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F/AKC2:RAM

CRUISE RESULTS

Cruise 97-2 *F/V Golden Dawn* Trawling Impact Study July-August 1997

The Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC) conducted a study investigating potential impacts of bottom trawls on soft bottom benthos in the eastern Bering Sea. This study was a cooperative investigation with the Western Marine and Coastal Surveys Team of the U.S. Geological Survey (USGS), Menlo Park, California. This is a multi-year project which was initiated in 1996 with a NMFS trawling impacts study that compared macro-invertebrate populations in adjacent heavily fished and unfished areas.

OBJECTIVES

This study addresses new mandates in the Sustainable Fisheries Act of 1996 that require assessments of all activities with potential impact on essential fish habitat, specifically those related to fishing gear.

The primary objective of this survey was to determine if bottom trawls have a measurable effect on soft sea floor habitats and if so, what events define the recovery process. Potential impacts were to be directly studied by comparing biological and geological conditions before and after experimental fishing with a commercial bottom trawl.

Secondary objectives were to:

1. incorporate the USGS TrackPoint system to monitor range and bearing (*i.e.*, position) of the sampling net in real time;
2. conduct sidescan assessments of the sea floor;

3. collect epifauna and infauna samples;
4. collect underwater video to groundtruth sidescan imagery and to assess the benthos and sampling gear efficiency; and
5. assess heavily fished areas near Unimak Pass for potential future trawl impact study sites.

VESSEL AND GEAR

Sampling was conducted aboard the 40.4 m (132.6 ft) chartered commercial fishing vessel F/V *Golden Dawn*.

The standard sampling net used was an 83-112 eastern trawl (Fig. 1). This net had a 25.3 m (83 ft) headrope and a 34.1 m (112 ft) footrope. This net was equipped with a tickler chain, hula skirt, and had a 1.5 inch liner covering both wings and the entire bottom body, as well as complete coverage top and bottom of the intermediate and codend. There was a 30 mesh overlap with a standard 1.25 inch codend liner extending 65 meshes up from the terminus of the codend.

The 83-112 eastern trawl was towed behind 1,000 kg, 1.8 X 2.7 m, steel V-doors and 54.9 m (180.1 ft) paired dandylines. Each lower dandyline had a 0.61 m chain extension connected to the lower wing edge to improve bottom tending characteristics. The 83-112 eastern trawl has been the standard sampling net used during annual eastern Bering Sea surveys since 1982. Modifications described above were used for 1996 trawling impact studies in the eastern Bering Sea.

Seawater temperature profiles were to be collected at all sampling sites using a micro-bathythermograph attached to the headrope of the net. Surface seawater temperatures were also collected with a bucket thermometer.

Net mensuration systems were provided to assess sampling net configuration and performance data to be used in area-swept and catch-per-unit-effort (CPUE) calculations.

ITINERARY

The *Golden Dawn* began the survey in Dutch Harbor, AK on July 28 and ended the study in Dutch Harbor on August 15. An intervening port call was made at Akutan, AK on August 4 to modify the over-

the-side pole mount for the Trackpoint transducer.

SURVEY DESIGN AND METHODS

The study area is adjacent to the northeast corner of the Crab Protection Zone 1 in Bristol Bay (management area 512; approximately lat. 58°N and long. 160°W; Fig. 2). The study area supports a large invertebrate assemblage, based on previous RACE trawl surveys in the area.

Sampling protocol was planned in 3 phases:

1. integrated biological and geological sampling before experimental trawling including sidescan assessments of the sea floor, epifauna trawls and the collection of infauna core samples;
2. experimental trawling which consisted of repetitive trawling of a single predetermined track line using a commercial Bering Sea combination trawl; and
3. integrated biological and geological sampling after the commercial trawling phase.

Auxiliary gear included a Track Point USBL acoustic positioning system interfaced with a vertical reference unit, differentially corrected GPS receiver and USGS custom logging and navigation software. This integrated system was intended to provide accurate information on the location of the bottom trawl while fishing. In addition, net mensuration equipment was provided to monitor the configuration and points of bottom contact of the sampling net. A low light color video camera was attached to the trawl to document interaction of the gear with the sea floor and benthos.

All trawl catches were to be sorted to the lowest possible taxon, weighed, and enumerated. Station data including time, position, trawl performance, distance fished as well as catch information were to be entered onto shipboard computer systems.

