HOOK, LINE AND THINKER

The Newsletter of the Fishermen and Scientists Research Society

Issue: 2007 - 1 **Winter 2007**

FSRS 14TH ANNUAL CONFERENCE IN REVIEW

The Fishermen and Scientists Research Society held its 14th Annual Conference and Annual General Meeting at the Best Western Glengarry Hotel in Truro, NS on February 16th and 17th. On behalf of the members, we would like to gratefully acknowledge the Director's Office, Science Branch, Maritimes Region, Fisheries & Oceans Canada; Nova Scotia Fisheries and Aquaculture – Lobster Science Fund; Nova Scotia Fisheries and Aquaculture; AMIRIX Systems Inc. (VEMCO Division); Encana Corporation; Prospect Area Fulltime Fishermen's Association; Atlantic Electronics; AVC Lobster Science Centre; Halifax West Commercial Fishermen's Association; Eastern Nova Scotia 4X Community Management Board; Guysborough County Inshore Fishermen's Association; Scotia Harvest Seafoods; Maritime Aboriginal Aquatic Resources Secretariate; Scotia Fundy Inshore Fishermen's Association; and Wade Company Limited for their support and financial contributions, without which the conference would not have been possible.

The Conference was preceded by the Joint FSRS-GOMLF Lobster Science Workshop on February 15th. This Workshop explored the relationship of various lobster recruitment and ventless trap projects and the advantages of the different methodologies. An overview of the Workshop, and information on how to obtain a copy of the Workshop report, is available on Page 31.

The Conference was well attended with a turnout of over 120 fishermen, scientists and others. Our friends and colleagues from south of the border even braved a severe snow storm to get here. There were fishermen and scientists from Maine, Massachusetts and New York in attendance. Many guests

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and members traveled great distances to attend and as always we had guests who came to learn more about the FSRS and to explore opportunities to collaborate with us. Thank you to everyone for taking the time to attend and contribute to the Conference and Workshop.

WORKSHOP SESSIONS

The Conference workshops dealt with a wide range of topics, from juvenile haddock habitat use to artificial lobster habitat, cod tagging, temperature monitoring on lobster traps, Irish moss, and inshore ecosystem research. Because of the storm, François Grégoire was unable to be there to give his presentation on An Update on the Mackerel *(Scomber scombrus L.)* Situation in the Northwest Atlantic, however, John Tremblay graciously stepped in to fill the timeslot, giving a presentation on Fishery Independent Indicators of Lobster Abundance. Thank you to all presenters for their informative and enlightening sessions: Alida Bundy, Don Clark, Nell den Heyer, Ellen Kenchington, Jim Manning, Glyn Sharp, Chris Taggart , Shelly Tallack and John Tremblay. Pages 4 to 25 of this issue provide reports on their presentations and the discussions that followed, as well as the Scientific Program Committee Report presented on Day Two of the Conference.

Disclaimer:
The discussions following the presentation summaries are presented as recorded and interpreted in the rappatours notes. The remarks were not confirmed with or edited by the participants. While every effort was made to ensure accuracy, it is possible that errors or misinterpretations may have occurred.

POSTERS AND DISPLAYS

In addition to the workshop sessions, there were a number of poster and information displays. The scope of topics covered in the displays was broad. A special thanks to all the participants in the poster/information displays. A complete list of the posters and displays, as well as the abstracts for them, can be found on Pages 26 to 30.

Photo courtesy of L. Wayne Spinney.

RECEPTION

Not all of the Conference was serious work. Members and guests had a chance to sit back, relax and socialize during the reception. Not only did this give members a chance to get reacquainted, it was also a great opportunity to continue to build better communication between fishermen and scientists. Faith Scattolon, Regional Director General, DFO Maritimes Region, was able to join us for the reception. Her attendance and on-going support for the valuable work done by the FSRS was greatly appreciated.

The “Dutch Auction”, which has become a popular annual event, was an even bigger success this year, raising over $2,100 for the FSRS. Participants also had a chance to win some fabulous door prizes throughout the two days of the Conference. A special thanks to the companies who donated the door prizes and items for the auction.

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Donation of Auction Items and Door Prizes:

Acadian Glass Art
AEL
AF Theriault
Apple Auto Glass
Assante Capital Management Ltd.
Associated Marine Supply
Atlantic Cat
Atlantic Catch Data Limited
Atlantic Fisherman
Atlantic Work Wear
AVC Lobster Science Centre
Best Western Glengarry Inn
Bill's Gaff
Boston Pizza
Carquest
Chapters Halifax
Comeau Seafoods Stock Room
Cotter's Ocean Products
Fox Hill Marine
Golf Central
Gulf of Maine Lobster Foundation
Goodlife Fitness Clubs
Halterm Ltd.
Hi Liner
HP Fisheries
Hydroslave
IMP Dartmouth
IMP Saulnierville
IMP Yarmouth
In Too Deep Fisheries
Leblanc Brothers
Louisbourg Ship Supply
Massachusetts Lobstermen's Assoc.
MicroAge Computers
Motor Mart
Nova Scotia Museum
Novi Boat Brokers
NSERC
PMD Services
Princess Auto
Rainbow Net and Rigging
Rudders
Shoppers Drug Mart
Southwest Honda
Superstore (Yarmouth)
Superstore (Bayers Lake)
The Navigator
The Sou'wester
Tim Hortons
Tusket Ford
V & R Traps
Vernon D'eon
Vogue Optical
Wade's Wire Traps
Walmart (Bayers Lake)
Wedgeport Boats
Zellers (Bayers Lake)

The FSRS Annual Conference gives fishermen and scientists the opportunity to get together, discuss important issues and meet with old friends and acquaintances. *(Photos courtesy of L. Wayne Spinney)*

ENVIRONMENTAL MONITORS ON LOBSTER TRAPS (EMOLT)

Presented by: Jim Manning, Oceanographer, Northeast Science Center
Summarized by: Alain d'Entremont, FSRS Fisheries Technician

What is eMOLT? The eMOLT project is a non-profit collaboration of industry, science, and academics devoted to the monitoring of the physical environment of the Gulf of Maine and the Southern New England shelf. In a series of phases funded by National Oceanic & Atmospheric Administration (NOAA)'s Northeast Consortium beginning in 2001, they have developed low-cost strategies to measure bottom temperature and salinity and, most recently, surface current velocity with the help of nearly 100 lobstermen dispersed along the entire New England coast. They hope to extend their existing multi-year time series (and monitoring capabilities) and contribute to whatever operational ocean observing systems developed for the region in the future.

So what did the project discover for 2006? How was 2006 different from previous years? The data collected from lobster fishermen's trap gauges show that the bottom temperatures were for the most part higher than in previous years. Rise and fall in bottom water temperature in some areas correlated well with wind events. When there was a strong wind from the north and east, the warm surface water evidently piled up along the shore (detected by pressure sensors) and descended to the deep causing dramatic warming particularly in the early fall season. This process called "downwelling" occurs all along the coast.

What do the satellite-tracked drifters tell us about the flow field?. Unlike 2005 when nearly all the drifters released off the Maine coast ended up in Massachusetts Bay, those released in 2006 headed out into the middle of the Gulf or re-circulated back to the Bay of Fundy. The drifters released in the Bay of Fundy in 2006 documented a strong re-circulating gyre east of Grand Manan. A few of the units traveled 2-3 times around the gyre before heading down the coast of Maine.

