

## **Northern Bering Sea Surface Trawl and Oceanographic Survey Plan, 2020**

by

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## Abstract

The 2020 northern Bering Sea surface trawl and oceanographic survey operations are contingent on health and safety concerns related to COVID-19. The survey is a multi-disciplinary research project conducted aboard a chartered fishing vessel, the F/V *Northwest Explorer*, scheduled to begin and end in Dutch Harbor, AK from August 27 and September 20, 2020 with a port call in Nome, AK on Sep 8, 2020. The survey will support Alaska Sustainable Salmon Fund research objectives on juvenile salmon and the Alaska Fisheries Science Center's Bering-Arctic-Subarctic Integrated Surveys and Recruitment Process Alliance ecosystem research programs. Additional objectives by Alaska Department of Fish and Game and U.S. Fish and Wildlife Service will also be supported during the survey.

## Overview

The 2020 northern Bering Sea surface trawl and oceanographic survey plan will be to start and end in Dutch Harbor, AK on Aug. 27 and Sep. 20, respectively. A port call is scheduled in Nome on Sep 8. The survey will support: 1) surface trawl research on juvenile salmon and other pelagic nekton species in the northern Bering Sea, and 2) oceanographic data collection in the northern Bering Sea. Principal funding support for the survey is provided by the Alaska Sustainable Salmon Fund (AKSSF) through the project entitled 'Northern Bering Sea Surface Trawl Survey, 2020' and by the Alaska Fisheries Science Center's Recruitment Process Alliance and Bering-Arctic-Subarctic Integrated Surveys. Additional support is provided by the Alaska Department of Fish and Game and U.S. Fish and Wildlife Service.

Survey objectives include: 1) Estimate abundance, distribution, size, and stock-structure of juvenile salmon, 2) Collect ecosystem data on forage fish species, 3) Collect electronic oceanographic data and water samples for temperature, salinity, chlorophyll a, nutrients, and particulate organic carbon with a SBE9-11 CTD and Niskin bottles, and 4) Collect zooplankton and ichthyoplankton samples with a 20 cm (150 µm mesh) and 60 cm (505 µm mesh) cm bongo array.

Personnel/Science Party: name, title, gender, and affiliation

| Name (Last, First) | Title                    | Date Aboard | Date Disembark | Gender | Affiliation |
|--------------------|--------------------------|-------------|----------------|--------|-------------|
| Murphy, Jim        | Fish Bio/Chief Scientist | 8/27        | 9/20           | M      | AFSC        |
| Wes Strasburger    | Fish Bio                 | 8/27        | 9/8            | M      | AFSC        |
| Dave Nicols        | Fish Bio                 | 8/27        | 9/8            | M      | AFSC        |
| Collen Harpold     | Fish Bio                 | 8/27        | 9/8            | F      | AFSC        |
| Liz Lee            | Genetist                 | 8/27        | 9/8            | F      | ADFG        |
| TBD                | Seabird Observer         | 8/27        | 9/8            | M      | USFWS       |
| Jamal Moss         | Fish Bio/Chief Scientist | 9/8         | 9/20           | M      | AFSC        |
| Sewall, Fletcher   | Fish Bio                 | 9/8         | 9/20           | M      | AFSC        |
| Garcia, Sabrina    | Fish Bio                 | 8/8         | 9/20           | F      | ADFG        |
| Nicols, Dave       | Fish Bio                 | 9/8         | 9/20           | M      | AFSC        |
| TBD                | Seabird Observer         | 9/8         | 9/20           | TBD    | USFWS       |
| TBD                | TBD                      | 9/8         | 9/20           | TBD    | TBD         |

AFSC—Alaska Fisheries Science Center, Auke Bay Laboratories, Juneau, AK

ADFG—Alaska Department of Fish and Game, Commercial Fisheries Division, Anchorage, AK

USFWS—US Fish and Wildlife Service, Office of Migratory Bird Management, Anchorage, AK

