# Groundfish Trawl Nets Designed to Reduce the Bycatch of Cod: catch data from Fishing Vessels NEC-MP2000-2 in the Gulf of Maine from 2000-2002 (NEC-CoopRes project)

**Website**: https://www.bco-dmo.org/dataset/3449
**Version**: 20110330
**Version Date**: 2011-03-30

**Project**
» Northeast Consortium: Cooperative Research (NEC-CoopRes)

**Program**
» NorthEast Consortium (NEC)



| Contributors | Affiliation | Role |
|---|---|---|
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## Dataset Description

Testing of two experimental trawl nets established that catch rates of Atlantic cod Gadus morhua could be reduced from standard practices while allowing the targeting of flatfish Pleuronectidae. The Ribas and topless nets both modify the top half of a trawl net; the Ribas net by using large square mesh; the topless net by removing much of the twine in the top of the net. Seventy pairs of alternate tows showed reductions of cod catch rates (kg/hr) that exceeded 76% for both nets. Catch rates of sublegal (<33 cm TL) yellowtail flounder Limanda ferruginea were more than 74% lower for both nets, compared to standard flatfish trawl. Reductions of sublegal (<33 cm) catch rates for winter flounder Pseudopleuronectes americanus exceeded 61%. Significant reductions occurred in legal catch for yellowtail (>32%) and winter flounders (>44%) with some evidence that this reduction was lower for the topless trawl. Underwater video showed cod exiting the nets through the top mesh and through the gap made by the removal of twine.
(from abstract, final report)

### Methods & Sampling

The two experimental net designs were tested against a standard design using the paired tow method (Wileman et al. 1996; DeAlteris et al. 1999). Under this protocol, tows were repeated as similarly as possible in pairs, with one tow using an experimental net and the other a standard net. When possible, tow position, tow duration, and tides were duplicated, with one leg of the pair immediately following the other leg.

To allow simultaneous testing on two vessels, two standard nets were constructed of 15.2 cm 3 mm diamond polyethylene (PE) mesh throughout, with 50 mesh diameter 16.5-cm square knotless mesh in the codend, 20 meshes wide on the top and bottom. The headrope and footrope lengths were 12.2 and 18.3 meters (Figure 1). The fishing circle in the standard nets was 140 meshes. The Ribas (Figure 2) and topless (Figure 3)

experimental nets were also constructed of 15.2-cm PE mesh with 75 mesh diameter 16.5-cm square mesh in the codend, 25 meshes wide on the top and bottom. The Ribas net replaced 15.2-cm diamond mesh on the top middle of the net with 25 meshes wide of 20.3-cm square mesh from the headrope to the codend. This design had a headrope and footrope length of 18.3 m. The two experimental nets had fishing circles with 100 meshes. All three codends had chaffing gear on the bottom half, consisting of unbraided strands of PE twine.

The topless net has no top wings, allowing the headrope to follow a taper of the net's gore into the top belly, reaching a length of 27.1 m. The bottom half of this net and the Ribas net are identical. Two sweeps were used during this study; a sweep with 15.2 cm cookies and a sweep with 10.2 cm cookies was used to increase flatfish catch rates.

Catch sampling was conducted by trained observers following protocols established by NMFS and modified by DMF for this study. For each tow, position, time, duration, weather conditions, catch composition and weights of all species, and length frequencies of target species were recorded. In cases of large volumes, subsampling of catch and extrapolation were performed using standard DMF protocols.

Underwater video of cod and flatfish behavior was acquired with a third-wire pan-and-tilt system developed by DMF. The camera was mounted on the headrope of the experimental nets. This system allows for viewing of the net while it is being towed. The pan-and-tilt unit has a 360-degree range of motion, allowing an ondeck operator to point the camera in a useful direction. Performance of the modified gear was viewed by the operator during filming and again later by DMF personnel at least once. Cod and flatfish reactions were logged and classified into two basic categories: fish that escaped and fish that are caught in the net. Flatfish species could not be distinguished due to inadequate video resolution and were grouped together.

### Data Processing Description

Catch rates were compared for cod (kept and discard combined), yellowtail flounder Limanda ferruginea (legal and sublegal separately), and winter flounder Pleuronectes americanus (legal and sublegal). Due to non-normal distributions of data, transformations of the logarithm of the rate plus 1 were performed. Transformed rates were then tested first with paired t-tests, and then with ANOVA modified for unequal sample size, with net and boat as factors (Sokal and Rohlf 1995). Tukey's b method was next used to find significant differences in means, if any.

Lengths of cod and commercially valuable flatfish were collected to the extent practicable; often all individuals caught were measured. These lengths were combined across all tows. When subsamples were measured or when kept and discarded fish were measured separately, the total estimated number of individuals (N) at each length was extrapolated from the proportion of the subsample to the total catch. These lengths were compared between experimental and controlled tests using the Kolmogorov-Smirnov tests, adjusted for sample sizes following DeAlteris et al. (1999) (Sprent 1989). Standard fishing practices were followed as much as possible. Fishing locations were selected to optimize catches of cod and flatfish.

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## Data Files

| File |
| --- |
| **cod_redux_catch.csv** (Comma Separated Values (.csv), 383.36 KB)<br>MD5:f23ebc38a54f27fc96c5b3b7499111e2<br>Primary data file for dataset ID 3449 |

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| catch | adjusted catch per hour | kg/hour |
| depth | depth at start of tow from echosounder | fathoms |
| gear_type | type of gear used; see final report for description | text |
| haul | haul number | integer |
| lat_begin | latitude at start of haul; North is positive | decimal degrees |
| lat_end | latitude at end of haul; North is positive | decimal degrees |
| lon_begin | longitude at start of haul; East is positive | decimal degrees |
| lon_end | longitude at end of haul; East is positive | decimal degrees |
| name_common | common name of fish | text |
| species | taxonomic name of this | text |
| tow_duration | duration of tow | hours |
| valid_tow_flag | true=good tow; false=not good tow | text |
| weight_lb | catch weight round weight in pounds | lb |
| day_local | day of month in local time | 1 to 31 |
| month_local | month in local time | 1 to 12 |
| year | year of sampling | YYYY |
| yrday_local | local day and decimal time as 326.5 for the 326th day of the year or November 22 at 1200 hours (noon) | 1 to 365 |
| time_begin_local | time at start of haul | HHmm |

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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | Beam Trawl |
| **Generic Instrument Name** | Beam Trawl |
| **Dataset-specific Description** | Tested two experimental trawl nets, Ribas net and topless net. |
| **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-MP2000-2**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57989 |
| **Platform** | Fishing Vessels |
| **Report** | http://northeastconsortium.org/ProjectFileDownload.pm?report_id=92&table=project_report |
| **Start Date** | 2000-12-19 |
| **End Date** | 2002-05-29 |
| **Description** | multiple vessels<br><br>**Methods & Sampling**<br>multiple vessels |

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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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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 |
|---|---|
| NorthEast Consortium (NEC) | unknown NEC-CoopRes NEC |

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