

**Cruise Report of the NMFS/Industry Survey Trawl Study
Conducted by the *R/V Albatross IV* and *F/V Sea Breeze*
28 October-6 November, 2002**

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CRUISE RESULTS
NOAA SHIP ALBATROSS IV
AL 02-11 Survey Trawl Study

Cruise Period and Area of Operations

The cruise was conducted during 28 October - 6 November, 2002, primarily within Closed Area I and the waters east of Cape Cod, Massachusetts.

Objectives

The objectives of the experiment were to examine variability in catch rates of the R/V Albatross IV using standard Yankee #36 trawls in two configurations; one configuration that rigidly conformed to standard specifications as described in the document "Specifications for Construction of NEFSC Standard #36 Bottom Trawl", and a second configuration that was known not to meet specifications, including offset trawl warps.

Operational Plan

The operational plan of the cruise specified that sampling take place within 3-5 areas; each area sampled for 48 hours. One randomly chosen gear configuration would be used for 24 hours, then configurations switched and tows made at the same locations the following day, offset by approximately 1 hour to account for tide and light conditions. Stations were chosen using a two stage randomized block design to determine the starting point for each tow (see below). A commercial fishing vessel, the F/V Sea Breeze, using standard industry fishing gear performed paired tows alongside the R/V Albatross IV on as many stations as possible. At each station, the Sea Breeze determined the tow direction.

A constant scope was to be used for all tows within an area. The scope chosen was that used for the deepest likely depth in an area. In order to eliminate using the wire meter on the Albatross, considered a possible source of error, it was agreed that the trawl warps would be paid out to the next set of visible marks after the calculated scope amount. This ensured that there was either no offset or a known offset even if scope was slightly more than 'specified' (3:1 in depths up to 184m and 2.5:1 in depths greater than 184 m). ITI Net Sensors were used on every tow.

Area and Station Selection

Area Selection General sampling areas were provided by the commercial fishing industry. One 'shallow' area approximately 87m in depth, one mid-range area approximately 139m, and one 'deep' area approximately 198m were selected in order to sample as many species as possible (Figure 1). Specific areas were chosen in consultation with the scientific crew on the Albatross and the industry partners on the Sea Breeze based on depth and an effort to avoid hangs or tearups. The areas were 5-minutes by 5-minutes (approximately 25²nm).

Station Selection Each area was subdivided into 25 blocks, each 1-minute by 1-minute. Each block was further subdivided into four quadrants. Sixteen blocks were chosen, the maximum possible number of stations that could be performed during one 24 hour period, using uniformly

distributed random numbers. Stations were then placed in a randomly selected quadrant within each block.

Gear Configurations

Two gear configurations were used during the study. The first configuration (OPT) conformed to the Yankee #36 specifications as described in the document "Specifications for Construction of NEFSC Standard #36 Bottom Trawl":

- Net #21, constructed prior to the experiment and inspected to meet the specifications by industry representatives,
- doors used (Pair #38) were inspected by industry representatives to meet tuned door specifications,
- backstraps used were fitted with swivels (with the appropriate number of links removed to maintain standard specification) to ensure that there were no twists in the chain while the net was fishing, and
- even trawl warps (re-measured and certified the day of sailing).

The second, or "worst case scenario" (WCS), configuration consisted of:

- Net #14, used during the 24-27 October, 2002 'video cruise' (the last 4 days of Leg II of AL 02-09, Autumn Bottom Trawl Survey),
- Pair #37 doors considered to be performing poorly during the 'video cruise',
- backstraps with no swivels and intentionally twisted 2 times, and
- trawl warps offset to match the mis-marked warps used during 2001-2002 surveys.

Commercial vessel gear specifications:

- Standard 6" mesh groundfish net,
- 16" (with 12" at wings) rockhopper footrope with 2 3/8" cookies ,
- 110' sweep,
- 30 fm groundcable used in Area 1, 50 fm groundcable used in Areas 2 and 3, and
- 6 cm mesh codend liner.

The order of gear configurations used in each area was determined by coin toss. Due to the round the clock nature of the cruise, the Sea Breeze conducted a few less tows than the Albatross to allow her crew to rest.

