



**UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE**

Northwest and Alaska Fisheries Center  
Resource Assessment and Conservation  
Engineering Division  
7600 Sand Point Way Northeast  
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Seattle, Washington 98115-0070

March 23, 1988

**CRUISE RESULTS**

NOAA VESSEL JOHN N. COBB  
CRUISE NO. JC-87-05  
NMFS/WDF GROUND FISH ASSESSMENT/TRAWL DYNAMICS  
SURVEY OF PUGET SOUND WATERS

**CRUISE PERIOD AND AREA**

Between September 28 and November 4, 1987, a groundfish survey of Puget Sound and adjoining U.S. waters and a series of trawl dynamics trials were completed aboard the JOHN N. COBB by personnel of the National Marine Fisheries Service/Northwest and Alaska Fisheries Center (NAFCA)/Resource Assessment and Conservation Engineering (RACE) Division in conjunction with the Department of Fisheries of the State of Washington (WDF). The survey area included all accessible U.S. waters in the Puget Sound Region from Cape Flattery and the Strait of Juan de Fuca to the Strait of Georgia and Case Inlet (Figure 1). The trawl mensuration experiments were conducted at one site in Possession Sound and two sites in Saratoga Passage.

**OBJECTIVES**

The primary objectives of the cruise were:

1. Perform a reconnaissance survey of the trawlable waters of the Puget Sound Region, identifying demersal sampling sites and developing a sampling protocol for future WDF groundfish assessment surveys.
2. Estimate the abundance of starry flounder and English sole in the survey area.
3. Measure the variability in the dimensions of RACE Division survey trawls resulting from changes of depth, warp ratio and current direction.





## GEAR, METHODS AND RESULTS

## Groundfish Survey

The survey area was divided into 24 strata: 6 regions, each with 4 depth intervals (10-20 fm, 21-40 fm, 41-60 fm and >60 fm). A total of 148 trawling stations were allocated proportionally to the area of each stratum. A tow was attempted at each selected location using a 400-mesh Eastern otter trawl with 5 ft X 7 ft doors, 20 fathom bridles and a 1-1/4 inch mesh liner in the codend. If the selected location was not trawlable, nearby areas in the same depth interval were searched for suitable bottom.

In the initial stages of the survey, trawl tows were 30 minutes in duration at a speed of 3 knots. The duration was later reduced to 10 minutes because of difficulty finding enough trawlable bottom to complete the longer tows. Catches for these abbreviated tows were still deemed large enough to be representative.

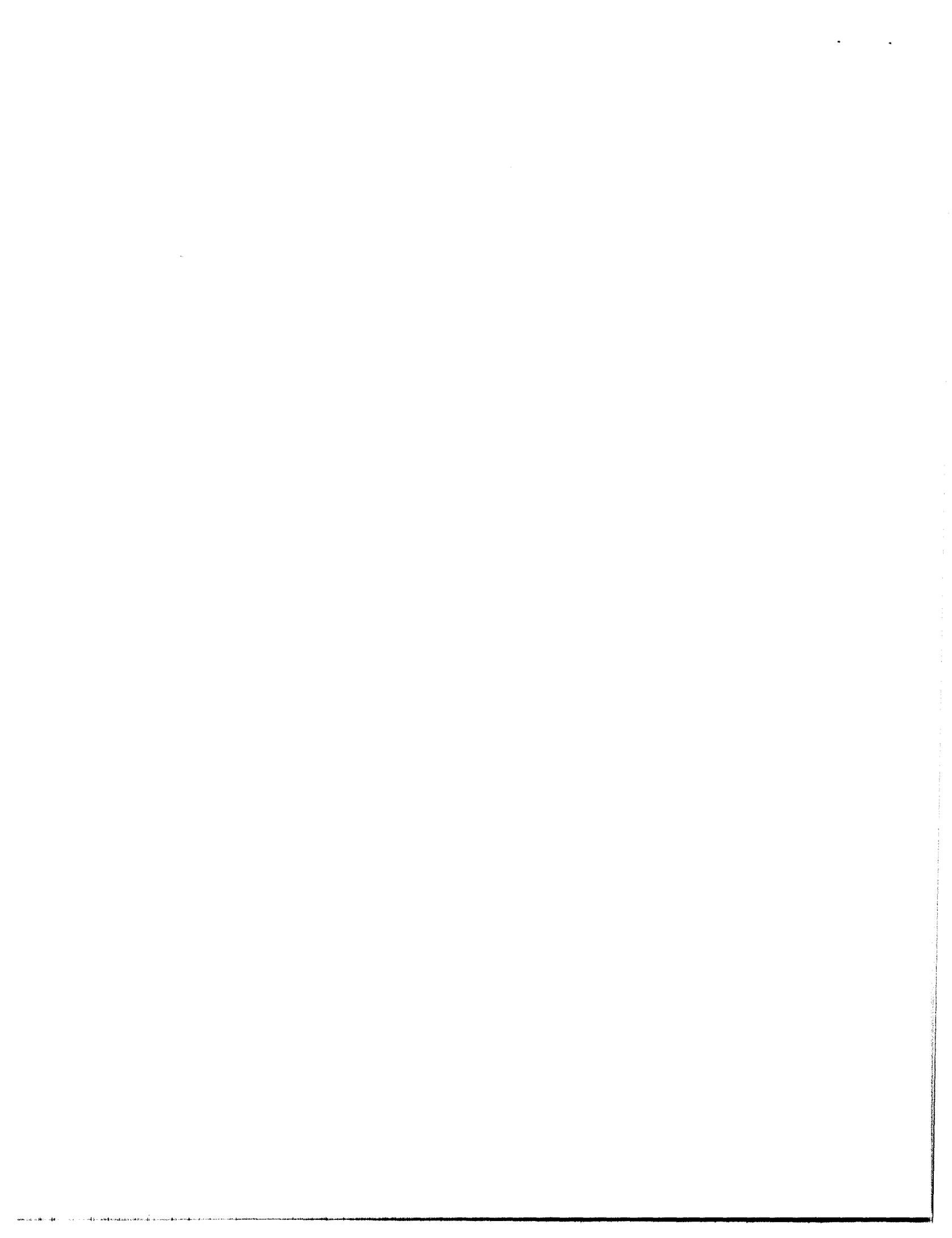
Catches were processed following standard RACE Division sampling procedures for estimating total weight, numbers, average weight and size composition of the observed species. A sample of 25 English sole were randomly selected from each catch for length, weight and age analysis.

