Conducting scientific research projects that support sustainable fisheries, aquaculture, and agriculture

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Research Cruise Summary Report
2025

Project Name:	Tension in the Air: Using a tensiometer to assess dredge fullness and loss during haul back comparing the 5-row and extended-link apron dredge configurations
Vessel Name:	F/V Princess Scarlett
Departure Date:	1/20/2025
Land Date:	1/24/2025
Port:	Fairhaven, MA
Chief Scientist:	Farrell Davis
Scientific Crew:	Ryan Munnelly, Luisa Garcia, Tanner Fernandes
Report Completed by:	Farrell Davis

STUDY AREA

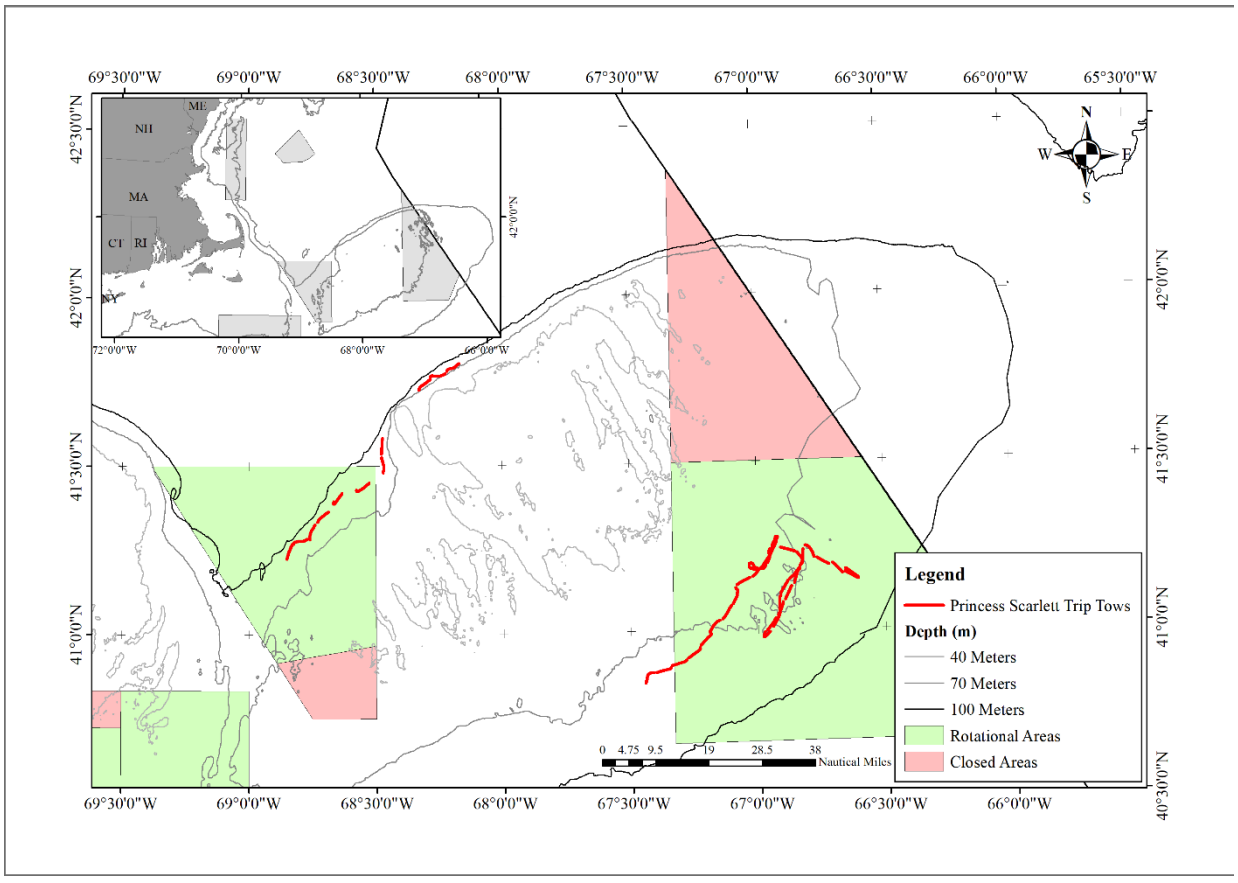

Figure 1: Chart of study area, including rotational management areas, and locations of tows conducted during the trip.

