



### Principal Investigator

Dr. W. Scott Pegau  
PWS Science Center  
wspegau@pwssc.org

### Research Period

2012-2017

### Funding

Exxon Valdez Oil Spill  
Trustee Council

### Collaborators



### Prince William Sound Science Center

PO Box 705  
Cordova, AK 99574  
Phone: (907)424-5800  
Fax: (907)424-5820  
Web: [www.pwssc.org](http://www.pwssc.org)

## Project Summary

# HERRING RESEARCH AND MONITORING PROGRAM

### BACKGROUND

In the decades prior to 1990 there was a robust Pacific herring population in Prince William Sound. Not only are these forage fish a key link in the complex food web of Prince William Sound, but they supported a lucrative early season commercial fishery that brought the communities of the Sound to life each spring. In 1993 that fishery collapsed. While there is debate about the cause of the collapse, our interest is in what prevents the herring population from recovering.



### PROGRAM DESCRIPTION

Today, researchers from multiple institutions are working to determine why herring populations remain depressed. With funds from the Exxon Valdez Oil Spill Trustee Council, which oversees funds from a settlement between State/Federal government and Exxon, a group of research and monitoring projects were designed to improve predictive models of herring stocks through observations and research. Monitoring efforts include disease prevalence, enhanced adult biomass survey, juvenile biomass index survey, and condition of young of the year herring. A series of process studies will help improve our understanding of individual components of the herring life cycle. These studies include determining the age at first spawn, identifying population genetic structure, analysis of herring scales for growth patterns, intensive surveys of juvenile populations and conditions, analysis of fatty acids to determine migration distances, improving validation of acoustic measurements, disease related studies, acoustic tagging, development of non-lethal sampling methods, modeling of herring populations, data visualization, outreach, and synthesis. This work is complementary to the Gulf Watch Alaska program that examines other important environmental factors in the region.

### The objectives of this multi-faceted study are to:



- ❖ Provide information to improve input to the age-structure-analysis model;
- ❖ Address assumptions in current measurements;
- ❖ Develop new approaches to monitoring; and
- ❖ Inform the synthesis effort.

## Research Team

*Dr. Mary Anne Bishop,  
PWS Science Center*

*Dr. Kevin Boswell,  
Florida International  
University*

*Dr. Trevor Branch,  
University of Washington*

*Dr. Michele Buckhorn,  
PWS Science Center  
Cordova District Fishermen  
United*

*Dr. Ron Heintz,  
National Oceanic and  
Atmospheric Admin.*

*Dr. Paul Hershberger,  
US Geological Survey*

*Dr. Tom Kline,  
PWS Science Center*

*Dr. Scott Pegau,  
PWS Science Center*

*Steve Moffitt,  
Alaska Department of Fish  
and Game*

*Dr. Richard Thorne,  
PWS Science Center*

*J.J. Vollenweider,  
National Oceanic and  
Atmospheric Admin.*

*Sharon Wildes,  
National Oceanic and  
Atmospheric Admin.*

## IMPROVE THE AGE-STRUCTURE-ANALYSIS (ASA) MODEL

The ASA model provides fisheries managers the estimated stock population. The disease and adult biomass surveys are designed to provide additional information to the ASA model. The juvenile biomass and condition surveys will lead to estimates of the number of new fish recruiting to the spawning biomass. We are examining when fish first spawn so the maturation function used by the model can be tested. We will examine the genetic stock structure to determine if there is one stock as assumed. We are also testing the ASA model and examining other stock dynamic models.

## INFORM THE SYNTHESIS EFFORT

A synthesis is required in this program. The data management and visualization project will help gather the required information. Herring scale analysis will provide additional information about the growth of herring that can be connected to environmental conditions.

## ADDRESS ASSUMPTIONS IN CURRENT MEASUREMENTS

It is important to ensure we are properly interpreting the measurements we are making. We are conducting intensive sampling of juvenile herring distribution and condition to ensure proper timing of our sampling. Fatty acid analysis provides information on fish movement between sampling events. Acoustic validation efforts are designed to ensure proper interpretation of measurements. We are working to ensure proper timing of disease measurement as well.



## DEVELOP NEW APPROACHES TO MONITORING



Technological advances provide new tools for research and monitoring. We are using new acoustic and optical approaches to determine if they provide a non-lethal approach to sampling the fish. Acoustic tags are being implanted in fish to determine where they go after spawning. Disease research is leading towards the ability to determine populations at risk of disease outbreaks.

## WHAT WE WILL LEARN

We are working to improve the input to the existing ASA model used by fisheries managers, while also conducting research that will lead to either new models or improvements to the existing one. We are ensuring the measurements that are being used are the best for the purpose, and we will continue to improve our efforts as our understanding and technology improves.