Herring Fishery Gear Selectivity Seminar

Monday, December 13, 2004

Urban Forestry Center, Portsmouth NH

Hosted by the Associated Fisheries of Maine, American Pelagic Association, and East Coast Pelagic Association

Summary: Over the last several months, it has become clear to all in the New England commercial fishing industry that successful rebuilding of groundfish stocks brings with it the challenge of minimizing increasing interactions with other fisheries. Interaction at varying levels has been documented in several fisheries using a variety of gear types – lobster, whiting, scallops, and groundfish itself. The most notable recent example has been bycatch of haddock in the directed herring fishery during the summer and fall of 2004. Though federal observer data indicates the herring fishery is a relatively "clean" fishery compared to many others in the region, the "zero tolerance" regulation on possession of groundfish bycatch elevated the herring fishery to the top of the Council's agenda.

In addition to modifying fishing patterns, the herring industry has sought to better understand the spatial and temporal phenomenon through requests for increased observer coverage and dialogue with the various management and enforcement agencies charged with oversight of this issue. Perhaps more important has been the dialogue between the herring industry and the groundfish industry, which will hopefully continue to lead to constructive collaboration to resolve this issue. The industry has taken this effort a step further and convened a gear selectivity seminar on Monday, December 13, 2004. The goal of this seminar was to bring together groundfish and herring fishermen, advisors, and gear design experts to work collaboratively towards increasing the selectivity of herring gear to the extent practicable.

Meeting Attendance: Dr. William Overholtz, NEFSC; Dr. Chris Glass, Manomet Center for Conservation Sciences; Kevin Hayden, Swan Net Gundry/Ireland; Seamus Melley, Swan Net Seattle/WA; Jon Knight, Superior Trawl, Rhode Is; Gary Loverich, NETS, Seattle/WA; Cliff Goudey, MIT, Cambridge, MA; Mike Pol, MA DMF, Conservation Engineering; Dave Simpson, CT DMFO/NEFMC; David Pierce, MA DMF/NEFMC; Rodney Avilla, NEFMC; Sally McGee, NEFMC; Jim Ruhle, MAFMC; Phil Ruhle, NEFMC; John Williamson, NEFMC; Hannah Goodale, NMFS, NERO; Lori Steele, Chris Kellogg, Phil Haring, NEFMC Staff; Madeleine Hall-Arber, MIT-Sea Grant; David Beutel, RI-Sea Grant; Dana Morse, ME Sea Grant; Joe Mello, NMFS Observer Program; Rich Canasta, New Bedford Auction; Ethan Estey; Billie Schofield, NORPEL; Kevin Scheirer, John Annala, GMRI; Geoffrey Smith, Ocean Conservancy; Jay Cox and Keith Pendleton, F/V Dona Martita; Peter Prybot, CFN; Matthew Connolly; Jim Kendall, NBSC; Joe Bendilesen; Kohl Kanwit, ME DMR; Jackie Odell, NSC; Gage Ashbaugh, F/V Providian; Geir Munsen, Seafreeze; William Bright, F/V Retriever; Peter Mullen, F/V Western Venture; Ken LaValley, UNH Sea Grant; Jim Gallagher, F/V Challenger; Gerard McCallig, F/V Endeavor; Declan Conneely and Nick Jenkins, F/V Jean McCausland; Dave Ellenton, Cape Seafoods; Maggie Raymond; AFM, Peter Moore, APA; Mary Beth Tooley, ECPA; and, other interested members of the public.

HERRING FISHERY GEAR SELECTIVITY SEMINAR

URBAN FORESTRY CENTER, PORTSMOUTH, NH
MONDAY DECEMBER 13, 2004
10 AM - 5 PM

Hosted by Associated Fisheries of Maine, American Pelagic Association and East Coast Pelagic Association

AGENDA

10:00 Welcome: Maggie Raymond (AFM), Peter Moore (APA), Mary Beth Tooley (ECPA)

10:15 Status of Georges Bank Haddock and Herring Resources –
Drs. William Overholtz, NMFS

- Stock Status Herring/Haddock
  - Total SSB 2000-2004
  - Projected SSB 2005 and beyond
  - Total TAC vs Harvest 2000-2004
  - Projected TAC 2005 and beyond
- Spatial Distribution – Adults and Juveniles
- Future Predictions

