To Explore the Potential for a Non-Trawl, Low Bycatch Means of Harvesting the Increasingly Abundant Haddock Resource

Principle Investigator: Dr. Kenneth J. La Valley
UNH Coop. Ext. / NH Sea Grant
Water Resources Department
131 Main Street, 219 Nesmith Hall
Durham, NH 03824
(603) 862-4343 (*p*) (603) 862-0107 (*f*)
Ken.lavalley@unh.edu

Industry Partner: Kelo Pinkham
F/V Bad Penny
187 Westside Road
Trevett, ME 04571
(207) 633-6315

Final Report Submission Date: September 23, 2009

Abstract

Currently mandated mesh size in the New England multispecies fisheries make the targeting of haddock by trawl and gillnet challenging. As a consequence of the contrast in size between the highly protected cod and the haddock it is difficult to retain commercial quantities of haddock without a significant bycatch of cod. Even though recent developments of the "Eliminator Trawl" as well as other haddock separator trawls have successfully targeted haddock, these technologies have not had wide-spread industry pilot trials. To mitigate the mortality associated with trawl and gillnet bycatch there has been a recent surge of interest in research evaluating fish traps or pots, and the use of species selective bait both in New England and Maritime Canada. This project explored the use of three proven demersal fish trap designs specifically modified and baited for catching Atlantic haddock of a size and condition for use in the live fish market.

Investigated designs were the standard Alaskan Crab Pot, a modified Massachusetts cod pot with a 48" mesh balloon to increase trap volume and a Norwegian two-chambered fish pot. Traps were soaked for 24 hours, and three baits were evaluated for their ability to target haddock and fish in general. These baits included surf clam, artificial haddock bait and herring. The traps were successful in catching fish, most notably cod. Initial results appear to indicate that the Norwegian design and surf clam bait is the most promising combination for fish catch in general. Atlantic haddock were not landed during any field trials. Difficulties obtaining NMFS permits and scheduling vessel days resulted in field trials being conducted when haddock were migrating offshore or were not observed in high abundance in the test areas.

Overall, we conclude that the effectiveness of fish pots/traps are largely dependent on target fish abundance and are therefore highly variable and seasonally dependent, the Norwegian two-chamber style pot was the most effective in landing fish in general, and insufficient evidence/data was collected to make any conclusions regarding the potential to target Atlantic haddock with fish pots. Notably, the Norwegian design is being compared to current cod pot designs by the MADMF.

Introduction

This project explored the use of three proven demersal fish trap designs specifically modified and baited for catching Atlantic haddock of a size and condition for use in the live fish market. Live haddock have a beautiful iridescent shine and striking black markings that quickly fade at capture. What better way to reintroduce the consumer to Haddock than the live market where the beauty of this fish will far outshine cod or talapia.

There are several factors that have come into play recently that have made this the right time to pursue a directed haddock pot fishery. These factors include, the recent increase in abundance of the Gulf of Maine haddock population, the unexpectedly low projection of cod abundance and failure to rebound as predicted, and the inability of the current means of harvest to access haddock without the taking of excessive amounts of bycatch, with the species of greatest concern being Cod.

The currently mandated mesh size in the New England multispecies fisheries make the taking of haddock by trawl and gillnet very difficult and inefficient. As a consequence of the contrast in size between the highly protected cod and the haddock it is difficult to retain commercial quantities of haddock without a significant bycatch of cod. Even though recent developments of the "Eliminator Trawl" as well as other haddock separator trawls have successfully targeted haddock while minimizing flatfish and cod landings. These technologies have not been sufficiently vetted through wide-spread industry pilot trials. To mitigate the mortality associated with trawl and gillnet bycatch there has been a recent surge of interest in research evaluating the behavior of fish within and around fish traps, and the use of species selective bait both in New England and Maritime Canada. It was our hope that the project would identify a selective approach to harvesting haddock for the live market niche.

Project Objectives

The objective of the development project was to modify and evaluate the use of a Pacific and Norwegian cod pot for use in the Atlantic haddock fishery. The research involved:

- The modification of the Pacific and Norwegian cod pot designs for suitable use in the Gulf of Maine haddock fishery;
- Evaluation of several baits for haddock selectivity (i.e. chopped herring, whole clams, squid etc.);
- The use of underwater video camera observations of fish behavior in and around experimental traps; and
- The evaluation of the designs for their potential use in the haddock fishery.

