Cruise Results for 2008 Untrawlable Bottom Project

Prepared by Michael Martin and Mark Zimmermann

Cruise ID:	**MF0807**	Vessel:	***NOAA Ship Miller Freeman***
Cruise Dates:	**7/1/2008 – 7/9/2008**		

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Overview

Biennial bottom trawl surveys conducted in the Gulf of Alaska by the National Marine Fisheries Service (NMFS) are a primary method of estimating and monitoring commercial groundfish abundance. These surveys follow a stratified random sampling design. A persistent problem in the accurate estimation of groundfish biomass using bottom trawl surveys is the unknown (but presumed large) amount of the continental shelf that is not fishable with our standard survey bottom trawl gear. In the current biomass estimation process, catch data for each species is expanded across entire strata regardless of the proportion of untrawlable ground within the strata.

Current bottom trawl surveys in the Gulf of Alaska include substantial areas that cannot be sampled with standard survey trawls due to the excessively rough, hard, or steep seafloor. Many of these areas have been identified while searching for trawlable bottom during the standard trawl surveys, but these efforts suffer from two problems. First, since survey stations are defined by a 25 km^2 grid superimposed on the survey strata, the data collected to date do not afford sufficient detail to examine trawlability on a fine scale. Another problem has been the subjective nature of the classification process for trawlability. Different observers, with varying levels of experience in bottom trawling and use of the survey net and using different acoustic systems, make subjective decisions as to whether or not there is a reasonable probability of collecting a trawl haul sample successfully at a particular station. Inevitably, this leads to inter-vessel and inter-annual differences in seafloor trawlability. To address this problem, a more objective and fine-scale method of evaluating the trawlability of the bottom with respect to the standard survey net would be very desirable. The main impetus for this cruise was to evaluate the utility of acoustic and ancillary data in the development of a more objective method of determining bottom trawlability.

Objectives

The scientific objectives of the cruise were to:

1. Evaluate a split beam echosounder's ability to measure slopes in both alongship and athwartship directions.
2. Examine how the interplay between hardness and roughness affects trawlability.
3. Estimate a split beam echosounder's ability to detect hardness/roughness.
4. Evaluate the importance of heave, pitch, and roll data on acoustic data quality in the estimation of trawlability.
5. Evaluate how the use of multiple frequencies improves the estimation of trawlability.

6. Collect video data to allow the validation and visualization of factors influencing the trawlability of the seafloor.

7. Collect video data to validate two Habitat Areas of Particular Concern (HAPC) sites in the western GOA.

Vessel and Gear

All operations were conducted aboard the NOAA ship *Miller Freeman*. Acoustic data were collected continuously along a series of transects with a Simrad ER60 echo integration system incorporating five centerboard-mounted transducers (18 kHz, 38 kHz, 120 kHz, and 200 kHz). A towed camera and winch system with artificial lighting was used for video validation of acoustic data.

Itinerary

June 30	Embark scientists in Dutch Harbor
July 1	Assemble and test camera systems
July 1 – 9	Acoustic and camera work around Unlalaska and Umnak Islands and the western Gulf of Alaska
July 9	Transit to Dutch Harbor

Study Areas

The areas studied included pre-selected areas around Unalaska and Umnak Islands and along the 100 m isobath in the western Gulf of Alaska (Fig 1).

Study Design and Methods

Trawlability Study

The trawlability portion of the cruise was a continuation of a study begun in 2007 aboard the NOAA ship *Oscar Dyson* and the study design and methods were similar. Sites were chosen based on depth (generally around 100 m), the likelihood of encountering rockfish aggregations, and the local

slope and rugosity of the seafloor inferred from bathymetric data. The probability of rockfish catch was inferred from previous catch information from both trawl surveys and commercial fisheries.

