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Report on the 2001

## **Industrial Workshop on Selectivity and Conservation during Trawling**



*Submitted to:*



The Northeast Consortium  
142 Morse Hall  
University of New Hampshire  
Durham, NH 03824

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# **Industrial Workshop on Selectivity and Conservation during Trawling**

by

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# **Report on the 2001 Industrial Workshop on Selectivity and Conservation during Trawling**

***Summary.*** A group of eight fishermen from two New Hampshire fishermen's cooperatives took part in a five-day custom-designed trawl gear workshop at the Center for Sustainable Aquatic Resources of Memorial University of Newfoundland between December 11 and 16, 2001. The workshop centered around the world's largest fisheries flume tank where various trawl gears and components were demonstrated and examined. Demonstrations focused on gear performances and conservation aspects, such as selectivity grids and seabed-friendly trawls. The workshop enhanced participants' knowledge of trawl gear and stimulated their interests in engaging in cooperative research in conservation-oriented fishing gears in the Gulf of Maine. The workshop was well received by the participants and has resulted in cooperative project proposals for the 2002 Northeast Consortium grant competition.

## **1. INTRODUCTION**

The Northeast Consortium (NEC) cooperative research and right whale research grants provide excellent opportunities for industry and scientist cooperation. However, many industry participants were not able to take this unique opportunity in the past two rounds of competition due to a lack of current knowledge and awareness of conservation technologies and how their ideas may be transformed into a cooperative project. As well, they are less aware of technologies available for testing innovative ideas and designs. Many proposals were also not funded due to a lack of industry/science partnership - an important criterion for the Northeast Consortium. To bridge gaps in knowledge and to foster cooperative research in Gulf of Maine, an industry workshop on trawl gear was proposed and subsequently supported by the Northeast Consortium. The workshop was to provide fishermen an opportunity to visualize their gears in a flume tank setting, and to introduce new gear designs and bycatch reduction devices which may be adopted or modified for testing in New England waters. The workshop was also to stimulate fishermen to use their creative minds and rich fishing experience to conceptualize innovative designs and devices for testing in our local fishery and to provide a forum for communication between fishermen and scientists.

Using flume tanks for industry workshops has been proven successful. The Newfoundland flume

tank has been used for similar workshops for fishermen from Alaska, British Columbia, New Brunswick, Nova Scotia and Newfoundland. A brief introduction of the tank and a short list of industry workshops took place in the tank in last a few years is attached in Appendix I.

The objectives of the proposed project were:

- ◆ To increase knowledge and awareness of conservation-oriented gear designs and operations among the fishing industry participants;
- ◆ To provide a forum where innovation ideas of conservation technology and management practices are communicated;
- ◆ To improve communication and to establish partnership between fishermen and scientists; and
- ◆ To stimulate ideas for the upcoming cooperative research and right whale research grant competition of the Northeast Consortium.

The workshop was jointly organized by the Center for Sustainable Aquatic Resources (CSAR) of Fisheries and Marine Institute (MI) of Memorial University of Newfoundland (MUN) and Cooperative Extension of University of New Hampshire (UNHCE), with support from two local fishermen's cooperatives in New Hampshire. Roy Gibbons of CSAR facilitated flume tank demonstrations. Pingguo He of UNH organized the workshop with supports from Rollie Barnaby (UNHCE) and Becky Claus (NEC). Evaluation of the workshop from the participants is attached in Appendix II.

## **2. WORKSHOP PROCEEDINGS**

The workshop was centered around the world's largest fisheries flume tank within the Center for Sustainable Aquatic Resources. The workshop was dominated by flume tank demonstrations of various trawl gears. The primary focus was on selectivity and conservation characteristics of the gear and how changes in gear rigging might affect gear performance. The workshop was supplemented with site visits to local gear manufacturers, research and develop centers for aquaculture, vessel tests, as well as fishing communities.