Project Participants

Dr. Ken La Valley (PI), is an Extension Assistant Professor and UNH Coop. Ext. / NH Sea Grant commercial fisheries specialist. As an Extension Specialist his role is to transfer the results of cooperative research and innovative technologies to regional fishermen from Maine through Massachusetts. Dr. La Valley was responsible for project design and statistical analysis as well as outreach material development and final report writing.

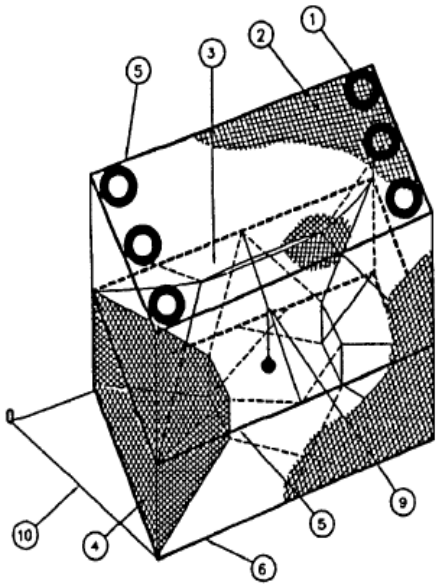
Kelo Pinkham (Industry Partner and Co-PI), Capt. of the F/V Jeanne C and the F/V Bad Penny. Pinkham was responsible for constructing experimental traps, organizing sea trials, altering gear designs and sampling locations as necessary, and supervising research technicians about his vessel.

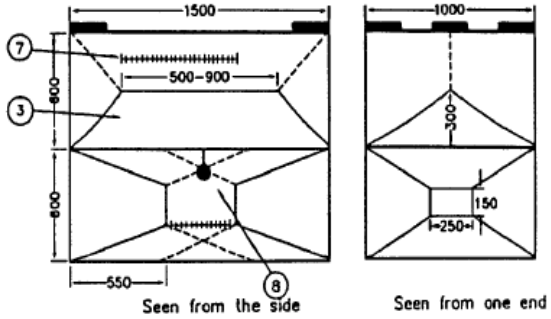
Bill Lee (Industry Partner), Capt. of the F/V Ocean Reporter. Lee was responsible for underwater video footage and as a field research platform for work conducted in MA.

Carl Bouchard (Industry Partner), Capt. Of the F/V Stormy Weather. Bouchard volunteered vessel time and effort to field test a trap design during high haddock abundance.

Design Approach, Methods and Results

Norwegian two-chamber pot for cod





1. Float rosendal 205/46 extra
2. Main net: Nr. 14 EK 28.5 mm 1/2 msk. black
3. Inner entrance
4. Monofile 25 mm 1/2 msk. blanc
5. Aluminium frame 10 mm
6. Steel frame 12 mm
7. Zipper
8. Bait bag
9. Hook for bait bag
10. Rope with hook to be connected to the buoy-line