CRUISE OBJECTIVES

Objective 1: Investigate the performance of a five-row apron with a 1.5:1 twine top relative to a seven-row apron with a 2:1 twine top.
Objective 2: Evaluate warp tension (pounds-force) relative to bag configuration, catch weight/composition, and relevant tow and environmental variables e.g. speed and Beaufort number.

This second research trip was dedicated to completing the first objective of comparing a five-row apron with a 1.5:1 twine top to seven-row apron with a 2:1 twine top and collecting additional data for the second objective. Aside from these differences, all other aspects of the dredge bags and head bales were standardized. While this objective is not a primary objective, the decision was made to compare the 1.5:1 twine top to CFF's standardized seasonal survey dredge in order to collect additional data on the performance of this modification relative to a gear configuration commonly used by the fishery.

Two dredges were towed simultaneously for 30 minutes with a tensiometer **(Figure 2)** secured to the warps during each tow to collect tension information in pounds-force (1 lb. f=4.44822 N), and inclinometers secured to the center bale bar to measure pitch and roll for the orientation of the dredge during the tow. These sensors are used to indicate the performance of the dredge. A temperature-depth (TD) logger was affixed to the dredge frame to collect environmental data during the trip.

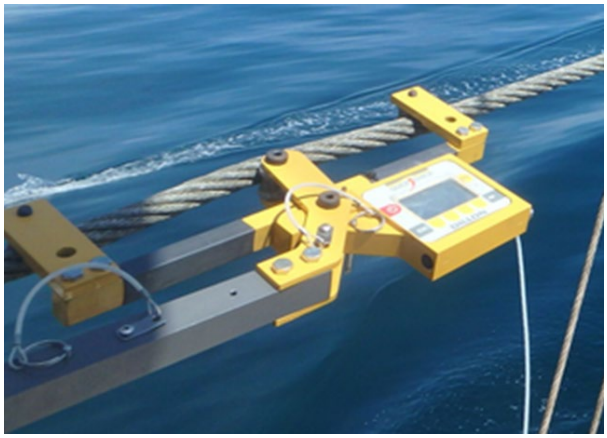

Figure 2: Tensiometer secured to the warp cable of the scallop dredge.

Sea scallop and bycatch information were collected from each side, each tow. For the first research trip, only bushel counts, weights, and shell heights were collected for sea scallops as the shell height/meat weight relationship was not necessary for this part of the analysis. Bycatch was sampled per species category, i.e. "trash" encompassing shell hash, sponges, sand dollars, etc. were accounted for by bushel counts and weights, while commercially significant groundfish or invertebrate species were enumerated, weighed, and measured for assessing length frequencies, and all other finfish and invertebrates were counted and weighed. Species weight over the course of 45 total tows are represented in (**Table 1**).

OBSERVATIONS AND KEY POINTS

Preliminary analysis of the relative catch efficiency of the five-row apron with a 1.5:1 twine top indicates that the modification fished had a similar to higher efficiency than the seven-row apron with a 2:1 twine top (**Figure 3**). Low catches of yellowtail flounder preclude our ability to confidently evaluate and compare the relative efficiency of the gears; however, we

encountered high numbers of windowpane flounder, allowing for an evaluation of the efficacy of the five-row apron with a 1.5:1 twine top for reducing bycatch of this species (**Table 1**).

The analysis indicates that the observed reduction in windowpane flounder bycatch was significant (**Figure 4**).