## 2.1 Workshop schedule

The workshop schedules were made flexible enough so that participants would have opportunity to spend longer time on topics or demonstrations of their particular interests. The following is the actual schedule for the workshop week.

- Dec. 10 Arriving Newfoundland
- Dec. 11 Introduction to workshop, the flume tank and the Marine Institute - Glenn Blackwood
  - Trawl Demonstration - Roy Gibbons
  - Site visit: Bridge Simulator at the Marine Institute
  - Trawl Demonstration - Roy Gibbons
- Dec. 12 Lecture/Discussion: Fish behavior in relation to fishing gears - Pingguo He
  - Lecture/Demonstration: Trawl doors - Carl Harris/Roy Gibbons
  - Visit: Ocean Science Center - Aquaculture facility
  - Site visit: Institute of Marine Dynamics - Ship testing facility
  - Site visit: Northstar Technical Inc. - Trawl monitoring system
- Dec. 13 Guest Speaker: Marine mammal and fishing gear - Jon Lien
  - Trawl demonstration - Roy Gibbons
  - Demonstration: Pressure resistance of trawl floats - George Legge
  - Lecture/discussion: Newfoundland fishery in last 20 years - Noel Milley
  - Lecture/discussion: Tuna and swordfish - Scot Grant
  - Trawl demonstration - Roy Gibbons
- Dec. 14 Trawl demonstration - Roy Gibbons
  - Discussion - Cooperative Research in the Gulf of Maine
  - Workshop Evaluation
  - Site visit: IMP - Fishing gear supplier
  - Site visit: Icedan Canada - Fishing gear supplier
- Dec. 15 Site visit: Bay Bulls cod grow-out facility
  - Site visit: Petty Harbor: Fishermen's Coop
  - Site visit: Marine Institute Research Vessel and Prowers Rock Boat Basin
- Dec. 16 Departing Newfoundland

## 2.2 Flume tank trawl demonstrations

Flume tank demonstrations involved more than ten scaled model trawls, many of which were installed with selectivity devices or designs. The following is a list of model trawls demonstrated in the tank:

- ◆ 170' Rockhopper 3-bridle trawl
- ◆ 1500 mesh shrimp trawl with Nordmore Grid
- ◆ IMP (DFO) 920 shrimp trawl with collection bags and grid
- ◆ UNH Icelandic box trawl with cod/flatfish separation grid
- ◆ Cut-away headline trawl for reducing cod bycatch
- ◆ Safari trawl with selectivity device
- ◆ Shuman hake trawl
- ◆ FPI skjoevoy shrimp trawl with seabed friendly foot gear
- ◆ DFO twin trawl rig for codend selectivity studies
- ◆ 96' Engel trawl



Roy Gibbons (left) and Peter Kendall “playing” a scaled trawl door.



Examining a scaled shrimp size sorting grid. Left to right: James Bowles, Craig Mavrikis, Peter Kendall, Peter Philips, and Roy Gibbons.

The flume tank demonstrations were facilitated by Roy Gibbons of CSAR with assistance from his colleagues Harold DeLouche, George Legge, and Chris Keats. Capt. Gibbons has tremendous experiences in trawl fishing in the Northwest Atlantic. His practical experiences, together with his instructional techniques, were very well received by the participating fishermen.

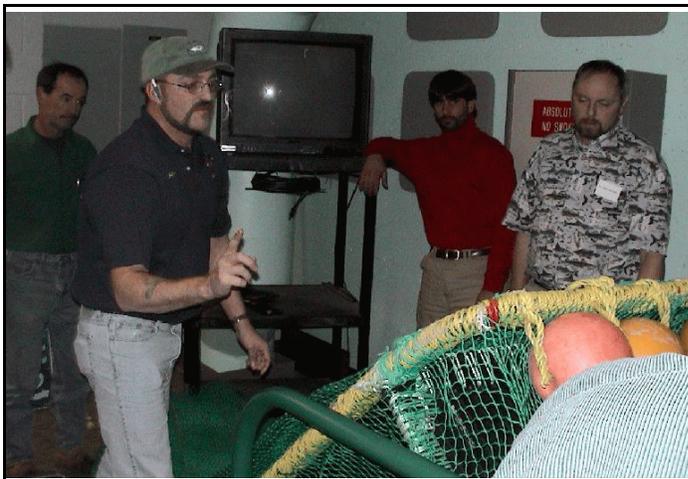
In addition to examining shape of each trawl and their selectivity devices at towing conditions, following parameters or