RESULTS

This study was contingent upon obtaining real time information on the true location of the commercial fishing gear and the sampling net because of the need to resample specific sites. Unfortunately, the integrated Trackpoint system failed to provide

the necessary information in the field environment. Consequently, the original experimental design was abandoned. Previous to this, a total of 38 infauna samples were collected from one experimental and one control site.

However, the *Golden Dawn* continued to collect a total of 60 (30 pairs) Sutar van Veen grab samples from heavily fished and adjacent unfished areas near the northeast corner of area 512. The grab samples were sieved for benthic infauna which were preserved in 10% buffered formalin and later transferred to a 50% solution of alcohol. These infauna samples will be sorted and processed to the family level at the School of Fisheries and Ocean Sciences, University of Alaska, Fairbanks.

Sidescan and/or video data sets were collected at three general locations: (1) the original experimental and control sites, (2) at the northeast corner of management area 512, and (3) in harder bottomed areas near Unimak Pass. These data are being processed by the USGS.

Also, a significant number of young-of-the-year Pacific cod (*Gadus macrocephalus*) were caught in a test tow near Unimak Pass. Associated fish and invertebrates in the nursery area were described.

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83/112 EASTERN

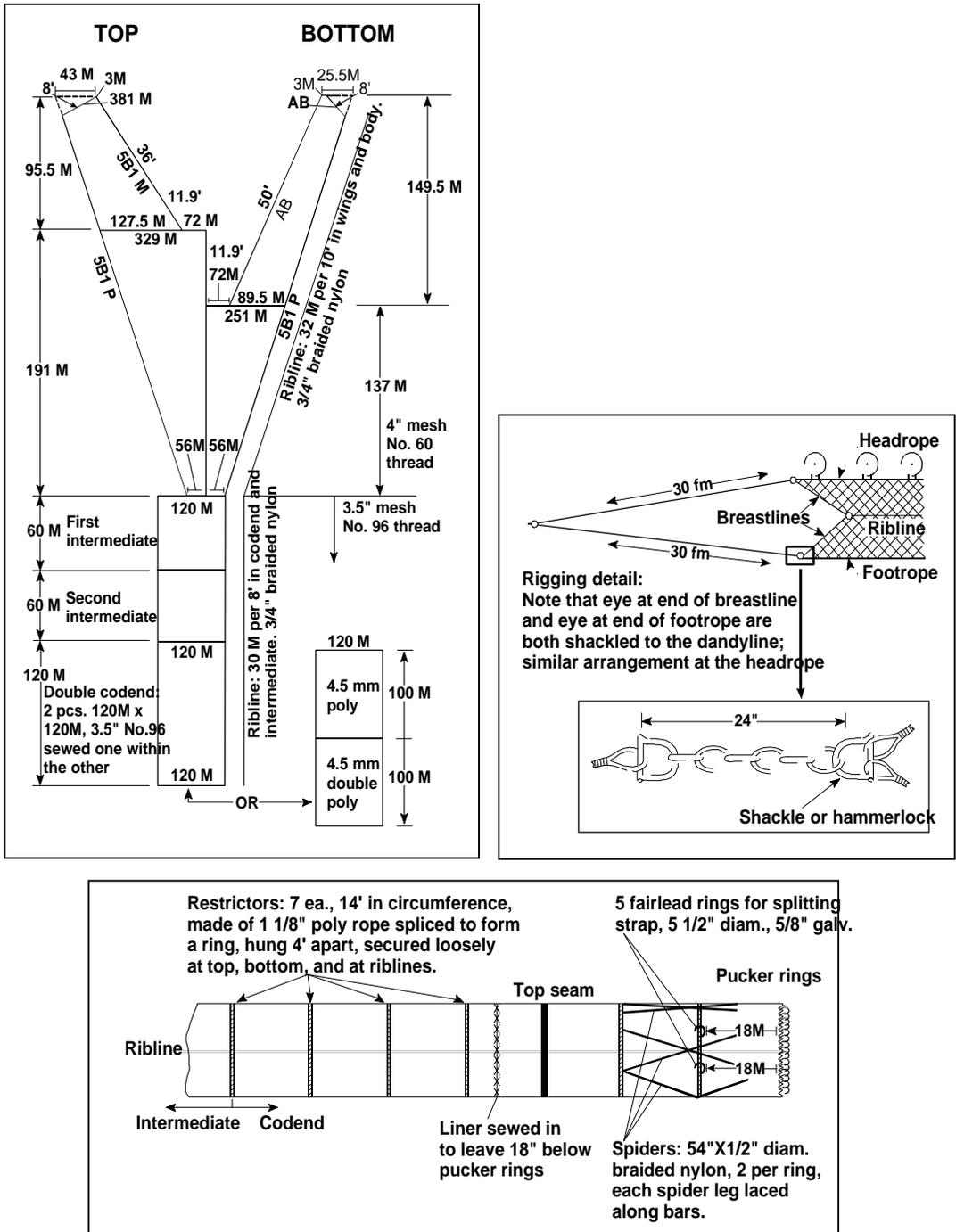


Figure 1. Diagram of the 83-112 eastern bottom trawl used in the 1997 trawling impacts (TRAWLEX) study.

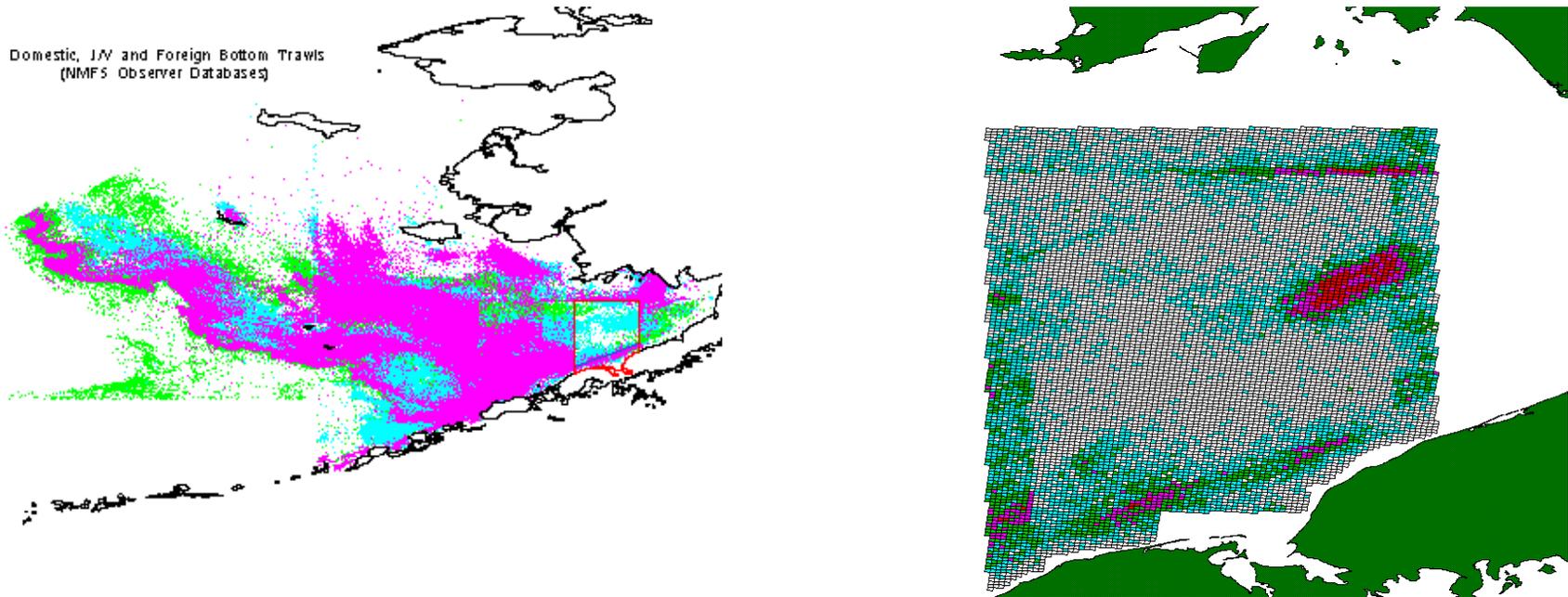


Figure 2. Historical (1973-1996) summary of bottom trawl effort in the eastern Bering Sea. Area 512, where the 1997 trawling impacts study was conducted, is outlined at lower right in the left panel and expanded in the right panel. The left panel displays starting locations for individual trawls by the foreign, joint venture and domestic fleets. The right panel summarizes trawling intensity (*i.e.*, aggregate number of tows) for 1-mi² cells. Note adjacent areas of relatively high (darkest shading) and no (lightest shading) fishing intensity near the northeast corner of Area 512.