

New trawl design effective in avoiding cod while targeting flatfish

PORTLAND, ME – In the summer of 2016, a new trawl was tested in the Gulf of Maine that promises to substantially reduce the capture of cod without loss of flatfish and other valuable species close to the seabed.

Called an Ultra-low Opening Trawl, or ULOT, this modified flatfish trawl is designed specifically to allow cod in the trawl mouth an opportunity to escape over the headrope and avoid capture.

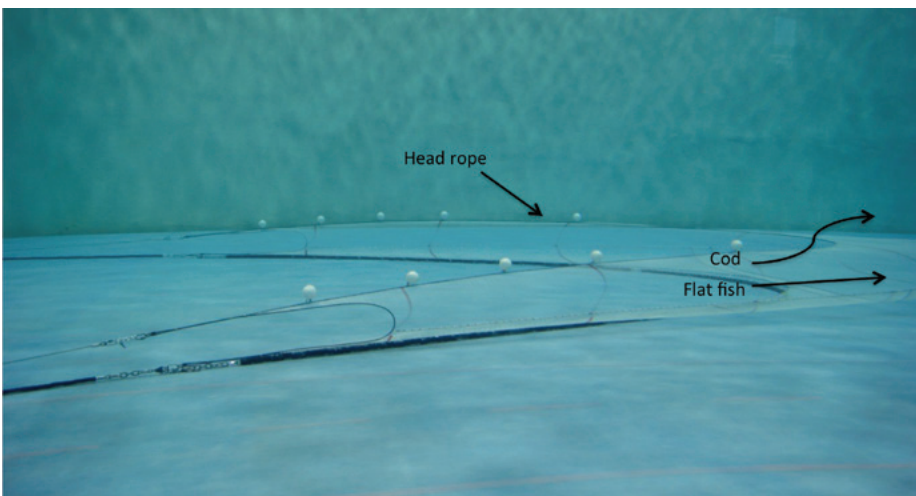
The ULOT has a vertical opening of only 2.5', a reduction of at least 50% compared to most traditional bottom trawls, and the headrope measures 10% longer than the sweep.

Over a period of several weeks this trawl was tested on the fishing vessel Lisa Ann III, owned and operated by Capt. Jim Ford, while fishing adjacent the Whaleback closure in the Gulf of Maine.

The development of the ULOT commenced several months earlier when an assembled team comprising of fishermen, conservation engineers, and a netmaker met to discuss ideas for a new trawl to avoid the capture of cod.

This was clearly a revolutionary approach, given that until recently there was a long history of trawl fishing to target cod in the Gulf of Maine.

Building on many decades of fishing experience, complimented by video observations and studies of cod



Steve Eayrs/GMRI photo

A scale model of the ULOT being tested in the flume tank at the Fisheries and Marine Institute of Memorial University, Newfoundland. Cod are able to swim over the approaching headrope and escape while flatfish enter the trawl.

behavior near the mouth of a trawl, the assembled team considered several prototype cod-avoiding trawl designs over a period of several months.

The ULOT design was ultimately selected by consensus by the team based on perceived simplicity, practicality, and likelihood of immediate adoption by fishermen should it prove successful.

Scale model testing

The ULOT was then modeled using computer software by staff at the Fisheries and Marine Institute of Memorial University, Newfoundland.

This modeling produced three-dimensional images of the trawl under a variety of rigging and operating conditions, such as warp-to-depth ratio, door spread, and towing speed, and useful outputs such as headrope height, trawl drag, and wingend spread for each simulated condition.

The outcomes of this modelling suggested the ULOT was capable of achieving the target vertical opening under a variety of conditions, particularly when spread similarly to a traditional flat fish trawl.

These results were promising and led to the next step in ULOT development, physical testing of a scale model in the flume tank at Memorial University.