What is the next step? They are working on a real-time temperature & depth probe that transmits data from the gauge to a system on the lobsterman's vessel. The data would then get transmitted in real-time through satellites to a NOAA server. More than 50 satellite-tracked drifters (most of them funded by NOAA HAB studies) will be deployed in the Bay of Fundy and along the coast of Maine in 2007. Mariners are asked to call the phone number printed on the PVC if they happen to come across one.

Since the eMOLT project is similar in many ways to various FSRS projects, they hope to collaborate, share data, and continue discussions in the future.

Where can I get more information? http://www.emolt.org.

Discussion

Q: I noticed the drifters in the gyre for the Bay of Fundy makes the same bullseye as the right whale presentation.
A: I noticed that too.

Q: When is the gyre at it's strongest in the Bay of Fundy?
A: When we tried in May it wasn't there, this time we tried in July and it was.

Q: Is Browns Bank current clockwise?
A: Drifters don't go around long, usually go up into the Gulf of Maine and then back.

Q: When should you interfere with a drifter?
A: If the sails are not ripped, all it's floaters are there, and it is away from shore then just untangle it (if needed) and re-release. In any case, you could try calling the phone number printed on the unit.

Q: Any drifters head up towards Halifax?
A: This year a few did due to strong summer surface winds, but generally no.

Q: In terms of relating catch to temperature, your graph looked good.
A: It's not definitely significant though.

IRISH MOSS RESEARCH PAST AND FUTURE

Presented by: Glyn Sharp, Marine Plant Biologist, DFO
Summarized by: Jeff Grave, FSRS Senior Fisheries Technician

Irish moss, known by the scientific name of *Chondrus crispus*., grows in the inter-tidal zone out to a depth of 5-6 fathoms. Of most significance to man is a chemical that is derived from it known as *Carrageenan.* Carrageenan is used as a food additive, with its main purpose being to control thickness and keep solids suspended. Some of the products that use this chemical are ice cream and chocolate milk.

PEI leads the Maritime Provinces in landings of Irish moss. Historically the highest landings occurred in the early to mid 1970's when landings were roughly 30000 tonnes. Nova Scotia landings during that same time were between 15000 and 18000 tonnes. In 2004, Nova Scotia landings were approximately 2500 tonnes.

Irish moss is harvested along the southern shore of Nova Scotia with the greatest concentration of harvest occurring in Lobster Bay. The best locations to harvest Irish moss are exposed headlands and Bays. Less exposed areas also have Irish moss but in those places it is usually found growing with other species of seaweeds.

Irish moss harvesting is very labour intensive. It is done using a rake with a 10-12 foot handle from an open skiff that is capable of holding at least one tonne of wet moss. Typically these boats are powered with outboard motors of between 20 and 40 horsepower. An important factor in successfully harvesting Irish moss is to gain the knowledge of the harvesting grounds. This allows the harvester to be able to effectively harvest different areas depending on the winds and tides. Harvest rates depend greatly on tides. The ideal depth for Irish moss harvesting is 0 m, low tide level, however harvesting can still take place when low tides are below 0.3 m in depth. It is extremely important when harvesting Irish moss that the hold fast is left behind so that the moss can re-grow from it. If the hold fast is damaged it can take up to three years for it to regenerate.

Research being done on Irish moss has included: yearly monitoring of moss beds (monitoring during the pre-season and mid-season.), effort surveys of harvesters in Lobster Bay, testing of various designs of rakes to determine which causes the least amount of damage to the hold fasts, and growth rates of individual fronds of moss. There have been a number of surveys of abundance carried out in southwestern Nova Scotia. One survey included regular raking of ten beds with ten, 5 m^2 plots prior to and during the season. Effort type surveys are generally done by counting the numbers of harvesters on the beds. Future research would include a survey of distribution and abundance in southern Nova Scotia. This data would be comparable with catch per unit effort and help determine the harvestable resource and the annual sustainable harvest.

ARTIFICIAL REEF - ENHANCEMENT OF BENTHIC DIVERSITY

Presentation by: Glyn Sharp, Marine Plant Biologist, DFO
Summarized by: Julie Sperl, FSRS Research Assistant

The goal of artificial reef structures is to enhance the production of communities of plants, invertebrates and fishes, and to increase the catch rate and efficiency of commercial species. In earlier days, any piece of refuse was used as a structure on which to base a reef. Today permits are required to install an artificial reef and they will not allow structures which can degrade over time causing clutter to wash up on beaches. Structures serving as artificial reefs do face several problems such as degradation, erosion, sedimentation, and placement economics. Other concerns that must be addressed in creating an artificial reef include materials, complexity, spaces, shapes, size of units, number of units, and density of units.

The purpose of creating artificial reefs can be habitat protection, fisheries, legislation, or Habitat Alteration and Disruption/Destruction (HADD). Wharves, infills and causeways are all examples of how a habitat can be altered, disrupted or destroyed. When it comes to protecting a particular habitat, production can be halted with a firm no, or it can be mitigated. Compensation can be redeemed by the placement of a new habitat by means of an artificial reef. HADDs are determined on an individual basis, as one can focus on generating a general habitat or a specific species. Target species are often commercially valuable, such as lobster. In the case of lobster, the focus is on reef creation.

Questions had to be addressed regarding the ecology of lobster for the artificial reef program at the Bedford Institute of Oceanography (BIO) including lobster behaviour, compensation, and scale. The research done to assess the success of this endeavour was initially implemented using 40 reef balls. Reef balls are large dome like structures made of cement. Colonization was tested in a stressed environment in Halifax Harbour and an unstressed environment in St. Margaret's Bay. They were placed on a gravel/sand bottom, changing it from being flat to high relief. The structures were deployed using lift bags, and were subjected to bimonthly non-destructive observation, as well as yearly destructive sampling.

The reef balls were host to 55 invertebrate species, five fish species and 15 species of plants. Halifax Harbour reef balls were occupied by lobster up to 5 lbs; however, there were only ever six lobster there at once. Succession was easily visible on these habitats, and the biodiversity mimicked that of other hard bottom communities. Production of those areas in particular was increased, though the cost per unit of production was not optimal.

In the lab the best value per tonne of rocks was tested to determine optimal rock size, configuration and shape. Larger piles of rocks elicited a larger number of lobsters, flat rocks garnered more habitation than others, a bottom that allowed burrowing was best, and lobster typically took up occupation of these habitats at night.

Next, these findings were tested to answer the questions whether or not rock piles attract lobsters, size of pile versus habitation, and substrate effect on a small reef at McNabs Island. The crab population quickly inhabited the structures assessed by non-destructive methods. When the rock piles were later dismantled in the fall there were lobsters occupying the reefs. The rock pile was also tested against the Comeau shelter, a flat-topped cement like block. In the Comeau shelters lobsters could not maintain a burrow because the sand shifted over the entrances.

In 2006 two reefs were constructed at Sambro Harbour. They consisted of a matrix of 20 one-metre diameter rock piles in three arrays at two sites in the harbour. One site was on a muddy/sand bottom and the other in a mix of sand and eelgrass habitat.

Diving surveys were conducted to monitor diversity, recruitment, abundance, night versus day, and burrowing. Surprisingly, four snowy groupers, whose northern limit is known to be North Carolina, had taken up residence in the reefs. The earliest local recruiter was algae, and within one month there were three species of crab inhabiting the rock piles. Lobster, echinoderms, gastropods also recruited quickly. Eventually there will be directed trapping and tagging to see how the lobsters are moving and from where they are immigrating.