11:00 Fish Behavior – Dr. Chris Glass, Manomet Center for Conservation Sciences

11:45 Description of Midwater Trawl Gear –
John Knight, Superior Trawl, No. Kingstown, RI
Kevin Haden, Swan Net / Gundry, Ireland

12:30 Lunch (Provided in-house)

The afternoon session will be moderated as an open discussion between MWT Captains and the following gear designers and researchers:

1:00 Possible modifications to MWT gear to reduce haddock bycatch
Kevin Haden, Swan Nets, Gundry Ireland
Seamus Melly, Swan Net USA, Seattle
John Knight, Superior Trawl, No. Kingstown, RI
Mike Pol, Mass. Div. Of Marine Fisheries, Conservation Engineering
Gary Loverich, NETS, Seattle

3:30 Research Needs to Minimize Bycatch of Juvenile and/or Adult groundfish
Dr. Chris Glass, Manomet
Cliff Goudey, MIT Sea Grant
Dana Morse, Maine Sea Grant
David Beutel, URI Fisheries Center

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Morning Session

Georges Bank Haddock and Herring – Stock Status (Dr. William Overholtz)

The Georges Bank haddock resource is not considered to be in an overfished condition, nor is overfishing occurring. Based on the most recent stock assessment (through 2002), haddock biomass on Georges Bank has recovered dramatically in recent years, and spawning stock biomass (SSB) has increased to around 100,000 mt. The 2000 year class of haddock on Georges Bank was relatively large and contributed to the recent increase in biomass. The exceptionally large 2003 year class has not yet been factored into the stock assessment and is expected to significantly influence projections of haddock biomass and available yield in the upcoming years. This year class will likely increase total biomass and SSB estimates around 2006 when it fully recruits to the fishery, at which time projected catches (available yield) will increase dramatically. Moreover, the relationship between SSB and recruitment suggests that recruitment should continue to increase in the future as the stock continues to grow under sustainable levels of fishing mortality.

The most recent survey data indicate that the herring resource is at a relatively high level of abundance, and the overall trend in survey data has been upwards over the last 40 years. While there was no scientific consensus reached during the most recent stock assessment, both of the two assessments that were reviewed suggest that the herring stock has increased significantly since its collapse in the late 1970s and early 1980s. While the most significant increase in herring biomass has been in the offshore area, on Georges Bank, the inshore Gulf of Maine component of herring is stable and possibly increasing -- about a factor of four higher than it was in the 1980s. We can expect to see signs of a biomass increase soon in the inshore area.

During 2004, interactions between herring and haddock occurred primarily along the northern flank of Georges Bank, an area where the abundance of both stocks has increased dramatically in recent years. Because both stocks, especially haddock, are continuing to increase in abundance, it is reasonable to assume that the interaction observed between herring and haddock does not represent a one-time phenomenon and will likely continue in the future at least on a seasonal basis, especially along the northern edge of Georges Bank. Interactions with both juvenile and adult haddock are of concern, as the extremely large 2003 year class of haddock is expected to produce a very large biomass of adult fish.

Behavior and Selectivity of Pelagic Fish – Herring (Dr. Chris Glass)

Despite the vast amount of literature available on the herring resource, there still exists a significant lack of knowledge about herring behavior and the impacts of fishing and various activities on fish behavior. There are several important characteristics about herring to acknowledge:

- Herring are obligate schoolers. They prefer to swim in large schools and cease to act as individual fish, but rather act as one unit in a large school.
- The sensory systems of herring are very well-developed. The ability of herring to hear, see, and sense movement (through the lateral line) allows them to sense other fish in the area, school in the dark, and react to changes in water pressure. These factors also influence the way herring react to fishing gear.

- Herring exhibit distinct migratory patterns, both seasonally (large-scale) and diurnally (night/day, small-scale). Migration is also affected by food availability and other environmental conditions.
- Herring have very good buoyancy control. They can gulp and release air to fill and void their swim bladders as needed.

The magnitude of some herring schools actually produce perceptible small-scale ecological changes in the water column – depleted oxygen, depleted food items, and increased feces/mucus, for example. Schooling structure also is affected by light intensity, water temperature, and food availability.