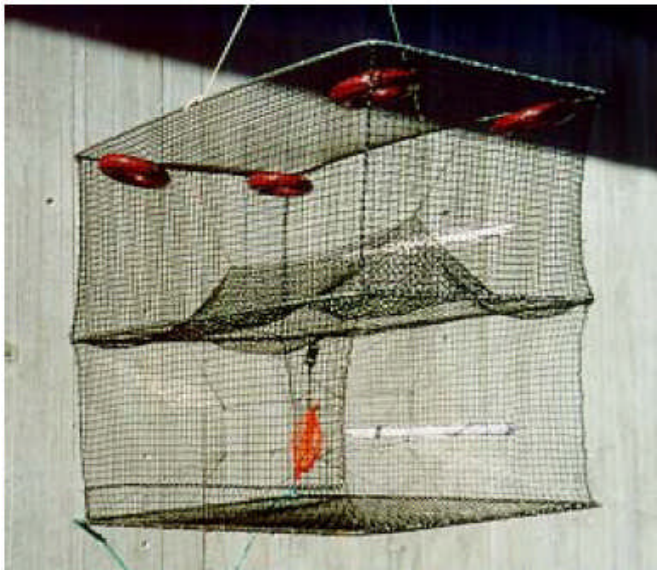


Figure 1. Norwegian Two-chamber design for

Norwegian technologists have developed an effective pot for taking live cod (above). The development of this technology was driven by the need for an alternative to gillnets. The pot has two chambers and two fairly wide entrance funnels leading into the lower chamber, with a narrow entrance leading to an upper chamber. A bait bag is fixed in the lower chamber between the two funnels. The pots are baited with squid for the cod fishery and set on a string or longline at depths varying from 50 to 300m (Furevik, 1997). For haddock we used vertical mounted triggers to allow easy entrance while providing an increased internal volume available for fish compared to the Norwegian design. During the investigations by Furevik (1997) it was indicated that the trap design was successful at catching several fish species, one of which being the Atlantic haddock.

Massachusetts Cod Pot

A typical MA Cod Pot as designed by , Mike Pol (MADMF) was re-configured for the haddock project. The dimensions were 6' X 6' X 3' with a 48" mesh balloon which increased the trap volume and height of the trap to 81" , see Figure 2. The pot has two offset entrances with triggers and shallow leads, leading to a 9" X 18" tunnel eye. The trap was modified to be collapsible to accommodate the typical northeast inshore commercial fishing vessel.

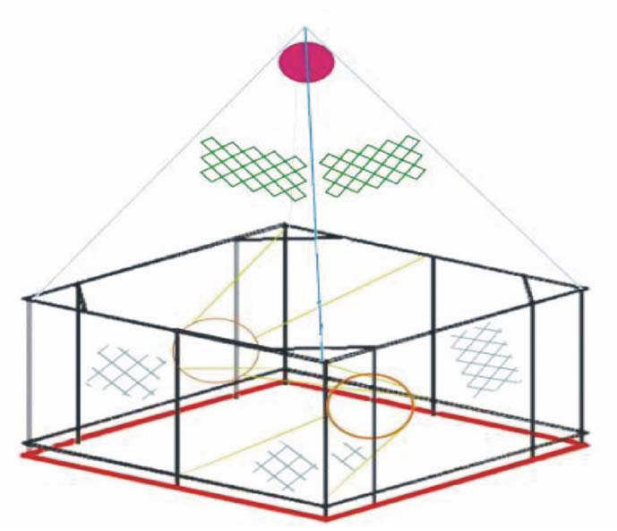


Figure 2. Collapsible 6' X 6' X 3' inches steel pot with floating roof section. From M. Pol, 2005, a final report to the Northeast Consortium.

Alaskan Crab Pot

A standard Alaskan crab pot design, measuring 6' X 6' X 3' with two entrance funnels was also constructed and tested against the Norwegian and MA designs.

Underwater Video Camera Deployment

Figure 3. Alaskan Crab pot being tested during field trials. Footage was used to identify haddock in and around pots.

Underwater video camera was intended to be used to document haddock behavior in and around each pot design. This information was used to verify haddock are in the area and make adjustments to trap design and baits. The camera assembly was not deployed in pots within test groups due to the unknown effects of undersea lights on animal behavior. Rather, each pot type from an onboard auxiliary group was fitted with the camera and deployed singly at a significant distance from the test site.

Field Evaluations

Traps were constructed and five experimental hauls were conducted during 2006. Fish traps were set approximately eight miles off of Rockport, MA. Traps were soaked for approximately 24 hours, and three baits were evaluated for their ability to target haddock and fish in general. These baits included surf clam, artificial haddock bait (as used by CCCHFA in haddock selectivity experiments in the hook and line fishery), and herring. Originally scheduled field trials planned to coincide with haddock migration into inshore regions outside of Maine, had to be postponed as the result of delays experienced obtaining an Experimental Fishing Permit (EFP) from the National Marine