Of the 148 designated stations, 96 were successfully sampled (Figure 1). Extensive net damage occurred at six stations and several stations could not be trawled in the Bellingham Bay area because the grounds were occupied by crab pots. The remainder of the stations were sites where no trawlable bottom could be found. All groundfish survey data was turned over to WDF personnel for editing and analysis.

## Trawl Dynamics Study

Information was gathered on the vertical and horizontal openings of several RACE resource assessment trawls. They were fished at three locations in Northern Puget Sound in a range of depths and at various scope ratios (Table 1). These measurements were collected with a net mensuration system which gauges trawl opening dimensions acoustically and sends them to the vessel for recording onto an interfaced microcomputer. Distance between the trawl doors during a tow was estimated by measurement of the amount of spread of the warps behind the towing blocks. Bottom currents at the study sites were recorded by a current meter moored near the towing track. Tow durations were 10 minutes and distances fished were measured with radar triangulation.

Trawl dynamics work was initially done on the weekends because of work schedule limitations for WDF personnel. When the demersal



survey finished a week early, additional trawl dynamics work was planned. Unfortunately, this extra work was cut short on November 4 when the COBB's trawl cable broke, preventing further trawling.

## SCIENTIFIC PERSONNEL

<u>Name</u>	<u>Week Number</u>	<u>Title</u>	<u>Organization</u>
Rob Wolotira	1	Chief Scientist	NWAFRC/RACE
Ken Weinberg	2,3	Field Party Chief	NWAFRC/RACE
Craig Rose	4	Chief Scientist	NWAFRC/RACE
Virginia Bryant	5,6	Field Party Chief	NWAFRC/RACE
Jim Smart	1,2	Gear Specialist	NWAFRC/RACE
Fred Bonde	3,4	Gear Specialist	NWAFRC/RACE
Phil Wyman	weekends,6	Biologist	NWAFRC/RACE
Connie Iten	5,6	Biologist	NWAFRC/RACE
Brady Coleman	weekends	Biologist	NWAFRC/RACE
Steve Quinnell	1,5	Lead Biologist	WDF
Jim Beam	1,2,3,4	Lead Biologist	WDF
Cyreis Schmitt	3	Lead Biologist	WDF
Steve Hulsman	2	Biologist	WDF
Paul Clarke	2	Biologist	WDF
Darcy Wildermuth	3	Biologist	WDF
Sue Hoffmann	3	Biologist	WDF
Bob Loff	4	Biologist	WDF
Wayne Palsson	5	Biologist	WDF
Greg Bargmann	5	Biologist	WDF

WDF - State of Washington Department of Fisheries

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Table 1. Scopes used in trawl dynamics study by site and trawl with number of tows (in parentheses).