While herring appear to be behaving and schooling as they have always been known to, the question about whether or not haddock are behaving differently as a result of the large 2003 year class is central. Without knowing the relative distribution of the fish by depth, this is a difficult question to answer. Generally, if density is not very high, haddock will distribute themselves along the sea floor. As density increases, the fish will certainly rise into the water column, but it is unknown to what extent this may be occurring along northern Georges Bank and how this behavior influences the nature and magnitude of interactions with herring. There was some concern expressed about assumptions related to where haddock reside in the water column. Some fishermen believe that haddock rise up into the 5-6 fathom range during certain times of the day. The scientists present at the workshop acknowledged the variability of the entire ecosystem, and the difficulty of resolving this issue in the absence of hard data.

Very little research has been conducted on potential fishing-related interactions between herring and haddock or other groundfish species, primarily because such interactions have not been as much of a concern in the past as they were during the summer of 2004 along Georges Bank. Based on the results of experimentation for cod/haddock separator trawls, it is clear that haddock tend to turn around and rise upwards in the net as they become exhausted. This bit of information may be helpful in developing a way to reduce increasing fishing-related interactions through gear modification. However, more information is required, and herring fishery-specific research should be conducted to better identify interactions and develop the most effective way to resolve them.

Herring Midwater Trawl Gear

John Knight, Superior Trawl, North Kingstown RI, and Kevin Haden, Swan Net/Gundry, Ireland, led a discussion on the definition and overall design of a pelagic midwater trawl net. In general, many midwater trawl nets are rigged to be fished from the headrope (unlike a bottom trawl that is fished from the footrope). A midwater trawl is a net not intended to fish on bottom. As gear specialists, both John and Kevin felt that a definition for a midwater trawl should be very general, as the gear is operated in many fisheries and many different places.

Midwater trawls used in the Atlantic herring fishery are not all uniform in size and configuration, as many fishermen have preferences in how they individually rig their gear. Many midwater trawls used in the herring fishery are fished from the top sheet, towed from the top with chain weights to pull down and open the net. The net is not actively fishing the entire time it is deployed, as fishermen can collapse the net opening from the vessel control panel. A single

trawl is fished with doors – two bridles coming back from each door with a 20-30 foot setback and a weight to let the net hang down. (Bottom trawls are constructed differently - bridles are all the same length, with floaters used on top of the net to open it up.) Pair trawl vessels do not need doors to operate the net. Mesh size in the wings is very large, and most nets use 3.2 meter mesh in the front end. The general rule of thumb is that mesh size decreases by 50% for each section of the net from the opening to the codend. Taper is pretty standard at 1.2 or 1.3 bars. In general, the net is constructed of 10 foot mesh 4-12 meshes deep that increment down from there through the net. Hanging line length is 250-400 feet.

Afternoon Session

Possible Modifications to Reduce Haddock Bycatch

Drawing on participant expertise in gear design, fishing practices, and fish abundance/behavior, a number of modifications to the gear were discussed for effectiveness in avoidance of haddock during herring fishing operations.

All participants agreed that more research needs to be conducted to determine behavioral differences / similarities between haddock and herring at juvenile and adult life stages. Underwater video of theses species responding to the commercially-fished gear is an important first step in this research.

To effectively resolve bycatch problems through gear modification, it is important to clearly identify differences between either (a) the behavior (swimming, schooling, and net avoidance) or (b) the size/shape of the fish species that require separation. Based on what little is known about herring and haddock schooling and behavior, there are several possible gear modifications that could be explored. It is important to note that each of the following possible approaches requires additional research to ensure that the ultimate solution resolves the bycatch problem most effectively while minimizing the loss of the target species and the resulting economic impacts on the herring industry.

Mesh

- It may be possible to reduce bycatch by increasing the mesh size in the front and/or top of the bag. Haddock are known to move upwards in the net as they tire, and larger mesh in the front and/or top panels of the net may provide more opportunity for escapement.
- Turning the knots on the mesh sideways in the belly of the trawl so they are facing outward has been shown to increase escapement for juvenile haddock in the Irish sea herring fishery.

Excluder Panels

- Installing excluder panels in the front and/or top of the net may provide a means for haddock escapement, but care must be taken to avoid "plugging" of the excluder.
- Another interesting concept to explore could be a "reverse excluder panel." In this case, an excluder panel would be developed for the target species (herring) and attached to the net along with a recapture bag. Herring would fall through the excluder panel and would be recaptured in a small mesh bag, while non-target species would simply pass through the main net and out the other end.

