Use of Kites in Shrimp Codends to Reduce Small Shrimps and Bycatch Species from F/V North Star NEC-PH2003-1 in the Gulf of Maine from February to May 2004 (NEC-CoopRes project)

Website: https://www.bco-dmo.org/dataset/3145
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Project
» Northeast Consortium: Cooperative Research (NEC-CoopRes)

Program
» NorthEast Consortium (NEC)

Contributors	Affiliation	Role
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Dataset Description

This project was to test an assumption that codend meshes expended by water-borne kite would allow more small shrimps and finfish to escape from the codend. A full scale kite-assisted shrimp trawl codend was tested in a flume tank to determine kite size, number of kites, their position and installation on the codend. The resulting full scale codend was tested at sea for the pink shrimps in Gulf of Maine shrimp trawl fishery through comparative fishing using the two-vessel parallel tow method. Seventy-seven pairs of tows were completed on two rigging designs. The results did not support the assumption that codends expanded by water-borne kites would reduce finfish and small shrimp catch in the fishery. Catch and bycatch data collected throughout sea trials showed that a significant amount of fin fish bycatch still exists in the fishery even with the use of the Nordmore Grid. This is especially true for whiting for which a large amount of catch was discarded late in the season. This result indicates a need for continued effort in research and development for a better shrimp trawl to minimize bycatch in the pink shrimp fishery.

Final report

Methods & Sampling

Target species "shrimp" Pandalus borealis; other shrimp species caught: Pandalus montagui, Dichelopandalus leptocerus

Kite and codend design. The kites used in the codend cover were 2'6" by 1'3" and 1'3" high trapezoids made of rubberized canvas (He et al., 2005; He, 2007). The kite was restrained by a 16" twine to form an arc shape to ensure expanding in the correct direction.The codend used was the same size as the commercial shrimp codend. Shorter gore rope or lastridge ropes, were installed on the gore of the codend to take the strain of the load in the codend during the second half of the sea trials. Eight kites were used in each codend. The number and the position of the kites were determined by flume tank tests as described below.

Flume tank tests. A full scale codend with the last belly section of the trawl and the Nordmore Grid was shipped to the Newfoundland flume tank for testing in December 2003. Kites were installed onto the codend by the engineer at the flume tank with assistance from the project team members. Industry partners, the scientific collaborator and the principal investigator participated in flume tank tests.

Fully-rigged codend with kites and the Nordmore Grid was shipped back to industry partners for sea trials. Another codend identical to the one tested was constructed by a local gear manufacture for the other vessel.

Sea trials. Sea trials were carried out during the 2004 shrimp season between February and May off the coast of Maine. An exempt fishing permit was obtained from the State of Maine to fish out of the shrimp season during the late part of sea trials. Two vessels were involved constituting parallel tows, comparing catch and bycatch of shrimp codends with and without kites. Vessels owned and operated by industry partners were used for the sea trials. F/V 'Tenacious' based in Phippsburg (ME) and operated by Proctor Wells, and F/V 'North Star' based in Portland (ME) and operated by Vincent Balzano were fishing side by side during sea trials.

The two vessels had a similar shrimp trawl (880 mesh fishing circle) and compatible trawl doors (Bison #7). The bridles between the door and the wingend were 85'. Similar 12' Rockhopper sweeps were used by both vessels. The two vessels performed comparative fishing using the parallel tow method. While one vessel was towing a codend with kites, the other would be towing a regular codend without kites. The codend was switched after fishing for not more than two days. The tow duration was one hour and the towing speed was 2.4 knots.

The sea trials were divided into two sessions, with modification to the gear made at the start of the second session. During comparative fishing between the two vessels, the vessels stayed within 1/4 nautical miles from each other. The codend was switched from 'with kites' to 'no kites' in one vessel, while from 'no kites' to 'with kites' in the other vessel, or vice versa. During the second session of the sea trials, starting from Tow 35, modifications to the codend included shortened gore rope which was 7% shorter than the fully stretched codend length. Six tows were completed with both vessels towing a codend with kites at the same time to examine if there was any difference between the two codends with kites. The 'calibration' tows were carried out at the middle of the sea trial period. An underwater video camera and acoustic measurement devices will be used to monitor the functioning of the shrimp trawl codend with kites. A video camera was installed above the codend in a number of times to monitor the fish/shrimp escaping from the codend (exhibit 4). The NetMind' trawl measuring device was used to monitor trawl geometry.

Data Processing Description

Sampling, measurement and analysis. The total shrimp catch was weighed. A sample of about 1 kg shrimp from each tow from each vessel was sent to the Maine Department of Marine Resources' (DMR) Boothbay Harbor laboratory for further measurement and examination. Catches were divided into four categories during analysis: target species - shrimps, and bycatch species including controlled species, other species, and shellfish (Exhibit 5). All controlled groundfish bycatch was separated and their lengths measured. A sub-sample was measured in cases when large number of bycatch species were retained. Some dominant species in the 'other fish' category were also sampled and measured. All catches were weighed according to species.