Site	Possession Sound 92 - 113 fm			Lower Saratoga 57 - 72 fm			Upper Saratoga 21 - 28 fm		
Trawl									
Poly N'Eastn	250 (2)	275 (4)	350 (2)	150 (2)	160 (4)	250 (2)	55 (1)	75 (8)	110 (1)
Nyln N'Eastn	250 (2)	300 (4)	350 (2)	150 (2)	175 (4)	250 (2)	55 (2)	75 (4)	110 (2)
83/112 Eastn	250 (2)	300 (4)	350 (2)	150 (2)	190 (4)	200 (2)	60 (2)	80 (4)	115 (2)
400 mesh Eastn	250 (2)	300 (4)	350 (2)	150 (2)	190 (4)	200 (2)	60 (2)	75 (4)	110 (2)
Nyln N'Eastn (heavy rollers)	250 (2)	300 (4)	350 (2)						



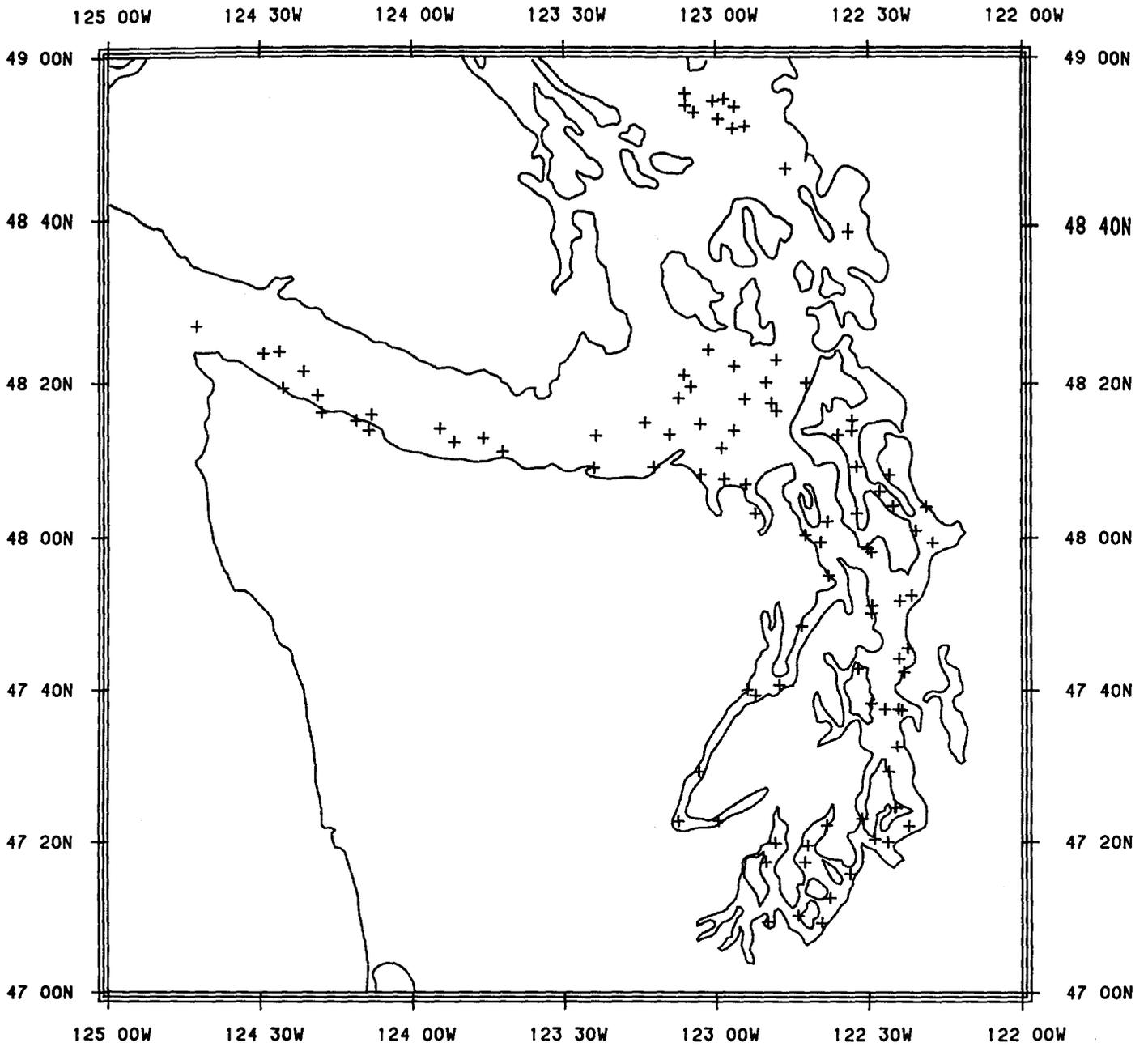


Figure 1.--Sites sampled during Cruise 87-05 of the NOAA vessel JOHN N. COBB (trawl survey-plus signs, gear studies, dots).