Results

A total of 72 trawl tows were conducted at randomly selected sites within each sampling area for 30 minutes by the R/V Albatross; 61 tows were conducted by the F/V Sea Breeze. After each tow on the Albatross, the catch was sorted by species and weighed (nearest 0.001 kg) using motion compensated digital scales and lengths of all fish were measured. All catch and biological data were recorded using the shipboard automated data entry system. Aboard the Sea Breeze, the catch was also sorted by species and weighed. Individual fish lengths were taken on a subsample of the catch when time allowed. Catch weights were recorded on standard fisheries observer program logsheets and transmitted to the Albatross for data entry and summarization. Catch numbers and individual fish length data were also recorded on fisheries observer program

logsheets and processed at the Woods Hole Laboratory the day after the cruise ended.

The first area sampled was located in the northwest corner of Closed Area I (Figure 1). A total of 20 stations were sampled by the Albatross during the first 48 hours of the experiment. The first 10 were conducted using the WCS configuration, and the second 10 used the OPT configuration. The Sea Breeze performed 17 paired tows.

The second area sampled was located approximately 16 miles east of Nauset Beach, Cape Cod. The Albatross conducted 26 tows, 13 tows with the OPT configuration followed by 13 with the WCS configuration; the Sea Breeze conducted 24 tows.

The third area was located in the northeast corner of Closed Area I. During this portion of the experiment, the Albatross again conducted 13 tows with each configuration. In this area, the OPT configuration was used for the first set of tows followed by the WCS gear.

Summary of Tows Conducted in Each Sampling Area

	Albatross "Optimal"	Sea Breeze	Albatross "WCS"	Sea Breeze
Area 1: NW CAI	10	8	10	9
Area 2: E Cape Cod	13	11	13	13
Area 3: NE CAI	13	11	13	9

Scope and Trawl Warp Offsets Used in Each Sampling Area

	Max. Chart Depth (m)	Average Depth (m)	Scope (m)	Warp offset
Area 1: NW CAI	148	139.4	450	7'8"
Area 2: E Cape Cod	205	198.2	550	10'3"
Area 3: NE CAI	93	87.6	300	5'7"

During the first set of tows in Area 1, door spread readings from the Simrad ITI system appeared variable for the WCS gear. As a result, a series of tows were made using both the WCS and OPT gear where, during the same tow, the trawls were towed for approximately 40 minutes alternating between even warps and offset warps and door spread data collected.. Two tows were made in Area 2 using the WCS and in Area 3 using the OPT gear. This data will be analyzed further by NEFSC and industry representatives. Average door spread and headrope heights for each gear configuration and for the F/V Sea Breeze are provided in the table below:

<i>R/V Albatross IV</i> 'WCS' Config	<i>R/V Albatross IV</i> 'OPT' Config	<i>F/V Sea Breeze</i>
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Area	Depth	Door Spread	Headrope Height	Door Spread	Headrope Height	Door Spread	Headrope Height
<i>Meters</i>							
1	139.4	24.01	- ¹	25.52	- ¹	60.35	4.02
2	198.2	23.80	1.88	25.09	1.43	76.91	4.02
3	87.6	22.95	1.89	24.59	1.40	76.91	4.02
Means		23.59	1.89	25.07	1.42	71.39	4.02
<i>Fathoms</i>							
1	76.1	13.11	- ¹	13.94	- ¹	33 ²	2.2
2	108.2	13.00	1.03	13.70	0.78	42 ³	2.2
3	47.8	12.53	1.03	13.43	0.76	42	2.2
Means		12.88	1.03	13.69	0.77	39	2.2

¹No headrope measurements from R/V Albatross IV in Area 1

²Door Spread 32-34 fm

³Door Spread 40-44 fm

Data Management and Disposition of Data

At the conclusion of the cruise, all data logs from the Sea Breeze were photocopied and provided to the vessel. Digital data (catch in weight and number, length frequency data from primary species, and ITI Sensors) from the Albatross were recorded on CD and provided to the Sea Breeze.

