analyses in Trevor Branch's UW proposal.

Movements of herring determined by the proposed HRM tagging program may inform our survey planning during this grant period. Understanding the movements of adult fish during the spring will help us address issues implicit in our survey design. In particular, we feel it is critical to investigate whether there are migratory links between the Montague and Port Gravina/Fidalgo aggregations. Thus, results from this allied proposal could help advance our sampling approach.

4. PROJECT DESIGN

A. Overall Project Objectives

Identify the overall project objectives for your project as submitted in your original proposal.

B. Changes to Project Design and Objectives

If the project design and objectives have changed from your original proposal, please identify any substantive changes and the reason for the changes. Please include the revised objectives in this section. Include any information on problems encountered with the research or methods, 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 project.

A. Objectives

Our main goal for this proposed project is to produce a reliable estimate of adult biomass of the spawning population of Pacific herring for each year during 2017-2021 in support of the age-structured assessment (ASA) model. In support of this goal, we identify the following objectives:

- 1) Carry out a hydroacoustic survey prior to the herring spawning season as a means to quantify the total biomass of adult herring in regions within Prince William Sound that have historically been important for spawning. This survey includes validation of targets by direct capture of fish with various gear types.
- 2) Each year conduct repeated hydroacoustic sampling over transects to quantify precision of our biomass estimates.
- 3) Carry out reconnaissance by air or ship to assure our survey design is adapting to any changes in the spawning distribution of Pacific herring in PWS.

5. PROJECT PERSONNEL – CHANGES AND UPDATES

If there are any staffing changes to Primary Investigators or other senior personnel please provide CV's for any new personnel and describe their role on the project.

No changes.

6. PROJECT BUDGET FOR FY19

A. Budget Forms (Attached)

Provide completed budget forms.

B. Changes from Original Proposal

If your FY19 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 proposal. 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. Budget forms

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

Budget Category:	Proposed FY 17	Proposed FY 18	Proposed FY 19	Proposed FY 20	Proposed FY 21	TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	\$39.5	\$40.7	\$41.9	\$43.2	\$44.5	\$209.9	
Travel	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6	\$2.8	\$ -
Contractual	\$10.8	\$10.8	\$10.8	\$10.8	\$10.8	\$54.0	\$ -
Commodities	\$1.5	\$0.0	\$0.0	\$0.0	\$0.0	\$1.5	\$ -
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$ -
Indirect Costs (<i>will vary by proposer</i>)	\$15.7	\$15.6	\$16.0	\$16.4	\$16.8	\$80.4	
SUBTOTAL	\$68.1	\$67.7	\$69.3	\$70.9	\$72.6	\$348.5	\$0.0
General Administration (9% of subtotal)	\$6.1	\$6.1	\$6.2	\$6.4	\$6.5	\$31.4	N/A
PROJECT TOTAL	\$74.2	\$73.8	\$75.5	\$77.3	\$79.1	\$379.9	
Other Resources (Cost Share Funds)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	

B. The original budget for years 2019-2021 for this project did not include ship-time. Having ship-time budgeted for the project during years 2017 and 2018 has allowed me to conduct a more thorough survey. Because of the likelihood of compressed field seasons in the future (given recent patterns in fish distribution and behavior) and multiple, competing objectives among projects relying on the *R/V Solstice* as the sampling platform, compromises would need to be made that would ultimately limit the scope of the acoustic survey. Having two

vessels operating simultaneously also provides an opportunity to observe, sample and survey simultaneously in both the eastern and western regions of the herring spawning range in PWS. Thus I request additional ship-time support for acoustic surveys (~\$10K/yr plus overhead) for the remaining three years of this project.

7. FY18 PUBLICATIONS AND PRODUCTS

Products include publications (include *in prep* and *in review*), published and updated datasets, presentations, and outreach during FY18.

Rand, P.S. In press. Pacific herring response to surface predators in Prince William Sound, Alaska. Marine Ecology Progress Series.

Rand, P.S. 2018. The dynamics of herring and predators in Prince William Sound. Delta Sound Connections

Raw data from adult acoustic biomass survey uploaded to HRM Research Workspace in June 2018.

Provided photos and messages for social media work by PWSSC contractor Teal Barmore (#BehindTheScenes).

Figure 2 appeared on the cover of the Cordova Times during spring 2018.