

## Final Progress Report

Saltonstall-Kennedy Award NA20NMF4270167

### Utilize an industry-seine fishing vessel to enhance data collection and improve assessment of Pacific Coast Coastal Pelagic Species

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Award Amount \$295,800

#### Executive Summary (500 words)

This project built on successful proof of concept and gear strategy work in 2017 and 2019, which used an industry purse seine vessel (F/V *Lisa Marie*) to conduct complementary nearshore Coastal Pelagic Species (e.g., Pacific sardine) acoustic surveys and sampling in conjunction with the NOAA-Southwest Fisheries Science Center (SWFSC) Acoustic-Trawl Method (ATM) survey. The NOAA-SWFSC ATM survey does not survey acoustically in waters shallower than 20 meters (m) and does not trawl in waters shallower than 50 m. However, CPS distribution is known to extend into much shallower depths through use of an industry purse seine vessel outfitted with acoustic equipment. The objective of this project was to expand CPS data collection to non-surveilled nearshore areas addressing industry concerns and needs identified in methodology peer reviews.

The project was composed of two parts. Part 1 was conducted wholly under the direction of the SWFSC. All project data (Part 1 and 2) were submitted to NOAA-SWFSC; however, only Part 2 results are reported as it was conducted separately from the NOAA-SWFSC survey. In Part 1, the F/V *Lisa Marie*, using an EK 60 echosounder provided, installed, and calibrated by SWFSC scientists, completed complimentary acoustic surveys of the nearshore distribution of CPS biomass off Washington, Oregon, and northern California (to approximately Bodega Bay) between July 16, 2021, and August 5, 2021. During this period, F/V *Lisa Marie* completed a total of 121 transects (25 transects off Washington, 52 off Oregon and 44 off California) as well as 30 purse seine sets. WDFW biologists were onboard for the duration of the to collect species composition and biological data from purse seined catches, as well as monitor the acoustic equipment and maintain a log of seining operations.



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In Part 2, F/V *Lisa Marie* repeated surveillance of only the Washington nearshore from August 18 to August 26, 2021. The purpose was to allow qualitative comparison of the nearshore CPS assemblages between Part 1 and Part 2 and to provide the opportunity to test and evaluate alternative approaches to standard seine set timing and basket sampling protocols. The F/V *Lisa Marie* completed 50 acoustic transects and 25 purse seine sets on acoustically observed CPS. CPS included six species: Jack mackerel (*Trachurus symmetricus*) and jellyfish (Cnidaria) by weight and frequency comprised most species collected. Unlike during Part 1 when no Pacific sardine were observed by the F/V *Lisa Marie* off Washington, Pacific sardine (*Sardinops sagax*) were collected from a single set on August 21 approximately 10 miles offshore of Taholah, Washington. Northern anchovy (*Engraulis mordax*) were observed in only one set, just north of the Columbia River, and included only four fish. Evaluation of alternatives to standard approaches found no evidence of sonar interference with acoustic equipment, setting immediately upon observation of CPS on the transect line rather than following completion may be efficient when CPS abundance is low or patchy, and the standard three basket species composition sample may not sufficiently represent rare species in the catch.

### **Project Goals and Objectives**

This project responded to S-K Program Priority 2, *Science or Technology that Promotes Sustainable U.S. Seafood Production and Harvesting*. The overarching goal of this project is to expand data collection and achieve better spatial and temporal coverage for Pacific sardine and other CPS via collaborative fisheries research, in order to facilitate and improve sustainable management and to provide environmentally compatible socioeconomic benefit to CPS harvesters and processors.

Goal 1: Provide data on the abundance and distribution of Pacific sardine and other CPS in California Current nearshore areas to inform assessment science and improve management.

Goal 2: Ensure that the design of our proof-of-concept project is capable of providing acoustic, species composition and biological data on CPS from nearshore habitats for use in future stock assessments and test alternative seine setting and species composition sampling strategies.

Goal 3: Share results and lessons learned.

### **Methods**

The F/V *Lisa Marie* conducted complementary echosounder, sonar, and purse-seine sampling along nearshore extensions of NOAA FSV *Rueben Lasker* survey transects, for approximately 28 days in July-August 2021. During this period WDFW biologists were onboard F/V *Lisa Marie* to log acoustic data per NOAA-SWFSC direction, guide selection of schools for sampling, conduct species composition and biological sampling, and maintain a log of project operations. F/V *Lisa Marie* met the FSV *Lasker* at her northernmost US transect and proceeded in the nearshore area along transects approximately 5 nmi apart, overlapping the easternmost leg of FSV *Lasker's* compulsory transects. F/V *Lisa Marie* alternated transit direction (east-west and vice versa), and repeated this protocol for 3-7 transects each day, ideally coincident with FSV *Lasker's* survey to vicinity of Eureka in northern California, to complete approximately 100 total transects.



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Subsequently (and approximately following a one-month interval), F/V *Lisa Marie* repeated nearshore surveillance along NOAA-SWFSC prescribed Washington transects for up to seven (7) days to support temporal comparison of species assemblage between stages. In addition, F/V *Lisa Marie* tested the feasibility of a different timing strategy to sample fish identified along transects. Per NOAA-SWFSC ATM survey protocols, acoustic surveying of transects is completed and then the vessel locates putative CPS schools in the area to sample. Due to the temporal and possible spatial lag, schools selected for sampling may not be the same as those acoustically surveyed. Instead, F/V *Lisa Marie* interrupted acoustic surveillance when putative schools of CPS were identified, sampled the seined catch, and resumed acoustic surveillance to complete the transect. Finally, species composition sample protocols were evaluated by increasing the number of scoops from three to ten baskets per set.

### **Project Results**

The project was evaluated and achieved the following metrics:

1. Successful co-development of collaborative research protocol with NOAA-SWFSC and WDFW
2. Successfully conducted acoustic, video, and biological/species composition sampling
3. Timely transmission of data to NOAA-Southwest Fishery Science Center
4. Shared results with PFMC and its relevant advisory bodies and presented at the 2022 Tri-National Sardine and Small Pelagics Forum
5. Completed a final project report

### **List of biological samples**

All sampling was conducted on board the FV *Lisa Marie* and fish scooped from the seine net were returned to the water following sampling. Otoliths were extracted from CPS and provided either to the NOAA-SWFSC or WDFW for ageing.

### **Significant issues**

The project was initially planned for 2020 but delayed until 2021 due to the global pandemic and related cancellation of field operations in 2020.

### **Description of plans for additional work**

The expectation is the F/V *Lisa Marie* will continue nearshore surveillance of CPS under the direction of the NOAA-SWFSC. The F/V *Lisa Marie* conducted the survey in 2022 and plans are underway for 2023.

### **Description/analysis extent to which goals were met**

The project accomplished a full survey of the nearshore CPS assemblage in conjunction with the NOAA-SWFSC. Under direction of the NOAA-SWFSC, the F/V *Lisa Marie* fulfilled the objectives for Part 1 and the data were incorporated into ATM biomass estimates. Under Part 2, the F/V *Lisa Marie* accomplished the planned work to evaluate set timing strategies and species composition-basket sampling protocols. In addition, the acoustic and species composition data collected during Part 2 elicited new questions by SWFSC scientists and may support other exploratory analyses.