Scientific Personnel

National Marine Fisheries Service, NEFSC, Woods Hole, MA

Frank Almeida	Chief Scientist
John Galbraith	Fishery Biologist
James Hardage	Biological Science Laboratory Technician (Fish)
Patricia Hersey	Computer Specialist
Nancy Lee Peltier	Computer Assistant
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Katherine Sosebee	Research Fishery Biologist
Leah Bowe	Contractor
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Tracey Sutton	Biological Oceanographer
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Phillip Ruhle, Sr.	Commercial Fisherman, Capt. F/V Sea Breeze
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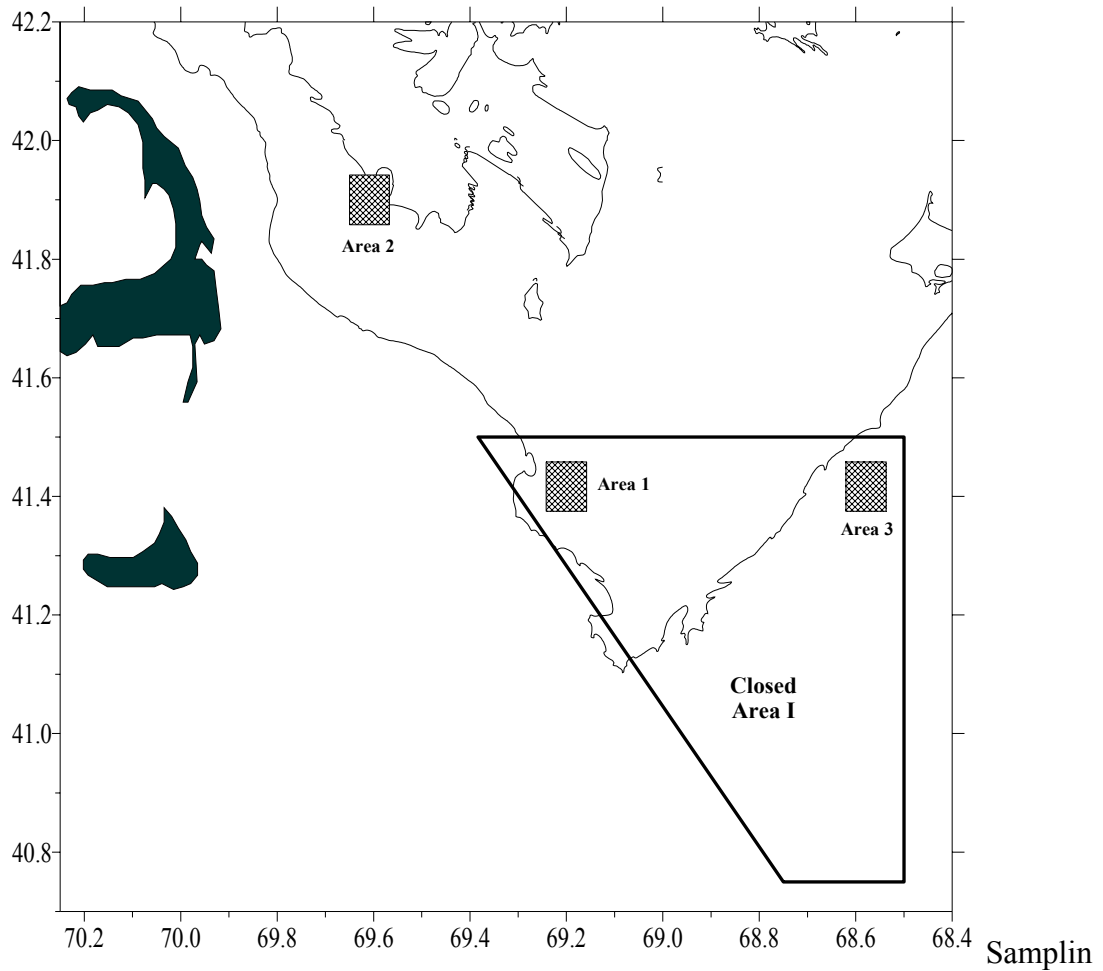


Figure 1. Sampling Areas where paired tows were conducted during Survey Trawl Study (R/V Albatross IV Cruise 02-11).

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