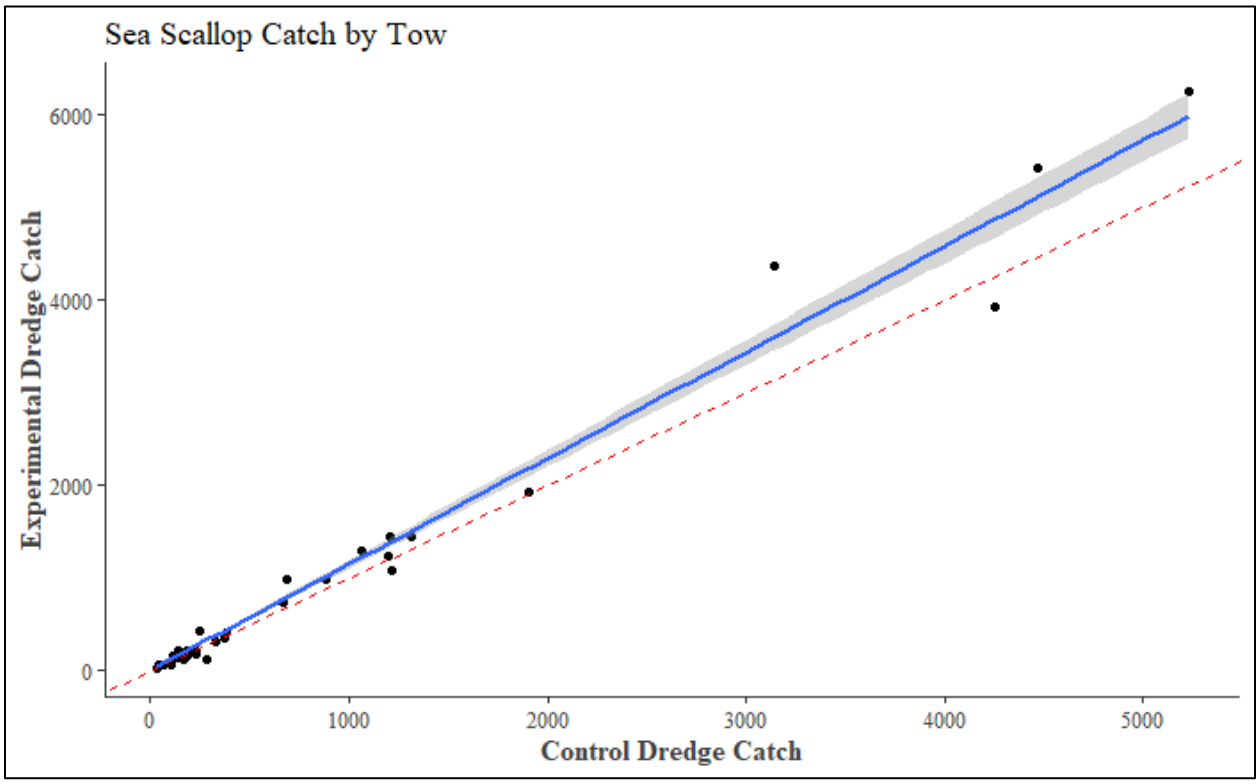

Figure 3: Pooled sea scallop catch efficiency of the five-row apron with a 1.5:1 twine top relative to the seven-row apron with a 2:1 twine top. Sea scallop catch slightly increased with the seven-row configuration.

