The Development of a Modified Sea Scallop Dredge

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Project Objective: To provide for a prototype chain mesh “turtle” excluder” that can be tested in future scallop dredge industry trials.

1. Construction of a modified sea scallop dredge that may reduce sea turtle interactions.


Project Summary: Five sea scallop vessels were involved in building and testing the modified dredges; two vessels from New Bedford, Massachusetts (F/V Justice and F/V Venture) and three vessels from Seaford, Virginia (F/V Defiant, F/V Miss Stevie B and F/V Miss Juanita B). The vessels’ power ranged from 520 hp to over 1,000 hp and all towed two 15’ or 14’ scallop dredges depending upon vessel size and horsepower. All fishing operations were conducted in the mid-Atlantic region from November 1, 2002 to January 28, 2003. One of the vessel’s two dredges were modified with the chain mat excluder devices. Due to initial operational difficulties, the modified dredge was not used during the full trip on two of the vessels from Virginia.
**Project Details:**

*Chain Mat Construction.* Dredges were modified by installing 3/8" chain from the top of the cutting bar to the dredge sweep (up-and-downs). The number of up-and-downs depended upon the size of the dredge and the construction of the chain bag; generally 11 were used for 15' dredges and 9 for 14' dredges. For the Virginia vessels, eye-rings were welded to the top of the cutting bar which served as attachment points for the up-and-downs. Six “tickler” chains were installed looped across the mouth of the bag and attached to various points along the sweep chain. Please refer to attached photographs on pages 5-9. Two types of chain were used: Beacon 7 3/8" chain at $3.25/foot and a 3/8" galvanized chain at $4.13/foot; approximately 150-180 feet of chain was used for modification of the dredge. Cost for each dredge modification including links and shackles (no labor) was approximately $500-$600. The chain mats were installed by the crew and supervised by the captain and principal investigators; some cases, dock maintenance did the necessary welding.

On the first trip of the F/V *Justice*, the chain mat was rigged in the conventional New Bedford “rock chain” configuration where all the ticklers looped around so both ends were attached to the dredge frame, not the sweep chain. This resulted in asymmetrical openings in the chain mat. The chain mat rigging was then changed so that a grid of 12" squares were formed by running the ticklers side-to-side and attaching them to the main sweep chain.
**Modified Dredge Performance.** Overall catch data indicated that weather and vessel power were significant variables for low powered vessels. However, for the higher powered vessels (F/V Defiant, F/V Venture and F/V Justice), the dredge modification did not reduce scallop catch. The F/V Venture completed two trips to the Hudson Canyon Closed Area (HCCA) and catches were higher by up to 30% for the modified dredge. The F/V Defiant also experienced increased catches on the order of < 10% for a trip outside the HCCA. At this point in time, we cannot offer an explanation for the difference in performance between the two dredges and the difference between the vessels fishing in different locations.

The lower powered vessels experienced a drop in catch rates of about 10% especially in rough weather. In fact, during one period of rough weather, one vessel had difficulty maintaining towing speed. It is important to note that the captains of the two lower powered vessels did not have very much experience using rock chains; experience will be a factor in the use of dredge modifications with the chain mat. Vessel captains and crews that do not have experience using rock chains will need more specific instructions on the installation of the chain mats. For example, in one instance, the up-and-downs were shortened making them pull on the sweep; this adversely affected catch rates.

Using hardened schedule 70 chain is important in minimizing wear. All the vessel captains felt that the use of chain mat would be helpful in reducing turtle interactions, especially in those cases where the turtle would be caught in the bag of the dredge and brought onboard the vessel.
**Turtle Interactions.** During the gear trials, there were two turtle interactions. In one case, the turtle was captured (in the bag) of the dredge that was not equipped with the chain mat excluder. The turtle was released unharmed. In the other case, the turtle was seen “hanging onto the chain mat when the dredge surfaced..then it swam away.” The captain felt certain that the turtle was have been captured by the dredge if not for the chain mat.

**Conclusions.** We conclude that the concept of using the chain mat as described in this report is a reasonable first approach to minimize the take of sea turtles by scallop dredges. However, as noted, there are still some operational questions to be answered, additional research and testing is recommended for the summer of 2003 in the mid-Atlantic when the chances of encounters with sea turtles are the greatest. This initial effort has been a success and represents a good starting point for future work.
Photograph #3