

Name of Project: Development and Transfer of Fishing Technologies to Increase Size Selectivity in the Northern Shrimp Fishery

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Pingguo He, NH Sea Grant, UNH/EOS/OPAL

Background and Statement of the Problem

The reappearance of robust northern shrimp stocks, believed to be the result of strong 2003 and 2004 shrimp year-classes, has resulted in significant harvesting opportunities for the commercial fishing industry that could translate into increased economic benefits and stability for harvesters and processors. However, due to the prolonged period of intense management and reduced New England shrimp landings, the shore side infrastructure (i.e. processing facilities) was reduced and regional markets were forced to import northern shrimp to maintain their markets. To compete in such a diluted market, fishermen have tried to improve quality and consistency to both increase local demand for fresh product and obtain higher prices for their catch. Shrimp are marketed by the count per pound, with the highest value given to the lowest count (larger shrimp). One feasible method for fishermen to enhance their quality and value would be to target larger shrimp catches.

Since 2004, NH Sea Grant has worked collaboratively with fishing industry members and researchers to enhance the selectivity and reduce bycatch in the northern shrimp fishery. Several strategies or devices have been developed that will significantly enhance size selectivity of shrimp and have been shown to reduce the catch of non-target species. One strategy in particular, the dual-grid system has been identified for transfer to the industry. Currently, we (industry and science partners) are positioned to begin technology transfer activities to regional shrimp fishermen (ME, NH and MA).

This project fits into the Sea Grant, Cooperative Extension and UNH mission/vision of engagement by bringing research originating from UNH, a land and sea-grant institution, to the general public and targeted users, in order that they can make research-based decisions that will directly benefit their livelihood.

Project Details

Goals and Objectives

The over-all project goal is to increase the economic value of landed northern shrimp by increasing the size selectivity of shrimp trawls.

The research and outreach objectives for this project will be to first, increase fishery stakeholders knowledge of available innovative technology that will increase the size selectivity of shrimp (thus increasing the economic value), and second, provide at-sea demonstrations to interested industry members, that will provide hands-on opportunities to evaluate the gear.

Target Population and Audience

The target audience will include;

- commercial shrimp fishermen (ME, NH and MA),
- fisheries scientists, and
- fisheries managers.

Methods

Task 1. Increase fishery stakeholders knowledge of available technology that will increase the size selectivity of shrimp.

For this task we have chosen the dual-grid system designed and evaluated by Pingguo He. The dual-grid system sorts shrimp by size allowing the smaller less valuable shrimp to exit the net while retaining the larger animals. To increase stakeholder knowledge of this net design we will complete the following;

- 1 - Host a gear session at the ME Fishermen's Forum to provide commercial shrimp fishermen the opportunity to see the gear and discuss its operation and results., and recruit potential users.
- 2 - Provide local workshops to present the gear to fishery stakeholders and recruit potential technology users.
- 3 - Publish a Sea Grant technical document and article in a regional trade publication to increase awareness of the technology and assist recruiting potential users.
- 4 - Publish the research and development efforts in a peer reviewed publication.

Task 2. Provide at-sea demonstrations to interested fishermen and provide prototype gear for use by industry.

- 1 - Build several (2 – 4) prototype dual-grid systems that can be easily incorporated into existing fishing nets for evaluation by industry.
- 2 - Offer at-sea demonstrations of the dual-grid system. At-sea demonstrations will be collaboration between industry members, the

extension specialist and scientist partners that have worked to develop the above technologies.

Evidence of External Collaboration and Partnership

The external industry partner will be critical to the use of the technology by additional fishermen. Successful use of the shrimp size sorting system will be communicated between fishermen which may result in increased demand for the technology and its incorporation by the regional shrimp fleet. Not only will the industry partner be a critical component of communicating the technology to potential users but will be important for recommending gear design modifications to the researcher and outreach partners.

Impacts and Evaluation Plan

We expect that this project will deliver a feasible method that will increase the size selectivity in the northern shrimp fishery for regional fishermen. Use of the technology may result in increased revenue and more stable markets for the industry. Success will be measured from a research standpoint by empirically comparing shrimp catch rates and size selection of traditional gear to the experimental gear. This evaluation will be published as a final report and within a peer reviewed journal.

We expect that members of the northern shrimp fishery will choose to use the size sorting device to reduce small shrimp landings. To quantify this expectation outreach and engagement impacts will be measured by the reported increase in awareness of the alternative gear technologies, and the number of regional fishermen that choose to use them. A survey will be used to estimate the increase in awareness of the shrimp size selective gear and the number of fishermen interested in learning more and/or using the gear. As described in the methods section, outreach and engagement activities will be published in trade journals, as technical documents, and through video and the world wide web.