## Operations

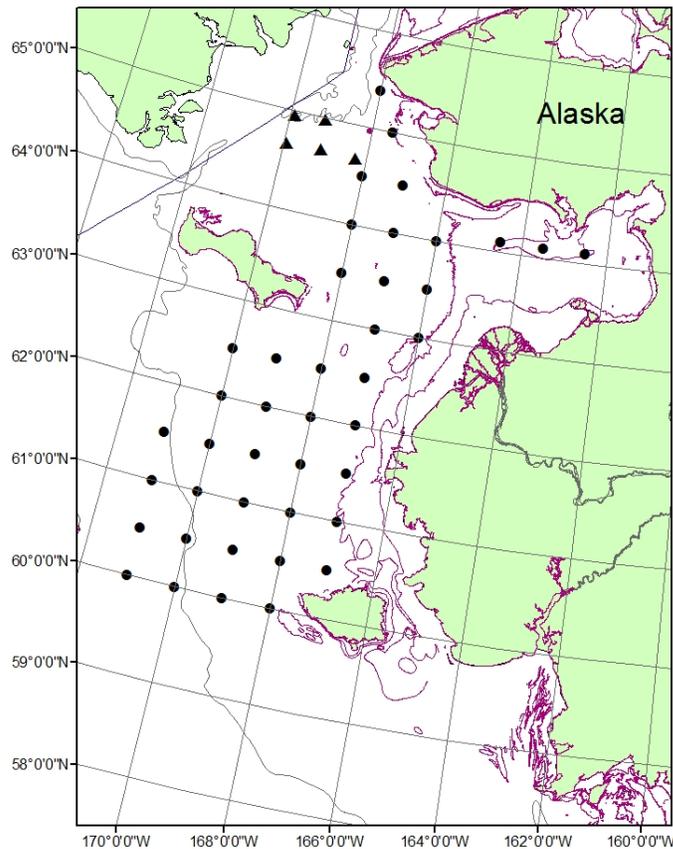
Survey operations will be conducted during daylight hours, generally between 07:30 and 20:00. Stations will be sampled using a systematic grid design with a station grid of approximately 30 nm (every 0.5 degree of Latitude and 1.0 degree of Longitude). The survey will cover the area from 60°N to 65.5°N (Fig. 1).

Surface sampling will be completed with a Cantrawl 400/601 rope trawl with ¾” synthetic TS2 bridals and 5m NETS alloy doors. All surface trawls will be deployed for a duration of 30 minutes with 330 m of main trawl warp. A net sonar will be used during each surface trawl deployment to monitor and record net dimensions. Temperature and depth sensors (SBE39) will be secured to the footrope of the trawl to record vertical dimensions of the trawl. Polyform buoys will be added to each headrope wingtip and to the centre of the headrope to help maintain the trawl at the surface.

An electronic catch logging system developed by AFSC will be used to record station and biological data collected from each trawl haul. Biological data will include species catch composition by weight and number. All other biological data will be defined by sample protocols defined for 1) juvenile salmon, 2) immature/mature salmon, and 3) all other fish species. All specimen collections will be tracked with barcoded specimen tags.

Information collected on salmon will support AKSSF research objectives: 1) Estimate stock-specific juvenile Chinook salmon abundance and provide adult run size forecasts for Canadian-origin and total Yukon River Chinook salmon. 2) Define relationships between juvenile and adult abundance for chum, coho, pink and sockeye salmon from the Yukon River and Norton Sound, and 3) Evaluate how warming in the northern Bering Sea is altering the diet, growth, and energetic status of juvenile salmon.

Oceanographic measurements, zooplankton and ichthyoplankton data, fish diets, energetic status, and jellyfish community composition will support ecosystem objectives as part of the Bering-Arctic Subarctic Integrated Surveys and the Recruitment Process Alliance research programs. Zooplankton and ichthyoplankton data will be collected at each station with a 60 cm diameter bongo frame with 505 micron nets, a 20 cm diameter bongo frame with 150 micron nets and a Seabird SBE-49. This bongo array will be deployed obliquely through the water column from the surface to near-bottom (5m from bottom). One net from each bongo frame will be preserved in 5% buffered formalin, the second 60cm bongo net will be sorted for on-board Rapid Zooplankton Assessment (RZA). CTD casts will be conducted at station. Sensors that will be added to the SBE 911+ CTD include dual TC sensors, a PAR spherical sensor (Biospherical Instruments QSP 2300), chl-a fluorometer, beam transmissometer (Wet Labs C-star), and dissolved oxygen sensors (SBE 43). CTD casts will be to near-bottom (5 m from bottom). Water samples collected with Niskin bottles attached to the CTD will be sampled for chlorophyll a, nutrients, salinity, and particulate organic carbon.



**Figure 1.** Proposed survey stations for the Northern Bering Sea surface trawl and oceanographic survey, August 27 to September 20, 2020 aboard F/V *Northwest Explorer*.

### Supplementary Projects

Distribution and abundance of seabirds: A trained US Fish and Wildlife observer will be onboard the vessel to assess the distribution and abundance of seabirds and marine mammals. With limited vessel coverage of this area, a seabird observer will provide valuable information on the distribution of the upper trophic level species present in the coastal Northeast Bering Sea. Visual surveys for marine birds and mammals will be conducted while the vessel is in transit.

Distributed Biological Observatory (DBO): DBO sites are regional hotspot transect lines and stations located along a latitudinal gradient and are considered to exhibit high productivity, biodiversity, and overall rates of change in the Arctic marine ecosystem by NOAA Fisheries. Region 2 DBO stations will be sampled during the survey, weather permitting.