One hectare of reef would cost $20,000. Utilization and management of other artificial reefs brings up other questions as well. For example: who will exploit the reefs; add licences; is this an aquaculture situation; will it conflict with a trawling area; what kind of gear limitations are required; how will the change in transport of sediments impact other habitats, and how will this project remain economical with no net loss? Questions of a more scientific nature must be addressed, such as will there be a high production rate of the target organism, and will the structures attract and/or be an active site for producing new organisms.

Discussion

Comment: There was one lobster in 11 – 12 feet of water in a boiler. It got so big it couldn't get out, about 25 – 30 lbs.
A: This has been seen before in accidental junk habitats.

Q: Research question with respect to carrying capacity in aquaculture. What if the proposed environment won't support any more production?
A: A lot of people are struggling with that, trying to answer the question.

Q: Are these lobsters immigrating, if so, how far, and are there sand paths on which to travel?
A: They will travel long distances, kilometres, (known through sonic tagging). The big ones at McNab's Island in Halifax Harbour have a huge depth gradient to traverse (100+ feet). The animals can move seasonally.

Q: Does it matter where you put the reefs?
A: Yes, we try to avoid rocky reef habitat, too patchy.

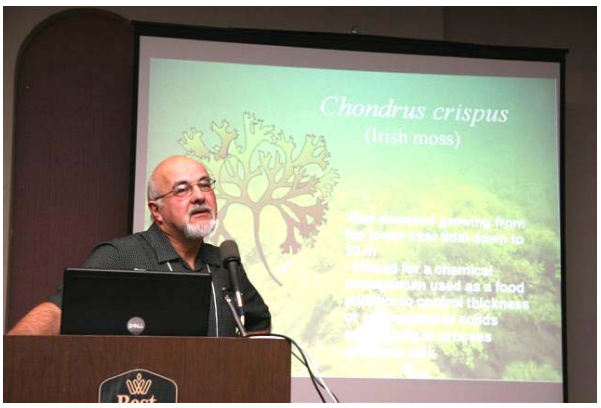
Q: With regard to the quality of habitat for remediation, who evaluates the removed habitat?
A: Decisions are made on a daily basis, so there is good co-operation. Always asking lots of questions, don't have absolute proof, but at least there is some remediation.

Q: Could be targeting a different scale of animals, like square yards of animals.
A: Why not make a kelp bed?

Q: How quickly does kelp grow?
A: An inch a day. Within one year it can be very long.

Q: Are tires still being used to create these reefs?
A: Yes.

Q: How environmentally friendly are reefs made of tires?
A: It's not certain; they do not seem to degrade very much.



Glyn Sharp.*(Photo courtesy of L. Wayne Spinney)*

Q: Would the monitoring be in place to evaluate the mitigation progress?
A: It's being worked on. In the future more feedback will be put into this portion of the program.

Q: What happens when you are asked to put a structure in a certain area?
A: They look at the total footprint and the whole picture.

WESTERN SCOTIA SHELF AND GULF OF MAINE COD

Presented by: Don Clark, Biologist, DFO
Summarized by: Alain d'Entremont, FSRS Fisheries Technician

Don Clark began his presentation by explaining the history of cod tagging in the 4X/Georges/Gulf of Maine area. He explained that the migration patterns of cod have been studied with the use of tagging since the early 1900s and the results of those studies were used to determine the current management areas. Since the distribution of the fishery and the distribution of the cod seem to change and evolve he believes that continuing the tagging project is important since it still produces useful new results.

He informed us that there is some variation within the cod in 4X, with the length at age being different depending from what location in 4X the cod was caught. Cod caught on the Scotian Shelf on average are ten centimeters smaller than cod from the Bay of Fundy and cod from the part of 4X off of Lunenburg and Sambro on average are even smaller when comparing fish of the same age from each location. Spawning is thought to occur mainly in the Fall in coastal Nova Scotia and the Bay of Fundy and in the Spring on Brown's Bank. There seems to be mixing of the 4X population with 5Z or Georges cod, however, the amount is unresolved.

He then moved on to recent tagging efforts. In terms of recent tagging, from 2001 to 2005 there have been releases of tagged fish in the Bay of Fundy, Brown's, Georges and around the southern coast of Nova Scotia with tagging on the Scotian Shelf being done mostly with hook and line while in the Bay of Fundy it was done with otter trawl.

By showing the graphs of the distribution of tag recaptures from recent studies, there seems to be two separate populations of cod in 4X; the population that travels in and out of the Bay of Fundy and a second found on the Scotian Shelf. There seems to be little mixing between the populations. An interesting finding was that no cod tagged on the eastern part of Brown's were recaptured in the Bay of Fundy and instead seemed to remain in the Brown's area, on Georges Bank or on the Scotian Shelf. For cod tagged on the western portion of Browns, those cod were recaptured on Browns, Georges or the Bay of Fundy, with no recaptures on the Scotian Slope. Although few cod were found to be tagged on Brown's it does seem to indicate there may be a difference in cod from the east and west side.

There are indications in the recapture data that some seasonal patterns exist. Cod released on the northern edge of Georges Bank in July did not show the same movement patterns as cod released in the same area in February.

The data also shows that small cod don't seem to travel as far as larger cod. This is shown by the fact that with small cod tagged from lobster traps, the amount recaptured offshore increased with time. When a large cod is tagged, they seem be recaptured after traveling longer distances in their first year tagged. The Georges Basin data is interesting to scientists, since it seems to be an area where large cod are often found and come from a variety of release locations.

NORTHEAST REGIONAL COD TAGGING PROGRAM (NRCTP)

Presented by: Shelly Tallack, Program Manager, Northeast Cod Tagging Program, Gulf of Maine Research Institute
Summarized by: Alain d'Entremont, FSRS Fisheries Technician

The main goal of this research is to improve the understanding of cod distribution, movement and growth while also making the data accessible to the public and identifying future possible research questions.

To achieve this goal the NRCTP developed a collaborative cod tagging program involving scientists and fishermen throughout the Gulf of Maine region including Canada. The project involved 156 taggers, (108 fishermen and 48 scientists) who were trained to use a standardized tagging technique with the hopes of tagging 100,000 fish.

Recapture data showed that fish tagged in nearshore Gulf of Maine (5Y) had a tendency to remain in this area, while fish tagged in 4X (Bay of Fundy) and on Georges Bank (part of 5Z) showed some considerably mixing through a number of recaptures in deeper 4X waters (e.g. Georges Basin). The data also seems to show seasonal migrations and displacement differences due to age of the cod like those presented by Don Clark in his presentation.

The Cape Cod area was maybe the area with the most surprises. In this area, most recaptured cod had been originally tagged in this area as small fish. But as these fish grow, they appear to then join either the Georges Bank fish or the inshore Gulf of Maine fish – it remains unclear what determines this split in direction.

The data seems to indicate that the theory on circular migration may be wrong, with the cod from Georges, the Gulf of Maine, Cape Cod and the Bay of Fundy showing no link to the Eastern Shore. The data can be difficult to interpret because of low tag reporting in some areas, or due to little fishing effort in some areas. Therefore, before drawing any final conclusions, the data must be weighted and corrected for factors like biomass and fishing effort. GMRI is working on this process and the results will be presented to the National Marine Fisheries Service stock assessment teams in the next 6-8 months.

In terms of the data being public, you can go to http://www.codresearch.org or www.gmamapping.org/codmapping to get all the information on the project and the recapture data.