Scholarly Connection

This project will add to the fisheries gear technology discipline by publishing the research component in a peer reviewed journal. In addition, this project will offer insights and examples of successful technology transfer approaches and collaborative learning strategies for the outreach and extension community. This technology transfer approach may be submitted to the Journal of Extension.

Appendix I.

Sea Grant Publication
Trade Publication



Science and Industry Collaborate to Reduce Small Shrimp Catch

The reappearance of robust northern shrimp stocks, believed to be the result of strong 2003 and 2004 shrimp year-classes, has industry people hoping they'll be able to maintain a productive product stream that down the road could translate into increased economic benefits and stability for harvesters and processors.

However, stock abundance isn't the only element in a successful shrimp fishery. In the January 2007 issue of *Commercial Fisheries News*, Spencer Fuller of Cozy Harbor Seafood Inc. cautioned that market conditions – low worldwide shrimp prices, cheap warmwater shrimp, low prices for cooked/peeled northern shrimp out of Newfoundland and a 20% duty to export into Europe – factor in as well.

To compete in such a diluted market, fishermen have tried to improve quality and consistency to both increase local demand for fresh product and obtain higher prices for their catch.

Vincent Balzano, captain of the North Star out of Portland, has been working with Pingguo He of the University of New Hampshire to develop a new size-sorting grid system for the fishery in addition to the industry standard Nordmore grate.

He explained, "Although very successful at reducing fish bycatch, the Nordmore grate does not improve shrimp size selection, and large amounts of small shrimp are typically landed when they're present on the fishing grounds."

New grid design

Commercial shrimp fishermen are required to meet various gear restrictions, including a minimum mesh size of 1¾" and use of a Nordmore grate. They also must abide by a prohibition on mechanical devices used to cull, grade, separate or shake shrimp on

board. Working with these requirements, industry has collaborated with researchers since the late 1990s to further reduce deck sorting time by eliminating by-catch, enhancing catch rates,

and minimizing the gear's impact on bottom habitat through conservation engineering.

With support from the Northeast Consortium, He and Balzano have designed, manufactured and evaluated a new size-sorting grid system.

While previous multi-grid designs placed sorting grids after the Nordmore grate with limited success, the prototype consisted of a size-sorting grid (38"x45" with 11mm slots) placed ahead of a standard Nordmore grate (38"x58" with 25mm slots).

The operating theory behind the design is to direct small shrimp to a size-sorting grid where they exit the net, while the targeted large shrimp pass through a standard Nordmore grate and proceed to the cod-end. Finfish would continue to exit through an escape vent located at the top of the second grid.

However, He was concerned that diminished water flow between the two grids might reduce sorting efficiency, so they decided to evaluate two prototypes – one with a mesh funnel after the sorting grid to direct shrimp to the base of the Nordmore grate and one with no funnel.



Pingguo He helps Carl Bouchard refine his shrimp gear.

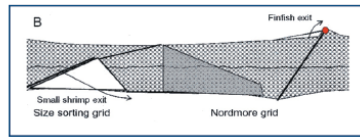
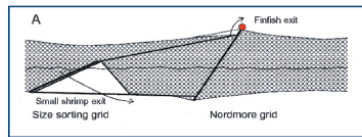
Testing

The designs were tested at sea during the 2005-2006 shrimp season aboard Balzano's North Star and the Persistence, owned and operated by Tim Eddy of Portland, ME.

Both size-sorting prototypes – with and without funnel – reduced small shrimp landings considerably, by 18-20 count per

Aboard the Stormy Weather, Paul Kuncho hauls in about 1200 lbs of Northern shrimp using the dual-grid system.





Two shrimp trawls, a dual grid without a funnel (A) and a dual grid with a funnel (B), are being tested in different areas and under different conditions to determine if either – or both – can help reduce small shrimp catch.

pound. The catch statistics appear to indicate that the majority of small shrimp excluded from the dual-grid system were 20mm (3/4”) carapace length and smaller.

Unexpectedly, the funneled design decreased shrimp catch by 43%, a margin clearly not acceptable for a commercial enterprise. But the catch rate using the no funnel grid system was comparable (no statistical difference) to the commercial catch. The research team did not observe a difference in finfish bycatch between the experimental systems and the commercial grate.