Other Gear Modifications

- Wing tip floats may be helpful to ensure that the net can fish in the water column and remain open, possibly eliminating the need for chains or weights along the footrope. Research must be done to ensure that skippers would be able to maintain precise and sensitive control over opening and closing of the mouth of the net.
- Wing Rope Trawls

Data and Research Needs to Minimize Bycatch

It is clear that when it comes to fish behavior, fishing-related interactions, and gear development, herring-specific information is lacking, which may compromise the ability of managers as well as the industry to identify a way to resolve this issue in the short-term. Perhaps what is most necessary in the short-term is a concerted effort to collect more and better information specific to the herring fishery so that the appropriate solutions can be developed for any problems that are identified. Consequently, a research plan for the short-term may lead to long-term solutions; this problem is not likely to disappear in the future as groundfish stocks continue to increase in abundance and the herring stock remains healthy.

Some data collection needs identified during the workshop include: greater knowledge of herring and haddock behavior, particularly when encountering a midwater trawl net in the water column; fish distribution - daytime, nighttime and lunar cycles; how fishing patterns may affect bycatch rates; and, reliable estimates of bycatch and discards for the fishery. Methods identified for data collection include video net observation, observer coverage for estimates of bycatch, and protocols for captains to collect and share information. Some workshop participants felt that there is a need to quantify the scope of the problem (degree of haddock bycatch relative to other fisheries) prior to expensive gear modification research and monitoring programs for the herring fishery.

Moving Forward

It will likely take a number of actions to achieve effective solutions to the haddock bycatch problem experienced in the Georges Bank herring fishery in 2004. Dr. Overholtz felt the larger, long-term issue may be a chronic problem with bycatch of adult haddock, if haddock stock size continues to increase. The juvenile haddock bycatch observed on Georges Bank this summer may be a problem only when there is an exceptionally large year class like that in 2003. The herring fishery will need a long-term plan to address this overall problem, as interactions with adult haddock and possibly other groundfish stocks will likely continue in the future as stocks continue to rebuild.

It would be best to understand the scope of the haddock bycatch rates in the herring fishery relative to the haddock stock prior to determining that gear modification or changes in fishing patterns are necessary. However, the current regulatory environment suggests that a more proactive approach may be needed for the herring fishery to be successful in 2005.

A three-pronged approach is suggested to address bycatch issues in the fishery:

1. A set-aside of incidental haddock catch for the herring fishery to reflect the increasing interactions resulting from rebuilding of the groundfish biomass (change the current "zero tolerance" policy that prohibits any haddock possession by vessels fishing for herring),
2. Further examination of haddock/herring interactions (utilizing underwater video) and testing of potential gear modifications for midwater trawls, and
3. An examination of herring fishing patterns that may affect bycatch rates.

Regulations that mandate zero retention of groundfish in the herring fishery pose a significant stumbling block in the ability of managers to quantify accurate bycatch rates and test effectiveness of gear modifications. There is an immediate need for Council action to implement a regulatory change to allow for a successful herring fishery in 2005 while working to minimize seasonal interactions with haddock. No matter how innovative the gear is, it still needs to be tested, and it needs to be tested during a time when there may be a bycatch problem (June-December).

Several possible gear solutions have been identified by this workshop. The industry should initiate a project to evaluate the problem using underwater video, then design feasible gear modification(s), seek partners for testing, and begin dialogue with cooperative research funding sources to achieve a required goal of minimizing bycatch to the extent practicable in the herring fishery.

Methods utilized in other parts of the country to manage and minimize bycatch should be examined more closely. Many participants feel it unnecessary to "reinvent the wheel," as similar problems have been encountered in other fisheries. Industry in some Pacific Northwest and Alaska fisheries has developed successful voluntary bycatch minimization programs that could be examined for utility in the herring fishery. These programs allow industry to collect and share data to minimize bycatch.

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Associated Fisheries of Maine, the American Pelagic Association and the East Coast Pelagic Association would like to thank all of the workshop attendees for their participation in seeking practical solutions for an emerging problem in the region. Also, we extend a special note of thanks to Lori Steele, Policy Analyst, NEFMC, for recording the day's discussion and assistance in drafting this report.