Discussion

Comment: Tagging fish has come a long way, and I think it's great. We had been told there was no mixing of our cod with 3Ps fish but then someone caught a fish in Ingonish that was from 3Ps and we had proof that they mixed.

Q: What are your tag loss numbers?
A: It's estimated at about 15%. Due to the small cost of the tags it would make sense that future studies should double tag each fish.

Q: Is there a difference in time from the recaptures of Halifax versus Georges Bank?
A: We have not looked at that information yet.

Q: Do cod spawn in the same areas each year?
A: Yes.

Q: Is there genetic diversity among the three groups?
A: It depends on the study you are looking at, Georges fish spawn in the Winter and Bay of Fundy fish spawn in the Fall.

THE DFO-FSRS INSHORE ECOSYSTEM RESEARCH PROJECT PROGRESS REPORT

Presented by: Alida Bundy, Research Scientist, DFO; Nell den Heyer, FSRS Project Officer; Carina Gjerdrum, Wildlife Biologist, Canadian Wildlife Service, Environment Canada
Summarized by: Nell den Heyer, FSRS Project Officer

With the move towards ecosystem-based and integrated fisheries management, it has become increasingly important that we improve our understanding of the structure and dynamics of the inshore ecosystem. Here, we present a progress report on the *DFO/FSRS Proposal For Inshore Ecosystem Research Project*, which was funded through Ocean Action Plan (OAP) Phase 1. The OAP provided a unique opportunity to focus research on the inshore area of the Scotian Shelf, defined in this project as the area inshore of 50 fathoms (the inshore limit of the DFO July research vessel survey) and/or the 12 nautical mile territorial sea limit, from Cape North to Cape Sable Island. Deliverables at the end of the project include a draft of the first volume of the Inshore Scotian Shelf Ecosystem Overview and Assessment Report (EOAR) and the identification of candidate Ecologically and Biologically Significant Areas (EBSAs).

The Inshore Ecosystem Project consists of nine research initiatives that will contribute to the Inshore Scotian Shelf EOAR. These research initiatives are:

1. Workshop on Inshore Ecosystems and Significant Areas of the Scotian Shelf (WIESASS)
2. Grey Seal Pup Survey
3. Monitoring of Environmental and Oceanographic Data
4. DFO Databases
5. Fishery-Independent Research
6. LEK Survey of Commercial Fishermen
7. Video of bottom habitat using URCHIN
8. At-Sea Catch Analysis

An overview of WIESASS was presented at the FSRS meeting last year and copies of the proceedings are now available. The Grey Seal Pup Survey and the Monitoring of Environmental and Oceanographic data were discussed during other presentations at this workshop. Here, we focus on initiatives 4 through 8, for which Alida Bundy is the chief scientist.

Data from commercial landings, industry surveys and the observer program are being analysed to describe the annual and seasonal distribution of landings of select species in the inshore area from Cape Sable to Cape North. The distribution and abundance of species in the inshore will be compared to the offshore areas of the Scotian Shelf. The distribution of snow crab and cod commercial landings from 1990 to 2005 were presented as examples. Landings without positional data were not included nor were the offshore, did not include the Bay of Fundy (4Xrs). For snow crab landings inshore are almost as large as landing outside. For cod the landings offshore were greater, but the 4VsN sentinel longline survey shows peaks in distribution along shore and around the haddock closed area.

This project also included an extensive fisheries-independent survey of a range of ecosystem components in ten focal areas. Among other things, the data collected could be used to identify latitudinal and inshore/offshore differences in biodiversity, abundance and distribution of some species, habitat associations, identify potential EBSAs and verify or “ground-truth” results from at-sea analysis

of commercial catch. At each of these focal areas five inshore sites were chosen arbitrarily for beach seining and fishing FSRS lobster recruitment traps. Further from shore, six stations were randomly chosen in three depth strata along a transect from 5 to 50 fathoms. At each station, three FSRS lobster recruitment traps and one multi-panel gillnet were fished on two overnight sets. This work was completed with the help of local fishermen. At each of the depth strata (three stations) and at two of the beach seining sites (two stations) water samples were taken for nutrient analysis, vertical tows were made for zooplankton and CTD casts were completed. Initial analysis of the data from the transects between 5 and 50 fathoms shows the predominance of crab caught. And analysis of nitrogen and phosphorus indicates that the water quality in all but a few stations is high. Opportunistic, quantitative bird surveys were also completed at all 10 transects of the fisheries independent survey. Ninety-eight 10-minute surveys were completed and 279 birds observed, including 14 species. Preliminary analysis suggests that there may be slightly higher bird abundance in Port La Tour and Mira Bay – the most westerly and easterly areas sampled. Some of the species seen are long-term residents of Nova Scotia waters, other are transient and migratory.

Another component of this project is a Local Ecological Knowledge Survey of commercial fishermen to map local knowledge of the distribution, seasonal changes in abundance, and life history and habitat associations of fish, invertebrates, birds, mammals and macrophytes. A rigorous two-tiered approach to this survey has been adopted (Davis and Wagner 2003). Tier 1 is a telephone survey that asked commercial inshore fishermen to identify experts or persons particularly knowledgeable about the ecology of their fishing grounds. The second tier is an open-ended face-to-face interview with the peer-identified experts. The Tier 1 phone survey is complete in all but one area, and the Tier 2 face-to-face interviews are underway in three of seven areas. Digitizing of maps from the local knowledge surveys is underway and one example of bird distribution was presented.

An underwater video survey using URCHIN was completed in six of the focal bays of the fisheries-independent research between mid-June and early July 2006. In total, 55 tows or drifts were completed. The average tow length was 750 m. The tows were completed to the extent possible in representative soft and hard bottom, low and high exposure sites. In total more that 30 hours of video of the bottom has been recorded and analysed. There were more that 40 species identified with several species observed for which we are seeking appropriate experts to help with identification. A very preliminary analysis shows there to be a relatively low encounter rate of all species, with some species, such as sea urchins being found in all bays, and others, such as lobster, being observed in only some of the bays. Further analysis of this data will take into account the video quality and habitat type.

At-sea catch analysis began in the Fall of 2005. The first trip was a longline trip on the 4VsW Sentinel Survey. All 41 subsequent trips were on commercial lobster vessels. FSRS Fisheries Technicians collected length and weigh data on all species caught in a selection of traps. Of the 42 trips completed, nine have been uploaded to the DFO database. A few examples highlighting the distribution of fish and mollusc catches in lobster trap were presented. Further analysis of the distribution of species along the coast by comparing LFAs, and the distribution of species along depth gradients will be completed. This data could also contribute to our understanding of the basic biology of understudied species by looking at length-frequency and length-weight relationships. Further work could also include small-scale distribution maps in more intensely sampled areas, perhaps comparing the species abundance and communities of headlands and bays.

Before this project wraps up March 30, 2007, DFO and the FSRS will host a Data Synthesis Workshop to bring all components of the Inshore Ecosystem Research project together. A proceedings from this workshop will be completed and the results will be incorporated into the Inshore Scotian Shelf EOAR. The FSRS Ecosystem Working Group will continue to work on this data and look for research opportunities and funding to continue ecosystem research in the inshore.

Fishermen have been involved in the design and conduct of all components of the Inshore Ecosystem Research Project. The project could not have been completed without the involvement of FSRS Fisheries Technicians, FSRS staff and DFO in-kind support. The project also benefited from the expertise and in-kind support of Environment Canada's Canadian Wildlife Service (CWS).