Top-less trawl

To address bycatch, He has been evaluating a “top-less” shrimp trawl with fisherman David Goethel of Hampton, NH, a project supported by the Northeast Cooperative Research Partnership Program of the National Marine Fisheries Service. This design has shown great promise and is continuing to be evaluated.

He believes that there will not be one gear design for the shrimp fishery that will work in every situation. “What we try to do as gear researchers is to give the industry additional tools,” he explained.

During the later part of the season or in specific habitats where shrimp size classes are mixed, the dual-grid system would be appropriate. On the other hand, when fishing in an area with high herring abundance, the top-less shrimp trawl or other bycatch reduction system may be the gear of choice.

Ground trawling

The next logical step is to begin making this technology available to the shrimp industry and see how it fares under commercial fishing conditions.

He presented the dual-grid system at a January fisheries roundtable meeting held in Portsmouth, NH. The roundtable meetings are sponsored by NH Sea Grant and offer a broad range of fisheries topics that are discussed in an informal setting.

Following the meeting, Carl Bouchard, captain of the Stormy Weather, expressed an interest in using the size sorting system. Bouchard was going to be fishing in an area he knew to have small shrimp and was hoping the dual-grid would improve his counts.

At the same time, Bouchard thought that the design might lose a considerable amount of large shrimp through the escape exit above the Nord-

more grate. As larger shrimp pass over the sorting grid, without a funnel or other means of mechanical direction, animals may first encounter the Nordmore grate nearer the fish escape exit, which could result in reduced separation time and loss of shrimp catch.

Always open to collaboration, He spent half a day working with Bouchard to place a panel of mesh after the sorting grid, hoping to direct shrimp to the bottom of the Nordmore grate and away from the fish escape exit. After fishing with the dual-grid several times over the following week, Bouchard came to the conclusion his counts were “definitely lower” and total landings were about the same.

“I’m not landing more large shrimp, I’m just catching fewer small shrimp,” Bouchard said, adding that he would like to try to use the dual-grid approach combined with the top-less trawl to “get the best of both worlds – reduce bycatch and release most of the one- and two-year-old shrimp.”

Bob Campbell, manager of the Yankee Fishermen’s Cooperative in Seabrook, NH, agreed with Bouchard. “On a given day, Carl’s counts have been lower than the fleet average. For example, on one particular day the co-op’s average count was about 52 per pound and Carl averaged around 43 to 44 per pound,” he said. Campbell also pointed out that if demand was higher, having a lower count would provide more opportunities for increased revenue.

Pingguo He will be presenting the dual-grid at the Maine Fishermen’s Forum. Anyone interested in an at-sea demonstration or in using the gear should contact him at pingguo.he@unh.edu or Ken LaValley at ken.lavalley@unh.edu.

For more information, please contact NH Sea Grant’s commercial fishing technology specialist:

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Sea Grant
New Hampshire

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Dual grid design reduces catch of small shrimp

PORTLAND, ME - The reappearance of a robust northern shrimp stock, believed to be the result of strong 2003 and 2004 shrimp year-classes, has industry people hoping they'll be able to maintain a productive product stream that down the road could translate into increased economic benefits and stability for harvesters and processors.

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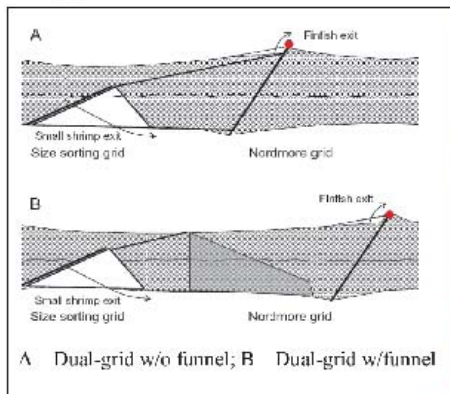
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The graphic at left shows the placement of a size sorting grid forward of the Nordmore grate. In at-sea tests, the funneled design B decreased the shrimp catch by 43%.

Below from left, Pinguo He and Carl Bouchard work on the grid in a shrimp net.



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Ken La Valley

Ken La Valley is an extension specialist with University of New Hampshire (UNH) Cooperative Extension/New Hampshire Sea Grant who is working to connect commercial fishermen interested in cooperative research with scientists who want to work with fishermen. He encourages anyone with ideas to get in touch.

La Valley can be reached at: UNH Cooperative Extension, 214 NeSmith Hall, 131 Main St., Durham, NH 03824; phone (603) 862-4343; or e-mail <ken.lavalley@unh.edu>.



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