conditions were demonstrated and/or measured:

- ◆ Measurement of headline height, wingend spread and door spread in relation to towing speed
- ◆ Measurement of drag in relation to towing speed
- ◆ Evaluate the change of bridle length on headline height
- ◆ Evaluate the effect of floatation
- ◆ Demonstration of a situation when two warps are not the same length
- ◆ Examine the effect of set backs
- ◆ Examine trawl door performance in relation to towing speed, door leg rigging and warp length



Joe Jurek examining scaled trawl doors on display.



Jerry Rowe (left front) suddenly having an idea about the shrimp size sorting grid while David Goethel (right), Craig Mavrikis (second right) and George Littlefield looking on.

Also demonstrated in the tank sessions were a scaled shrimp size selectivity grid, and pressure resistance of trawl floats in a pressure tank. A collection of different styles of model scale trawl doors were shown to the participants with selected styles tested in the tank. A full scale shrimp size selection grid was also examined in detail by the participant.

### 2.3 Lectures and discussions

A few lectures were arranged to intermingle with trawl demonstrations. The purpose of the lecture and discussion sessions were to cover conservation aspects of fishing operations which could not

be demonstrated in the tank. As well, a lecture on the Newfoundland fishery was arranged to give participants some background the differences and similarities of fisheries in Newfoundland and Gulf of Maine.

Guest speaker Jon Lien gave a lecture on marine mammals and fisheries. Dr. Lien is an Honorary Research Professor of the Memorial University of Newfoundland. His work on preventing and freeing whale and other marine mammal from entanglement in fishing gears made him a prominent figure in fishing industry and scientific community. He is currently a member of Canadian Fisheries Minister's Advisory Council on Oceans. "He had a complete understanding of social impact (of further restriction of fishing)", as one of the participants commented.



Dr. Jon Lien, a well-respected expert on interaction between marine mammals and fishing gears.

Pingguo He of UNH gave a lecture on fish behavior in relation to trawls. He explained the importance of understanding fish behavior during fishing operations. He illustrated how fish behavioral knowledge may be utilized in developing conservation-oriented fishing gears and fishing operations. A copy of his overhead slides was included in the participants' handbook which is attached as Appendix III.



Becky Claus (right) trying to learn how trawl door works from David Goethel.

Carl Harris and Roy Gibbons gave a lecture and demonstration session on trawl doors. Harris is a hydrodynamic engineer. He presented theory on trawl doors with lift and drag characteristics of various doors. He illustrated various designs of trawl doors and their performance. Gibbons is a fishing gear instructor who holds offshore fishing vessel skippers' license (Fishing Master Class I - the highest in fishing industry). Capt. Gibbons illustrated trawl door rigs and their

practical adjustments. Materials covered by Harris and Gibbons were included in the participants' handbook which is attached as Appendix II.

Noel Milley gave a presentation on Newfoundland fisheries in the past twenty years. Milley is a commercial fisherman employ by the Memorial University during winter months. He illustrated with graphs and data how fisheries in Newfoundland have been changed in last twenty years from primary groundfish fisheries to primary shellfish fisheries. His talk materials were included in the participants' handbook which is attached as Appendix III.

Glenn Blackwood, director of CSAR introduced the flume tank and CSAR, and works carried out by the unit. In addition, a short presentation was made by Scott Grant on tuna and swordfish.