SPATIAL UTILIZATION OF BENTHIC HABITATS BY DEMERSAL FISH ON THE SCOTIAN SHELF PROGRESS REPORT

Presented by: Ellen Kenchington, Director, Centre for Marine Biodiversity, DFO
Summarized by: Aaron Retzlaff, FSRS Research Assistant

This project tried to determine what biotic and abiotic characteristics of the environment make different areas vary significantly in their capacity as haddock habitat. In order to do this, they first had to find several pairs of hot and cold spots for haddock populations (characterized by abundance) that were in close proximity to one another. In this manner they could compare characteristics of the two areas and try to define why one would be considered preferred haddock habitat.

Haddock were chosen as a target species because they are the most abundant demersal fish on the Scotian Shelf and have an important commercial fishery. As well, juvenile haddock are closely tied to the benthos and so would be likely to be affected by it. This was important in this study because benthic habitat was being closely studied as a cause of variability in demersal fish populations.

Areas of the Scotian Shelf were assessed as haddock habitat based on the Fisheries and Oceans Canada (DFO) Summer groundfish trawl from 1970 to 2001. This data allowed the researchers to determine which areas had the highest haddock populations. It was assumed that haddock would be preferentially found in preferred habitat. Area selection did not rely simply on abundance, it included age and size components and whether fishing had recently taken place in the area. Four of the six chosen sites fell within the boundaries of an area which had closed to haddock fishing in 1987.

The six areas (three high abundance and three not) were characterized with regards to temperature, depth, and substrate type. As well, a measure of the diversity of the seafloor at each location was produced using towcams, sidescan sonar, multi-beam bathymetry, and as well bottom grabs to describe geological properties of sediments.

All sampling took place in the Fall when haddock juveniles had settled to the seafloor. Day and night sampling was initiated to assure that diurnal differences in behavior were not missed. Haddock that were caught during the research had their stomach contents saved for further analysis. Video samples of macrofauna were taken from transects and also specific habitat types.

The bottom of each area was assessed on two scales. The first was a large scale 10 x 10 km study area which was broadly assessed. At this scale, 800m separated transect lines were examined with sidescan sonar (some), Biosonics DT, and multibeam sonar.

The second benthic assessment was on a fine scale of 1 x 5 km and much more detailed analysis of the seabed was undertaken. The 1x 5 km areas attempted to include the depth and habitat variability of the 10 x 10 km. These areas were assessed using Biosonics DT, Sidescan Sonar, Towcams, Videograb, IKU grab (sediment), and Campelin otter trawl.

A geo-referenced three layer classification was produced using the collected data that included benthic communities, surficial geology, and bathymetry. The volume of data collected in this research required special consideration for data management. The data collected from this research has not been fully analyzed, but initial analysis has shown some interesting results.

Approximately 30 to 45 species were found in the Campelin trawls with haddock being the dominant species (~90% of sets). Haddock were found to be more abundant in areas which had been classified as "hotspots" which were chosen from historical data, and so they represent current "hotspots" as well.

The haddock rich areas were found to be have greater bathymetric relief than their haddock poor counterparts at small, medium, and large scales. Generally, haddock seem to prefer areas which are more rugged and complex, however, this is the least pronounced on Emerald Bank.

Data acquired from the sidescan sonar showed that areas with a large amount of sandy bottom were less preferred by haddock. Again, a more complex and patchy substrate was preferred by the haddock. Juveniles seem to prefer to sit in troughs termed megaripples.

The different methods for assessing bottom type and fish biomass all have positive characteristics. For geological data, the multibeam sonar is preferred because of its resolution (0.5m) and its ability to define four types of substrate. There were differences in fish biomass assessment, but all data corresponded relatively well.

Stomach content analysis for the haddock found that they were eating 142 different prey items. There were many differences in stomach contents depending on whether the haddock was from a preferred area or not, and which bank they were on. The differences between hot and cold areas were significant for all areas except for Emerald Bank.

The research presented produced a large geo-referenced database which can be used to assess characteristics of preferred habitat for haddock. Haddock seem to prefer complex habitats which are rugged and patchy. However, some analyses show that haddock seem to preferentially feed from sandy habitats and so further research is required to understand this disparity.

Discussion

Q: Why can you trawl in the closed area?
A: It required a permit.

Q: Are you finding juvenile lobster?
A: No, not in bottom trawls or in stomach contents of haddock.

Q: Do haddock help to make their own habitat by fertilizing the bottom with feces?
A: They might but we haven't looked into it.

Q: When are the haddock feeding? Is there differences in food between night and day?
A: No, difference in stomach contents but video might show some differences.

Q: Is there more danger of predation in some habitats?
A: Hard to say, there isn't any data available.

Q: When is the survey done?
A: In the fall.

FISHERY INDEPENDENT INDICATORS OF LOBSTER ABUNDANCE

Presented by: John Tremblay, Head, Atlantic Coast Crustacean Section, DFO
Summarized by: Kate Gardiner, FSRS Fisheries Technician

Lobsters are the most important fishery for the Maritime economy, consisting of 50% of the total landed value of seafood in 2003. The Southwest Nova Scotia Lobster Fishing Area (LFA) 34 is the most productive lobster area in the Maritimes producing 40% of Canadian lobsters and 23% of the lobsters caught throughout the world. It is for this reason that understanding the stocks are so important. Currently, there are no fishery-independent lobster surveys. Most lobster stock information comes from the industry and is based on landings, catch rates as reported in the commercial log books, the FSRS trap survey (reliant on volunteer commercial fishermen) and other trawl surveys such as the scallop survey where lobsters are obtained as bycatch. Although these methods of obtaining stock information are useful, it is important to develop a fishery-independent method that is not affected by changes in the fishery such as better technology and efficiency.

In developing a new survey method, habitat is an important characteristic to consider. Lobsters tend to prefer hard substrate, however, they will also create pits and burrows in soft sediment. The type of habitat in the areas to be surveyed could affect the type of survey tool. Traps can be used at various depths and substrates and can provide accurate size and sex data, however, there is always the question of catchability throughout the year. Similarly, diving can produce accurate size, sex and density data but it is limited by depth (<20m) and substrate (boulder and macrophyte bottoms are difficult to search) and is expensive. Video surveys have the advantage that large areas and greater depths can be covered compared to diving and at a lower cost. A disadvantage with video is that it is difficult to sex and size lobsters through video due to distortion and position, however, it is possible to place them into various categories such as pre-recruits, recruits, large and very large.

To further explore the potential of video, Saint Mary's Bay and Lobster Bay were surveyed during September and October 2006. These two areas were chosen because they represent two of the most productive lobster fishing grounds in LFA 34. In 2004-2005, these areas produced approximately 2200 tonne of lobster, exceeding any other area in the Scotia-Fundy region.

The camera system utilized was the URCHIN system developed by Strong and Lawton and was also used for the Inshore Ecosystem Project. This system is robust and consists of a black and white video camera which is drifted along behind a boat. The system includes two lasers placed 25cm apart to aid in quantitative measurements. The URCHIN system also comes equipped with light for use in deeper water, however, the lights created too much backscatter in the turbid water, so ambient light was used instead. Along with the video, GPS positions, depths and bottom maps were recorded throughout the transects. The grids sampled were chosen randomly with some suggestion from the fishermen and stratified between inshore and offshore areas. Once at the grid, the boat was positioned so that the wind would cause it to drift from one side of the grid to the other. The ideal drift was about 1 knot, with speeds greater than 2 knots resulting in difficulty in keeping the camera at the proper depth and in seeing and counting lobsters. The maximum depth was about 45m, however, the average depth was 25m. Due to the angle of the camera (3m view across the top of the screen and only 1-1.5m view across the middle), only lobsters viewed in the lower half of the screen were counted.