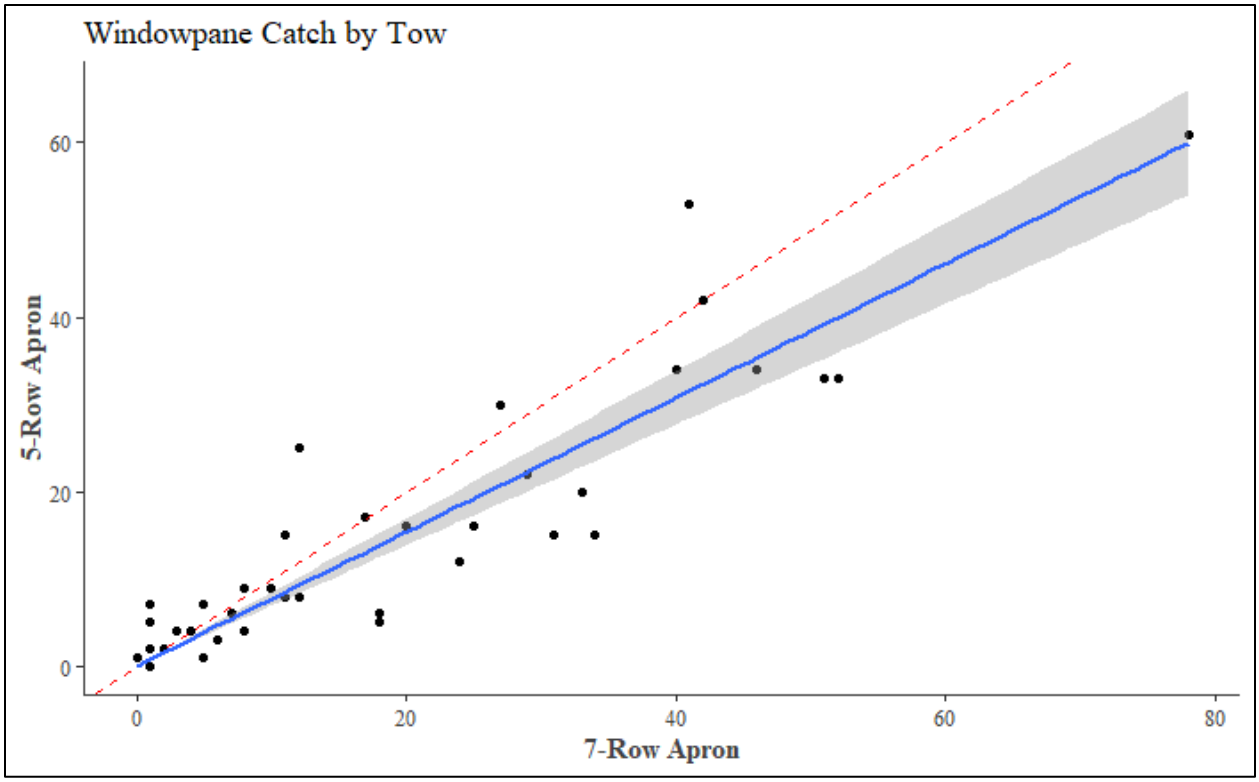

Figure 4: Pooled windowpane flounder bycatch of the five-row apron with a 1.5:1 twine top relative to the seven-row apron with a 2:1 twine top. Windowpane catch was reduced using the seven-row apron with the 2:1 configuration.

RESULTS

- 46 tows completed (The twine top fouled during one tow and was excluded from the analysis)
- Sampling occurred over a three-day period.

The species that comprised the catch on this research trip are listed in **Table 1**.

Table 1: Catch data of species (counts) from the 45 valid tows.

Species	Total Catch Exp (5 Row Apron)	Ctrl (7 Row Apron)	Difference (Exp - Ctrl)	% difference
AMERICAN LOBSTER	16	26	-10	-24%
AMERICAN PLAICE	1	5	-4	-67%
ATLANTIC COD	1	1	0	0%
BARNDOOR SKATE	71	93	-22	-13%
BUTTERFISH	1		1	100%
FOURSPOT FLOUNDER	13	8	5	24%
JONAH CRAB	34	55	-21	-24%
LONGHORN SCULPIN	5	5	0	0%
MONKFISH	23	28	-5	-10%
RED HAKE	7	6	1	8%
ROCK CRAB	14	11	3	12%
SEA RAVEN	2	2	0	0%
SEA SCALLOP (BASKETS)	268.98	253.49	15.49291042	3%
SILVER HAKE		7	-7	-100%
SUMMER FLOUNDER	13	12	1	4%
TRASH	40	53	-13	-14%
UNCLASSIFIED SKATES	4469	6075	-1606	-15%
WINDOWPANE FLOUNDER	603	762	-159	-12%
WINTER FLOUNDER		3	-3	-100%
WITCH FLOUNDER		1	-1	-100%
YELLOWTAIL FLOUNDER	12	16	-4	-14%

ADDITIONAL COMMENTS

Thank you to the captain and crew of the F/V Princess Scarlett!