## 2.4 Site Visits

Site visits of relevant facilities and fishing communities were an integral part of the workshop. Site visits supplement the tank demonstration and lectures to give a more broad scope of fisheries and fishing industry in Newfoundland. Site visits can be broadly divided into three types: research and development facilities, Fishing gear manufactures, fishing vessels and fishing communities.

### 2.4.1 R & D Facilities

Memorial University houses a world class full motion bridge simulator. In less than an hour the group was in the simulator, we were onboard a tanker and were taken virtually to the outside of St. John's Harbor. The participants were very impressed by the near real feelings of being onboard a vessel heading through the Narrows of St. John's Harbor with changing weather and sea conditions such as fog and icebergs.

The Ocean Science Center (OSC) is located in Logy Bay about 15 minutes away from the flume tank. OSC houses a research development facility for aquaculture. The group went through different components of the aquaculture facility including algae grow-out tanks, larval and juvenile tanks of commercial species, and brood stocks of cod and halibut.



Dr. Joe Brown of OSC (left) with Rollie Barnaby discussing aquiculture issues.

Institute of Marine Dynamics (IMD) is a facility of Canada's National Research Council. IMD possesses a 200 m long towing tank, an ice tank and a wave tank. IMD's industrial arm performs contractual tests on vessel, offshore structure, and propulsion systems for various clients ranging from shipbuilders, offshore oil developers to private yacht owners.



Exhibit 88. At an IMP gear store. Left to right: Jerry Rowe, George Littlefield and David Champion (IMP).

#### 2.4.2 Gear Manufacturers

Northstar Technical Inc. manufactures NetMind trawl monitoring system. The system comprises a deck unit, a hydrophone and a series of trawl-mounted sensors. The system provides fishing operators real-time information on gear geometry and catch accumulation.

IMP at St. John's is a full service manufacturing and retailing facility. The group visited a manufacturing shop with demonstration of trawl wire press for wire termination. A tour of the facility revealed the range of service including safety equipment, commercial gear components and marine protective clothing.

Icedan Canada is a trawl manufacturing and retailing facility. The group visited their rigging room and examined a specially rigged codend. The facility also manufactures selectivity grids for groundfish and shrimp trawls.



Charlie O'Driscio, Operator of the Bay Bulls cod grow-out site, saying goodbye to the group after visiting his cod cage.

#### 2.4.3 Fishing Communities

Bay Bulls is a site with cod grow-out cages. This was a pioneering site for cod grow-out which started in later 1980s. Mr. Charlie O'Driscio took the group to his cage in early morning. He has been in cod grow-out business for more than 14 years.

Petty Harbor Fishermen's Coop is one of two operating fishermen's coops in Newfoundland. Mr.



Tom Best (left) and Rollie Barnaby discussing Petty Harbor Coop.

Tom Best introduced the coop to the group with a video showing recent projects in cod holding and grow-out as well as sentinel fishery using cod traps.

Prowers Rock Boat Basin at the mouth of St. John's Harbor tied up a large number of trawlers and gillnetters between 45' and 65'. The group enjoyed the opportunity to examine various vessels and their outfits in a chilly and windy Newfoundland morning.

### **3. PARTICIPANTS**

Eight fishermen who participated the workshop were recommended by Portsmouth Fishermen's Coop and Yankee Fishermen's Coop in New Hampshire. They were primarily from New Hampshire with two from Maine and Massachusetts. The name and home port of the participants are as follows:

- James Bowles, Portsmouth, NH
- David Goethel, Hampton Harbor, NH
- Joseph Jurek, Seabrook, NH
- Peter Kendall, Portsmouth, NH
- George Littlefield, Seabrook, NH
- Craig Mavrikis, Portsmouth, NH
- Peter Philips, Portsmouth, NH
- Jerry Rowe, Seabrook, NH