When untrawlable or marginally trawlable seafloor was identified acoustically, the camera system was selectively deployed to provide video validation. Preference was given to areas of higher apparent fish abundance identified from the acoustic data. The camera was towed at speeds between 1 and 2 knots in close proximity to the bottom. The winch operator used real-time video viewed via a monitor on deck to finely control the amount of wire deployed to continually change depth and avoid obstacles. Continuous data on vessel motion (heave, pitch, and roll) were collected throughout the cruise to allow evaluation of the effect of vessel motion on data quality in estimating trawlability. CTD casts were performed periodically in order to better estimate sound speed for the acoustic data analysis.

Investigation of the proposed HAPC site included acoustic surveying of the seafloor to find harder and rougher areas where HAPC fauna would be likely to occur. Surveyed depths were mostly between 200 and 250 m. The camera system was deployed at a site considered to be the most promising in terms of observing HAPC biota.

Results

Only about half of the planned work was completed as the ship suffered mechnanical problems and was forced to return to Dutch Harbor on July 4, well before the scheduled completion of the cruise (July 4). Nevertheless, about 14 GB of acoustic data were collected along with over 10 hours of seafloor video and 5 CTD casts. In addition, vessel motion data were successfully collected throughout the cruise. Despite the smaller than anticipated data set, we expect that the collected data will prove sufficent to meet the scientific objectives of the project as data analysis takes place in the upcoming months. Only one of the planned HAPC sites was visited and the presence of HAPC fauna was verified.