A model ULOT was constructed and the assembled team

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SPECIES	STANDARD (KG)	ULOT (KG)
<i>Cod, Atlantic</i>	2830.1	1644.3
<i>American Plaice</i>	2385.9	2327.4
<i>Yellowtail Flounder</i>	1640.1	1671.9
<i>Witch flounder</i>	402.8	403.0
<i>American lobster</i>	370.2	402.8
<i>Skate</i>	357.0	285.4
Total	7986.1	6734.8
Total (all species)	8722.6	7264.7

GMRI graphic

A catch summary of the six most dominant species/species groups during this study.

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traveled to the flume tank for one week to test the trawl over a variety of operating and rigging conditions.

Some of the initial prototype designs were also tested in the flume tank by modifying an existing model trawl, to allow greater consideration of their potential for future development and testing.

These designs included an innovative flexible rope guiding barrier extending across the trawl mouth, and a so-called stealth trawl – with an angled panel of netting extending downward from the center of the headrope to the lower wings of the trawl.

Scale model testing of the ULOT was very successful.

The headline height and drag of this trawl was measured over a range of simulated spread ratios, warp-to-depth ratios, and towing speeds, and trawl geometry and bottom tending capability appeared satisfactory.

Going full scale

The assembled team was sufficiently impressed with these results that full scale testing at sea was the agreed next step in ULOT development.

A full scale ULOT was then constructed by Superior Trawl, based in Rhode Island, and tested on the Lisa Ann III.

Testing took place over several weeks on commercial fishing grounds adjacent the Whaleback closure in the Gulf of Maine.

The performance of the ULOT was compared against a similar sized traditional flat fish trawl – and catch data, trawl geometry, and fuel consumption was recorded from a total of 31 alternating pairs of tows.

The towing direction of each pair of tows was always in the same direction, and tow duration was one hour.

The catch from both trawls was dominated by American plaice, Atlantic cod, yellowtail flounder, witch flounder (grey sole), American lobster, and unclassified skates, and comprised 92% of the total catch by weight.

Catch rates of Atlantic cod were significantly reduced using

the ULOT, by an average of 94 lb hr⁻¹ or 45%, while catch rates of the remaining dominant species were not found to be different, with the exception of small American plaice (<12") which were reduced by 28%.

Trawl spread was 12% greater than the flat fish trawl (steps were successfully taken toward the end of the trials to reduce trawl spread), while fuel consumption was reduced by 7% using the ULOT.

These results were very encouraging and suggest the ULOT is an option for fishermen to avoid cod while effectively utilizing their flatfish quota.

Simplisitically, they suggest the ULOT provides fishermen an opportunity to fish almost twice as long before exhausting

their cod quota and having to purchase additional quota or stop fishing, while simultaneously enjoying a substantial fuel saving.

Arising from the success of the sea trials, three different sizes of ULOTs have now been constructed by Superior Trawl and are available for fishermen to test on their boats free of charge, providing vessel horsepower is between 200–550 hp.

Fishermen can test the ULOT on their own under normal fishing conditions for a period of around two weeks, although the ULOT team

would appreciate feedback about trawl performance.

Already several fishermen have taken advantage of this opportunity with encouraging outcomes.

These trawls are available to test immediately, and any fishermen interested in this opportunity can call Jon Knight, Superior Trawl, at (401) 782-1171; Steve Eayrs, GMRI, at (207) 332-7512; or Mike Pol, MA DMF, at (508) 990-2860 x116. ■



Steve Eayrs/GMRI photo

The Lisa Ann III preparing to head out. Two net drums are fitted on the stern so the ULOT and a traditional trawl can be tested alternatively.

This project is a collaboration with fishermen (Jim Ford – F/V Lisa Ann III, Dan Murphy – F/V Bantry Bay, Tom Testaverde – F/V Midnight Sun, Carl Bouchard - retired); a net maker (Jon Knight – Superior Trawl); and research scientists (Steve Eayrs – GMRI, Mike Pol – MA DMF, Chris Glass – UNH, and Pingguo He – SMAST). Funding for this work was provided by the 2014/15 Saltonstall-Kennedy Funding Opportunity Number NOAA-NMFS-FHQ-2015-2004246. This article provided by Steve Eayrs.