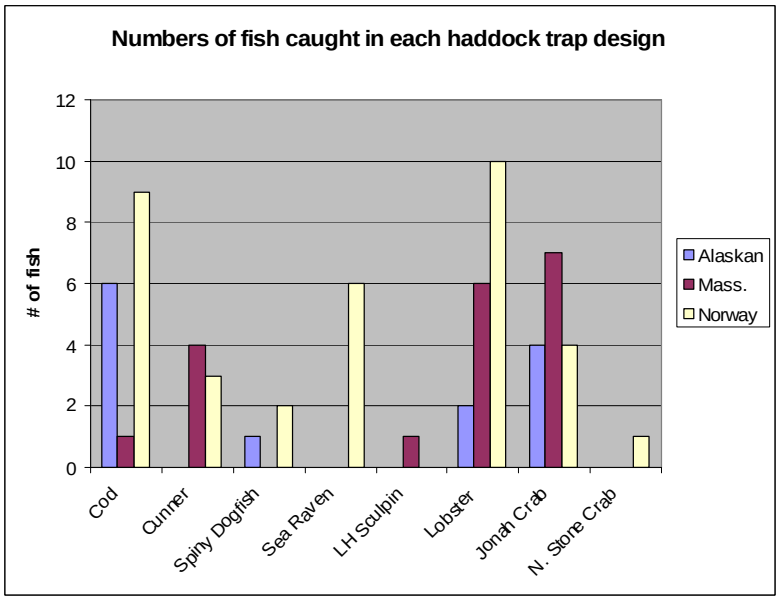


Figure 4. Fish trap landings by species and trap design.

Fisheries Service. As is the case with most fish trap fisheries, there is a strong seasonal correlation between catch rate and local population abundance. As the result of EFP delays, our initial field trials were conducted in October, 2006 at the end of Haddock movement out of the inshore area off of Rockport, MA. During this time haddock landings from bottom trawl and hook and line vessels in the area were low. Therefore, we were not surprised that we did not encounter haddock in any of our experimental soaks. In response to low catch rate, we postponed continued field work until the Summer of 2007 with the anticipation that haddock catch rates would increase when high abundance returned to the area.

The traps were successful in catching fish, most notably cod. Initial results appear to indicate that the Norwegian design and surf clam bait is the most promising combination for fish catch in general. See Figure 4, a simple graph illustrating catch rate by fish species and trap design.

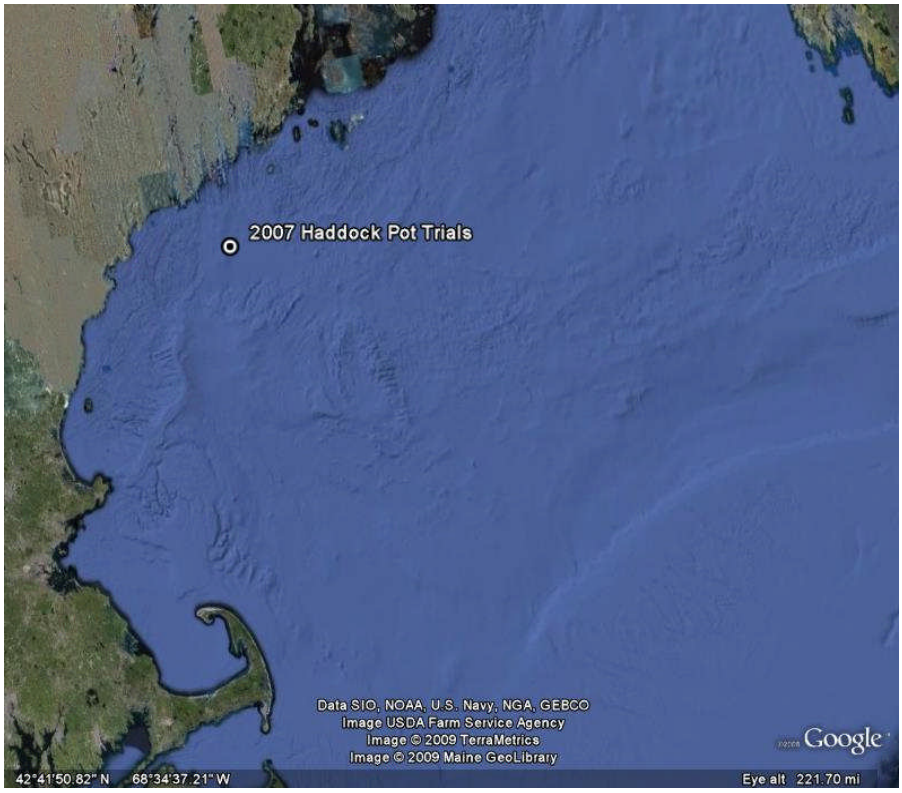


Figure 5. August, 2007 field trial location outside of Boothbay Harbor. ME.