<u>Lobster Bay</u>

Lobster Bay was sampled during ten days in August and September and resulted in 71 successful transects representing ~27% of the total possible grids. Traps were also set to help verify results and measurements. The substrate in this area was primarily mud, sand, gravel and small cobble, however,

there were rougher areas which made counting difficult. The lobsters found in these low complexity bottoms may be feeding on benthic invertebrates, however, further research is required.

As a side note, there were more lobster observed in the Inner Bay than the Outer Bay and initial density calculations were similar to estimates provided from dive surveys of the area. Further analysis of the data and the removal of unsuitable habitat may result in an increased density estimate.

Saint Mary's Bay

Saint Mary's Bay appeared to have more suitable substrate for the video survey than Lobster Bay, however, clarity was an issue in the Upper Bay along with depth in the Lower Bay. Yet, even with the added challenges, 57 successful transects were performed over six days in September and October representing 15% of the available grids. Interestingly, Saint Mary's Bay appeared to have more large lobsters than Lobster Bay and had less of a pronounced difference between the inside and outside areas, with the most lobsters per transect found in the lower half of the Bay. This may be the result of the lobsters actively moving in and out of the area.

Although the current video system worked well for the present survey, there are more sophisticated systems available. The Tow Cam can produce colour images and is capable of reaching greater depths, however, it requires special rigging, boat and technicians to achieve a similar result as the URCHIN system.

Even though the data has yet to be analyzed, it was interesting to see lobsters on almost every transect, irregardless of substrate. In the future, an examination of the use of various substrate in relation to season may be interesting, along with finding ways to improve the video and image quality.

Q: When the lobsters were found on the open bottom, would that suggest lower predation?
A: Possibly.

Comment: Lobsters with more barnacles on them indicate that the lobster molted earlier in the season .

Q: Anything done at night?
A: No.

Q: Is there a measuring error due to the curvature of the lens?
A: Not significant but broad size groups were chosen to account for measurement error.

Q: How about using colour pictures and more light to see the lobsters?
A: Maybe, but would lights affect the behaviour of the lobsters?

John Tremblay. *(Photo courtesy of L. Wayne Spinney)*

ESTIMATING THE PROBABILITIES OF RIGHT WHALE AND FISHING GEAR ENTANGLEMENTS IN THE GULF OF MAINE AND SCOTIA-FUNDY REGION

Presented by: Chris Taggart, Associate Professor, Dalhousie University
Summarized by: Kate Gardiner, FSRS Fisheries Technician

Gear entanglement of North Atlantic right whales is the second leading cause of human-related whale deaths with only vessel strikes showing a greater mortality rate. Since 1986, 50 dead right whales have been found, with six the direct result of gear entanglement. There has also been 61 reported cases of active entanglements in which it is assumed that at least 12 have died (due to their weakened state or have not been observed recently), 8 remain entangled and 33 have been disentangled naturally or through the efforts of human volunteers. Of the nearly 350 remaining right whales, 57% of the known animals show signs of past entanglements, with such occurrences appearing to be on an increase. Not only do entangled whales have an increased likelihood of death, they are also likely to sink after death causing an underestimation of the true mortality rate.

There have been several suggestions to help reduce the chance of entanglements of these endangered whales such as gear modifications and closure/limits to gear in specific areas favored by right whales, however, both these suggestions can have negative economic impacts for surrounding communities. Ideally, gear should be set with sinking groundlines and future development of new fishing methods to eliminate the need to attach gear to a buoy may help to reduce entanglements. However, to date, recent changes in gear have not shown a significant reduction in entanglements. Also, areas designated as Right Whale Conservation Areas do not encompass the seasonal migrations of the whales, therefore entanglements are still possible. There is also no legal requirement to not put gear in these areas – it is just a suggestion.

In 2000 a project was initiated using risk management techniques to assess the consequences and probability of entanglements in various areas throughout the year. This was done in an attempt to minimize entanglement risk for the whales while limiting the degree of disruption to the fishing community. A similar method was used to evaluate ship strike deaths in right whales and resulted in a shift of the shipping lanes to the east in the Bay of Fundy. This decreased the probability of ship strikes by 80% and was supported by the industry due to its low cost to implement. In the case of entanglements, there are only three possible consequences:

1) the whales become disentangled naturally, or the gear wears out and falls off or from the assistance of humans;
2) the whale becomes sick and then disentangled (may or may not survive);
3) the whale becomes sick and dies before it is able to be disentangled.

Data from the New England Aquarium on whale sightings between 1987 and 2002 were used to determine preferred whale areas which included the Grand Manan Basin in the Bay of Fundy and Roseway Basin on the SW Scotian Shelf – both of which have been designated as Northern Right Whale Conservation Areas. Gear locations were then examined for June through October of 1999-2005 since these are the months the whales are most prevalent in the areas. Focus was placed on gill nets, hook and line fishing and crab pots taking into account the number of sets deployed, amount of gear per set, soak time and depth to determine how much exposure the whales would have to the gear. Catch rates in these areas were also examined to determine importance of the fishery in those particular spots. Gear is wide spread with some concentrations around Grand Manan Island, Georges Basin and Georges Bank, however, gear was relatively uniform throughout the Fundy-Scotia region.

Gill Nets

Most of the gill nets were most numerous in July and August catching primarily cod, pollock and white hake, however, not many gill nets were found in the conservation areas. This may be the result of unfavorable fishing habitat or simply that the fishermen do not want to go into the area. In either case, the numbers of gill nets do not qualitatively appear to pose a major threat to the whales in the conservation areas relative to other gear and/or regions.

Hook and Line

This gear type was more spread out throughout the area compared to the gill nets, with lines surrounding the Roseway Basin and sets within the southern half of the Bay of Fundy Conservation Area. On average, each set has approximately 4000 hooks and is fished primarily during July and August. The main fish caught with this method were cod, tilefish, dogfish, white hake and cusk.

Traps

The trap fishery appeared to be the most limited to specific areas. These traps catch primarily Jonah and Rock crabs during July to September, peaking in August with an average of 2800 traps set.

Although no specific gear type had an increased likelihood of entanglement in the Bay of Fundy, the amount of gear surrounding the conservation area would make it difficult for any whales to reach this destination unscathed. In the Roseway Basin, however, hook and line gear appear to present the greatest threat entanglement. However, the gear in the surrounding water also represents a threat to the whales.

It is therefore suggested that gear should be removed for the conservation areas. Since there is currently a limited amount of fishing in these areas, it may not be too difficult to implement gear limitation, hopefully with the initiative driven by the local fishing industry. If unable to completely remove gear from these areas, it is important to remember that the critical months for the Northern Atlantic right whales in Canadian waters are July and August – so attempts could be made to limit fishing in these areas during that time. Finally, entanglements will never completely be eliminated however, with some forethought, the probability of such occurrences can be reduced.

Discussion

Comment: Lack of gear between the Roseway and Brown's Bank is due to minimal licenses for the area.

Q: When examining the speed and probability of death, was the size (tonnage) of boat taken into account?

A: Vessels were assumed to be of greater mass than the whales (>40t), thus the size of the vessel is of little consequence relative to speed.

Comment: He once encountered an entangled humpback whale which had 57 traps, 14 balloons and 8 anchors attached to it – were able to disentangle it.