In addition, three UNH staff attended the workshop:

- Rollie Barnaby, Cooperative Extension, 113 Northwood, Brentwood, NH 03833
- Becky Claus, The Northeast Consortium, 142 Morse Hall, Durham, NH 03824
- Pingguo He, Cooperative Extension, 137 Morse Hall, Durham, NH 03824

### **4. FEEDBACKS FROM PARTICIPANTS**

Each fisherman was given an opportunity to evaluate in writing the contents and organizations toward the end of the workshop, in addition to verbal comments during the workshop. The comments are generally very positive both in terms of content and organization. Participants praised very highly CSAR facilitator (Roy Gibbons) regarding his practical experience and easy-to-approach personality.

One of the suggestions from the participants is that more model trawls of local fishing gears are required so that they can deal with their own gear directly. Unfortunately, scaled models of specific gears are quite expensive to manufacture. It is hoped that with more involvement of flume tank tests from different groups of researchers in Gulf of Maine will result in more scaled models available for workshop demonstration in future.

## **5. ACKNOWLEDGMENT**

The workshop was financially supported by the Northeast Consortium. The author would like to thank staff at CSAR of Memorial University for their cooperation, two NH fishermen's cooperatives for their logistic support and all fishermen participated this workshop for their effort in making the event a great success.

## **APPENDIX I**

**The Flume Tank and the Fisheries and Marine Institute  
Memorial University of Newfoundland**

## ***THE FLUME TANK***

***Centre for Sustainable Aquatic Resources  
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Located in St. John's, Newfoundland, Canada, the oldest city in North America, the Newfoundland Flume Tank embraces five centuries of fishing traditions and modern technology. The flume tank opened in February of 1988 and is still the largest fisheries flume tank in the world. The tank boasts a test section of 21.5 m long, 8 m wide and 4 m deep, contains 1.7 million litres of water. The water in the tank is circulated at velocity of 0 - 1.25 metres per second. This represents a speed of 8 knots at 1:10 scale and 2.5 knots at full scale. The tank bottom is equipped with a rotating belt which can move at same speed as water, at a selected speed, or remain stationary to simulate seabed for bottom trawls, and to eliminate eddies caused by fluid friction against a stationary surface. A 32-channel high-speed data-acquisition system collects tensions from various points in the gear using a number of underwater load cells ranging in sizes from 2 kg to 45 kg. An underwater video camera can be positioned at any depth in the tank, and provides a view of towed fishing systems from the perspective of the fish. Three other video cameras positioned along the length of the tank are used to measure linear distances and geometry of the gear. The viewing gallery can accommodate 150 people for research tests, demonstrations and training workshops.

The tank is operated by the Centre for Sustainable Aquatic Resources (CSAR) of the Fisheries and Marine Institute of Memorial University of Newfoundland. CSAR comprises a team of specialists including fisheries engineers, fishing technologists, fish behaviorists, model construction specialists, and mechanical engineering technologists. The tank has been used to:

- test fishing gears, including trawls, traps, gillnets, aquaculture cages
- provide technical services for fishermen, fishing gear manufacturers/suppliers, other fishing industry groups, and public and private organizations;
- conduct training workshops for the fishing industry and the general public on the operations and behaviour of mobile and fixed fishing gears, and responsible fisheries.

Some of the recent training workshops include:

- Advanced Trawl Workshop for Alaskan Skippers
- Mobile Gear Selective Workshop
- Trawl Gear Workshop for Survey Technicians
- Fisheries Observer Course - Fishing Gear Recognition
- Shrimp Vessel Workers Course
- Salmon Trap Workshop for BC fishermen
- Surveillance Officers Workshop
- Technology Workshops on the use of Scanmar Trawl Equipment
- Wire Rope Splicing Workshops for Scallop Fishers
- Responsible fishing workshop
- Cod Trap Workshops

## **APPENDIX II**

### **Workshop Participant Handbook**