The final 5 field days were conducted from August 15-19th, 2007, outside of Boothbay Harbor, ME aboard the F/V Bad Penny, see Figure 5. Due to unforeseen circumstances, the Industry Partner, Kelo Pinkham was unable to focus his efforts on the Haddock Pot project in the Spring or early Summer when haddock were known to be in the area in high densities. As a result, field days were conducted in August and we were unable to land a single haddock. Previous 2006 results indicated that the Norwegian pot design was effective in catching fish. Using these observations as well as information gained while attending and presenting at the 2006, International Technical Workshop on Gadoid Capture by Pots (GACAPOT) workshop, we re-designed the Norwegian pot to float off bottom. This design was adapted and is currently being used by MADMF as an alternative cod pot design.

Conclusions

Overall, three main conclusions can be made from this development project. These are;

Figure 6. Cod landed during field trials.

- The effectiveness of fish pots/traps are largely dependent on target fish abundance and are therefore highly variable and seasonally dependent,
- The Norwegian two-chamber style pot was the most effective in landing fish in general, and
- Insufficient evidence/data was collected to make any conclusions regarding the potential to target Atlantic haddock with fish pots.

However, with the continued work currently being conducted by the MADMF it is likely that an economically viable cod pot design will be identified, as well as seasonally opportunities in which small scale directed pot fisheries can be utilized in the Ipswich Bay region.

Partnerships

Figure 7. Norwegian two-chamber pot being deployed on the F/V Bad Penny.

The project built upon the initial work conducted by MADMF that investigated the possibility of a cod pot fishery in Ipswich Bay, MA. From these results, the industry partner (Kelo Pinkham) became interested in targeting Atlantic haddock for a live market. The work was collaborative from the onset, allowing for published fish pot designs to be researched by the science partner and vetted by the industry partner to re-design for ease of handling on small inshore fishing vessels and to target haddock.

The most noteworthy contributions of this project were the promising results observed using the Norwegian two-chamber fish pot and the resulting partnership established between the industry partner and MADMF, to design and construct Norwegian style fish pots for use in the MA cod pot developmental fishery.

Impacts and Applications

Kelo Pinkham was contracted by the Massachusetts Division of Marine Fisheries (MADMF) to design and to construct Norwegian style pots, as used in this project, for continued cod pot research[1]. The project, also funded by the Northeast Consortium, aims to compare catch rates and sizes of Atlantic cod captured in Norwegian-style two-chambered pots to a Newfoundland cod pot that was a focus of a 2005 NEC supported project.

[1] *Mike Pol, MADMF. 2007. POTYEAR: Determining the Seasonality of Cod Pots. Northeast Consortium funded project, Award Number: 09-048A.*

Presentations

La Valley, K. J., K. Pinkham and B. Lee. 2006. Feasibility of a Directed Atlantic Haddock Trap Fishery in the Gulf of Maine. International Technical Workshop on Gadoid Capture by Pots (GACAPOT), November 4th, 2006. Gloucester, Massachusetts, USA.

Published Reports and Papers

Crocker, M. Building a better fish trap: Innovations to fish trap designs for use in the increasingly abundant New England haddock fishery. Collaborations. November, 2006.

Literature Cited

Furevik, D.M. 1997a. Development of a new cod pot and comparative trials with commercial pots and long-line. Paper presented to the ICES Working Group on Fishing Technology and Fish Behavior, Hamburg, Germany, 14-17 April 1997.

Furevik, D.M. 1997b. Trial of cod pots as an alternative to gill-nets in the Varanger Fjord in April to June and October to December 1996. Gear selection and sampling gear. Joint Russian-Norwegian Symposium, Murmansk, Russian Federation, 23-27 June 1997.

Images

Images have been submitted to the Northeast Consortium in digital format.