SCIENTIFIC PROGRAM COMMITTEE REPORT AND PROJECTS IN REVIEW

Shellfish Working Group Report

Lobster Moult and Quality Monitoring Project Update

The Lobster Moult and Quality Monitoring (LM&Q) Project was administered this year by the AVC Lobster Science Centre. Funding was provided by Nova Scotia Fisheries and Aquaculture, AVC Lobster Science Centre, the Municipalities of Claire, Argyle and Yarmouth, and the Town of Yarmouth. The FSRS was contracted to do the sampling.

24 plant samples were done from November 29 to December 16, 2006. Plant samples continue to be done when lobsters are available. Daily samples of blood protein and moult staging were done in Lunenburg from June to September 2006. Bi-weekly at-sea samples were done from June to mid-October 2006 from Port La Tour, Argyle and Yarmouth. Pre-season sampling was done from October 14 to November 8, 2006 from Port La Tour, Argyle, Yarmouth, Sambro, Moose Harbour, Cape Sable and St. Mary's Bay. The results are posted to the website www.lobsterscience.ca/molt.

Aaron Retzlaff gave a report on the research paper he co-authored on Variation in Annual Haemolymph Protein Regimes in the American Lobster (*Homarus americanus*), using the data from the LM&Q Project. After moulting, lobsters are soft, have little meat and are more susceptible to mortality. The moult stage of a lobster can be observed by haemolymph protein/pleopod staging. The known variables affecting moult timing include temperature, which is the most important, food availability, and food quality, amongst other factors. Aaron indicated that temperature has the known largest effect and that in this analysis he concentrated on this to determine whether temperature was responsible in this case.

Data collection started in 2004. Data has been collected on the Brix Index (relative), moult stage, sex, carapace length, and location. Aaron presented results on the changes in the Brix Index by area and by year, the changes in temperature over the years, the changes in the Brix Index by carapace length over time, and the changes in the Brix index by sex over time. His research showed that there are seasonal changes in protein and differences between deep and shallow sites, small versus larger lobster, and male versus female lobster. He indicated that more data is required.

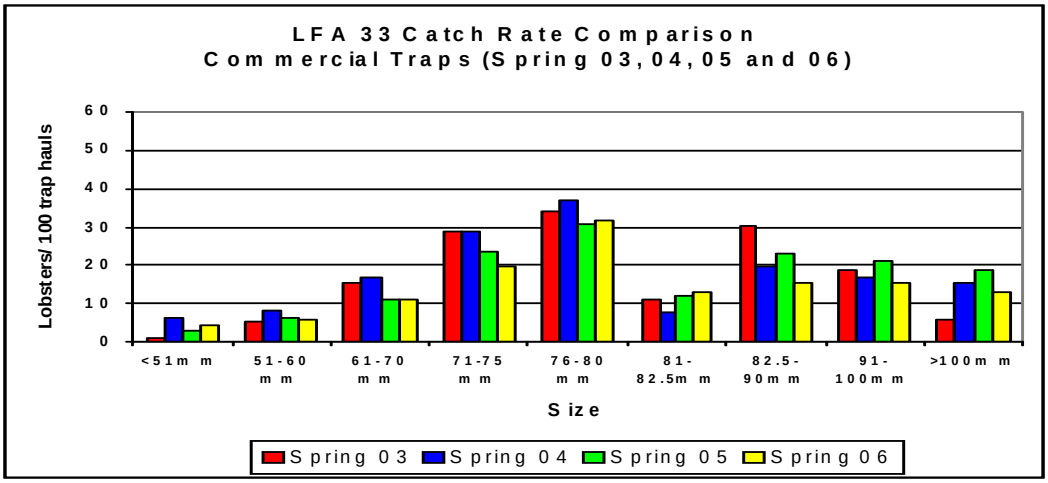
Discussion

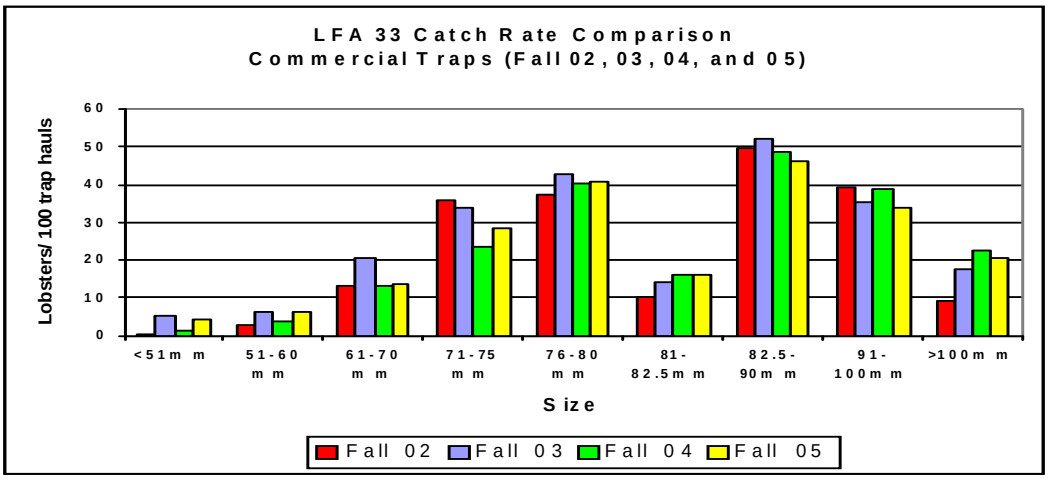
Questions were asked about the use of the pelopod data to interpret blood protein, the value of this for designing further research, e.g. use of fixed stations, and the differences between males and females.

Lobster Recruitment and Commercial Trap Sampling Projects

Carl MacDonald gave a presentation on the Lobster Recruitment Project at the Joint FSRS-GOMLF Lobster Science Workshop held prior to the Conference. A copy of his presentation is included in the Lobster Science Workshop report.

Carl gave an update on the LFA 33 Commercial Trap Sampling Project. Last season, 52 fishermen participated in the project, collecting information from a total of 156 commercial lobster traps. There were 3,023 trap hauls in the Fall and 3,246 in the Spring. A total of 7,241 lobsters were measured in the Fall and 5,432 in the Spring. Participants collect the same information that is collected for the Lobster Recruitment Project. There is now several years of data; there does not appear to be any real change over time.





Lobster Collector Project Proposal

John Tremblay gave a presentation on the Lobster Collector Project which the Shellfish Working Group is recommending the FSRS do. Young-of-year (YOY) is an important life history stage for lobster. The purpose of this project is to test artificial collectors for measuring YOY lobster abundance in shallow and deeper areas in South Western Nova Scotia. 100 – 120 collectors will be set at a range of depths in July. The project will involve the construction of collectors using the design being used by Rick Wahle in his project. The collectors will be deployed in Lobster Bay where YOY lobsters were collected by suction sampling in 2005. If successful, the project could be expanded to other areas in future years. Where possible, it will be complemented by suction sampling. It is possible that the results from such research could be used to forecast lobster abundance in future years, to compare between areas, and as an indicator of the importance of oceanography.

Groundfish Working Group Report

4VsW Sentinel Monitoring Project – Random Survey Phase

The 4VsW Sentinel Monitoring Project Random Survey was developed in a way that ensures a bridging index between the past stratified random survey and the future if the resource recovers. The objectives and benefits listed for the original project continue to be used as much as possible. The focus is on six strata – 462, 463, 464, 465, 468, 469. Three vessels were used to complete 53 stations.