Shrimp sizes were evaluated by measuring the carapace length and determining the 'count' which is the number of shrimp per pound. Shrimp samples sent to DMR were measured (for carapace length), and examined (sex, sexual stage, and whether egg bearing). Three species of shrimps were identified in the shrimp samples and their were separately recorded. Paired t-test was used to evaluate differences of shrimp catch, bycatch of controlled and other species, and shrimp size (count) between codends with and without kites.

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Data Files

File
shrimp_Net_With_Kites_Bycatch filename: shrimpNetWithKitesBycatch.tar (Tape Archive (.tar), 4.81 MB) MD5:59340f270a00e184775ac74a04329239 One .tar file containing two zip compressed dataset folders (each containing multiple Excel spreadsheet files) and one metadata README file: shrimpNetWithKitesBycatch_ReadMe, shrimpNetWithKitesBycatch_composite.zip, shrimpNetWithKitesBycatch_kiteStudy.zip

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Parameters

Parameter	Description	Units
link	This is a link to the README file and Excel data files.	text

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Instruments

Dataset-specific Instrument Name	Trawl
Generic Instrument Name	Beam Trawl
Dataset-specific Description	modified shrimp trawl
Generic Instrument Description	A beam trawl consists of a cone-shaped body ending in a bag or codend, which retains the catch. In these trawls the horizontal opening of the net is provided by a beam, made of wood or metal, which is up to 12 m long. The vertical opening is provided by two hoop-like trawl shoes mostly made from steel. No hydrodynamic forces are needed to keep a beam trawl open. The beam trawl is normally towed on outriggers, one trawl on each side. While fishing for flatfish the beam trawl is often equipped with tickler chains to disturb the fish from the seabed. For operations on very rough fishing grounds they can be equipped with chain matrices. Chain matrices are rigged between the beam and the groundrope and prevent boulders/stones from being caught by the trawl. Shrimp beam trawls are not so heavy and have smaller mesh sizes. A bobbin of groundrope with rubber bobbins keeps the shrimp beam trawl in contact with the bottom and gives flatfish the opportunity to escape. Close bottom contact is necessary for successful operation. To avoid bycatch of most juvenile fishes selectivity devices are assembled (sieve nets, sorting grids, escape holes). While targeting flatfish the beam trawls are towed up to seven knots, therefore the gear is very heavy; the largest gears weighs up to 10 ton. The towing speed for shrimp is between 2.5 and 3 knots. (from: http://www.fao.org/fishery/geartype/305/en)

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Deployments

NEC-PH2003-1

Website	https://www.bco-dmo.org/deployment/57990
Platform	F/V North Star
Start Date	2004-02-06
End Date	2004-05-24
Description	shrimp trawling

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Project Information

Northeast Consortium: Cooperative Research (NEC-CoopRes)

Website: http://northeastconsortium.org/

Coverage: Georges Bank, Gulf of Maine

The Northeast Consortium encourages and funds cooperative research and monitoring projects in the Gulf of Maine and Georges Bank that have effective, equal partnerships among fishermen, scientists, educators, and marine resource managers.

The Northeast Consortium seeks to fund projects that will be conducted in a responsible manner. Cooperative research projects are designed to minimize any negative impacts to ecosystems or marine organisms, and be consistent with accepted ethical research practices, including the use of animals and human subjects in research, scrutiny of research protocols by an institutional board of review, etc.

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Program Information

NorthEast Consortium (NEC)

Website: http://northeastconsortium.org/

Coverage: Georges Bank, Gulf of Maine

The Northeast Consortium encourages and funds
cooperative research and monitoring projects in the Gulf of Maine and Georges Bank that have effective, **equal partnerships** among fishermen, scientists, educators, and marine resource managers.

At the 2008 Maine Fisheremen's Forum, the Northeast Consortium organized a session on data collection and availability. Participants included several key organizations in the Gulf of Maine area, sharing what data are out there and how you can find them.

The Northeast Consortium has joined the Gulf of Maine Ocean Data Partnership. The purpose of the GoMODP is to promote and coordinate the sharing, linking, electronic dissemination, and use of data on the Gulf of Maine region.

The Northeast Consortium was created in 1999 to encourage and fund effective, equal partnerships among commercial fishermen, scientists, and other stakeholders to engage in cooperative research and monitoring projects in the Gulf of Maine and Georges Bank. The Northeast Consortium consists of four research institutions (University of New Hampshire, University of Maine, Massachusetts Institute of Technology, and Woods Hole Oceanographic Institution), which are working together to foster this initiative.

The Northeast Consortium administers nearly $5M annually from the National Oceanic and Atmospheric Administration for cooperative research on a broad range of topics including gear selectivity, fish habitat, stock assessments, and socioeconomics. The funding is appropriated to the National Marine Fisheries Service and administered by the University of New Hampshire on behalf of the Northeast Consortium. Funds are distributed through an annual open competition, which is announced via a Request for Proposals (RFP). All projects must involve partnership between commercial fishermen and scientists.

The Northeast Consortium seeks to fund projects that will be conducted in a responsible manner. Cooperative research projects should be designed to minimize any negative impacts to ecosystems or marine organisms, and be consistent with accepted ethical research practices, including the use of animals and human subjects in research, scrutiny of research protocols by an institutional board of review, etc.

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Funding

Funding Source	Award
National Oceanic and Atmospheric Administration (NOAA)	unknown NEC-CoopRes NOAA

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