Scientific Personnel

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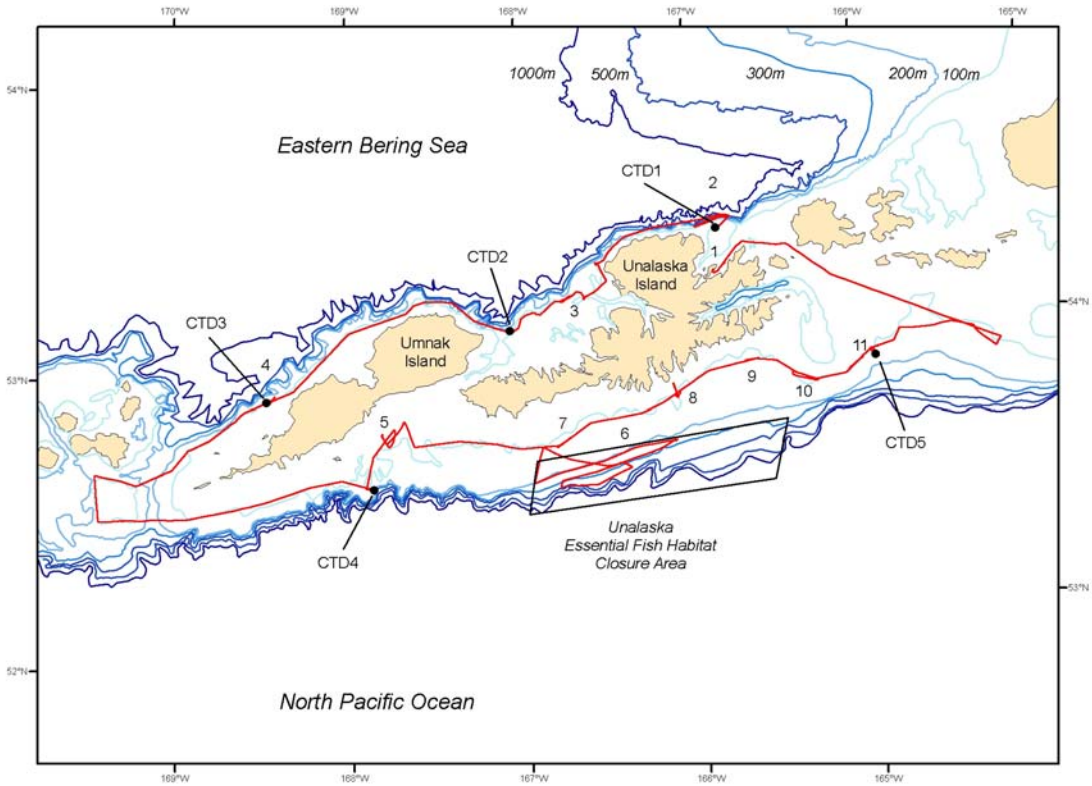
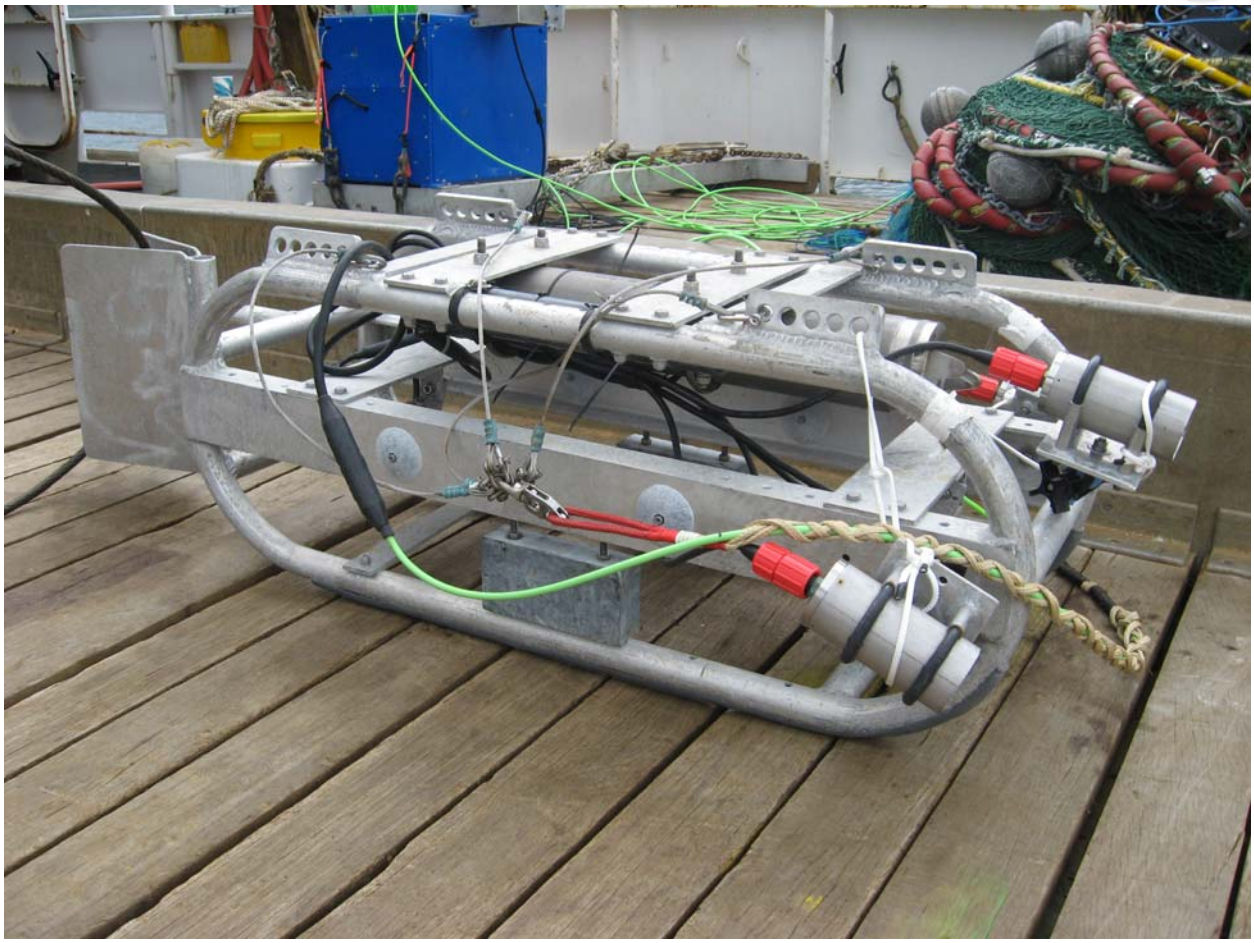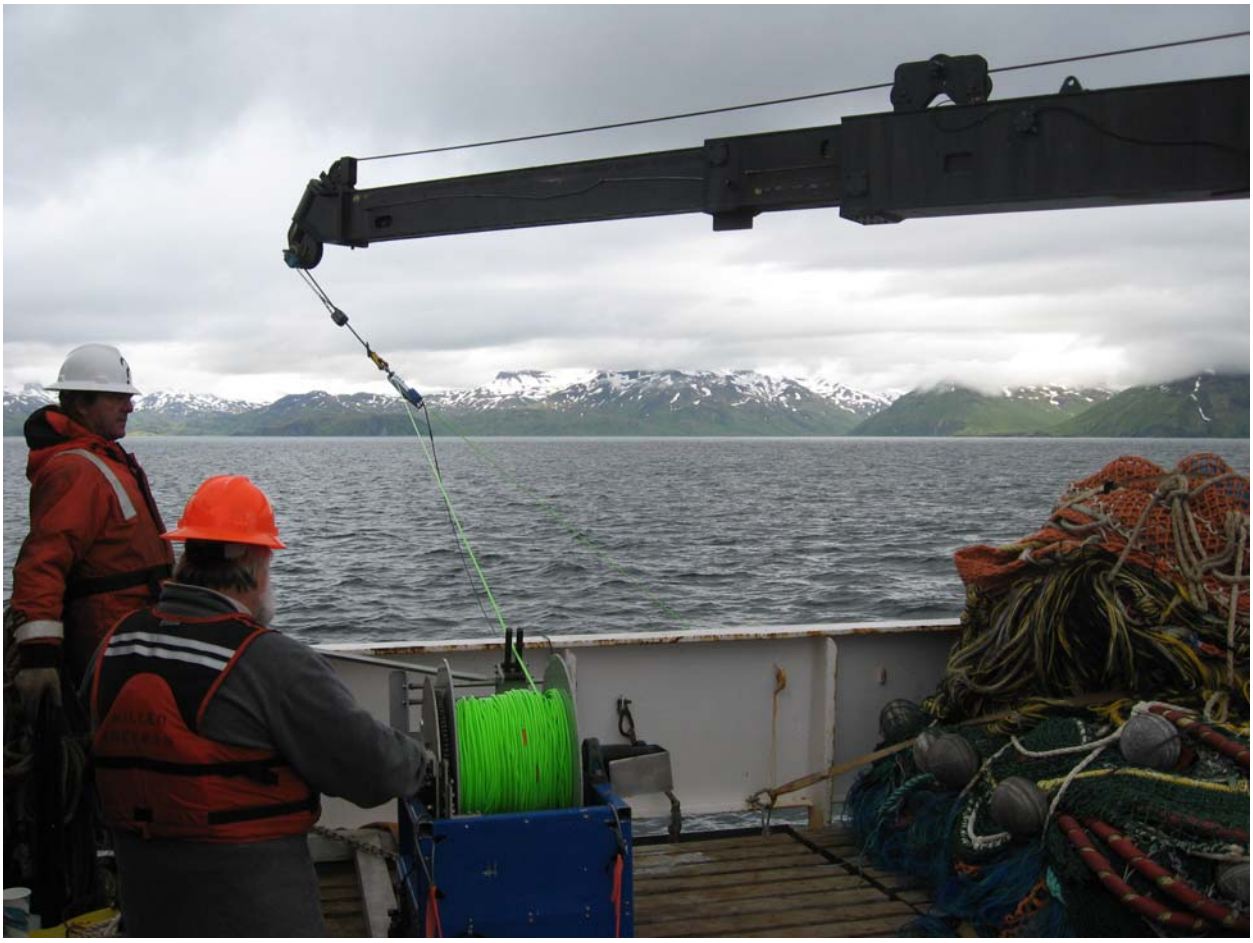
Figure 1. Transects completed during cruise MF0807. Black numbers indicate approximate locations of video camera drops. Black dots indicate CTD casts.