The revenue from the sale of fish was greater than projected, the resulting surplus will be used to help fund the project next year.

Table 1:

2006/2007 Sentinel Monitoring Project - Budget Analysis			
Updated January 22, 2007			
	Projected Costs	**Revised Projected Costs**	**Actual**
Projected Revenue			
JPA	$42,275.00	$46,475.00	$46,475.00
Projected Revenue From Sale of Fish	$2,000.00	$2,000.00	$4,368.92
Total Revenue	**$44,275.00**	**$48,475.00**	**$50,843.92**
Projected Expenses			
General Operating Expenses	$1,000.00	$1,000.00	$802.30
Staff Travel and Living	$500.00	$500.00	$1,125.16
Observers	$3,500.00	$3,500.00	$3,392.71
Charter Fees	$38,425.00	$42,400.00	$42,400.00
Workers Comp	$850.00	$935.00	$787.66
Total Expenses	**$44,275.00**	**$48,335.00**	**$48,507.83**
Surplus/(Deficit)			**$2,336.09**

Table 2: Random Survey Phase Revenue Analysis

Year	# Stations Completed	Total Pounds Fish Sold	Average Pounds of Fish/Station	Total Revenue From Sale of Fish	Average Revenue Per Station	Average Price Per Pound
2006	53	4,270	80.57	$2,717.90	$51.28	$0.64
2005	53	3,712	$70.04	$2,265.40	$42.74	$0.61
2004	53	6,640	125.28	$6,688.80	$126.20	$1.01*[Note]
2003	201	11,032	54.89	$8,430.35	$41.94	$0.76
2002	191	19,124	100.13	$17,304.33	$90.60	$0.90
2001	202	19,300	95.54	$14,287.35	$70.73	$0.74
2000	251	27,404	109.18	$19,951.55	$79.49	$0.73
1999	253	26,865	106.19	$22,633.70	$85.79	$0.81
1998	252	36,639	145.39	$33,073.30	$131.24	$0.90
1997	248	23,396	94.34	$15,376.43	$62.00	$0.66
1996	252	41,163	163.35	$24,055.25	$95.46	$0.58
1995	221	31,168	141.03	$25,932.76	$117.34	$0.83

Note: Average price/pound artificially high because of halibut. Average price/pound of halibut was $5.51, average price/pound of all other fish was $0.57.

4VsW Sentinel Monitoring Project – Commercial Index Phase

The 4VsW Sentinel Monitoring Project Commercial Index can utilize up to 20 boats, each allowed 12 fishing days. Larger vessels are also allowed two exploratory days. 100% DMP is required on all trips not accompanied by an Observer (At-Sea). Vessels selected for the Commercial Index must complete a minimum of 3 fishing days to remain eligible for the project in future years, although this requirement can be waived at the discretion of the Groundfish Working Group depending on circumstances. Vessels are paid 90% of the value of fish landed, except halibut, for which they are paid 50% of the value. Vessels pay their own hail, DMP and Observer costs. The goal is to have 30% at-sea sampling of the trips, using FSRS technicians when possible, otherwise an Observer is used. Shore-based condition sampling is done on as many trips as possible.

Six vessels were selected to participate in the project for 2006/07. Two vessels completed a total of six days. Vessels found the price of fuel, bait and fish to be a detriment to participating. There continues to be an interest in doing the Commercial Index if and when the price of fuel, bait and fish, weather, etc. makes it feasible.

Table 4: Commercial Index Phase Revenue Analysis

Year	# Fishing Days Completed	Total Pounds Fish Sold	Average Pounds of Fish/ Fishing	Total Revenue From Sale of Fish	Average Revenue Per Fishing Day	Average Price Per Pound	Vessels Share of Revenue	FSRS Share of Revenue
2006	6	13,404	2,234	$10,174.10	$1,695.68	$0.76	$8,523.08	$1,651.02
2005	5	7,124	1,424.80	$5,316.65	$1,063.33	$0.75	$4,650.59	$666.07
2004	0	0	0	0	0	0	0	0
2003	2	2,022	1,011	$1,700.95	$850.48	$0.84	$1,180.41	$520.54
2002	20	52,379	2,618.95	$45,372.95	$2,268.65	$0.87	$32,790.15	$12,582.80
2001	21	40,960	1,950.48	$30,264.45	$1,441.16	$0.74	$25,007.49	$5,256.96
2000	4	10,943	2,735.75	$7,893.15	$1,973.29	$0.72	$5,874.74	$2,018.41
1999	41	143,092	3,490.05	$112,393.15	$2,741.30	$0.79	$91,053.35	$21,339.80
1998	23	85,153.5	3,702.33	$79,999.72	$3,478.25	$0.94	$58,529.92	$21,469.80
1997	100	250,053.6	2,500.54	$168,180.80	$1,681.81	$0.67	$122,622.54	$45,558.26
1996	44	259,509.0	5,897.93	$186,716.00	$4,243.55	$0.72	$134,545.96	$52,170.04

Condition Sampling Project

Efforts were made in 2006 to revitalize this project. A limited number of samples were done. Factors affecting the project included ability to get round cod and haddock and availability of a technician to do the sampling. The intent is to continue focusing on sampling particular species and areas, where we can get good seasonal coverage (e.g.: 4X cod and haddock). The project is also striving to:

- Improve quality assurance in data collection/entry, including doing it in a more timely manner.
- Improve techniques – improve precision.
- Increase focus on evaluating impacts on maturity and spawning.
- Improve maturity staging.
- Include fecundity determination (number of eggs a female produces).
- Involve Ed Trippel – couple field work with lab work. Ed will be asked to be on the Groundfish Working Group.

Predator/Prey Relationships Study

The collection of stomachs for the predator/prey relationships study was put on hold pending analysis of what we already have and a review of where to go. FSRS Research Assistant Shannon Scott-Tibbetts was to work with Alida Bundy on the analysis. Unfortunately, Alida was not available to work on this project this year due to time commitments with the Inshore Ecosystem Project. She plans to begin analysis after April 1, 2007.

Multi-Panel Gillnet Pollock Survey

The purpose of the Multi-Panel Gillnet Pollock Survey is to demonstrate that multi-panel gillnets will catch small fish, that we will see a larger size range of Pollock so it can be used in the assessment. John Levy volunteered to do the project. The FSRS agreed to provide the multi-panel gillnets with small mesh sizes for him to fish next to his commercial nets. The FSRS also agreed to cover the cost of 2000 lbs of Pollock quota to do the survey; John will cover all other trip costs. An FSRS technician will go on the trip to do sampling. We were unable to complete the project this year due to a delay in the arrival of the nets, weather and a lack of quota. The project will proceed in 2007 if quota can be obtained.

Seal Worm Impact Research Project Update

The FSRS was contracted by the Grey Seal Research and Development Society (GSR&DS) to collect cod and American plaice samples to be analyzed for seal worm infestation rates. Cod and American plaice samples were collected in 4X and 4Vn; cod samples were collected in 4X. The samples were sent to Gary McClelland, DFO Moncton, for analysis. We are awaiting the results.

Discussion

Comment: In some areas where seal worms are abundant you can get a drop in price from $0.4 to $0.6 per pound.

Comment: Seal worms are spreading with the seals.

Comment: John Levy gave an update on the GSR&DS, indicating that they are working on developing a market for grey seal meat; the problem that has arisen with the Canadian Food Inspection Agency (CFIA) is deciding whether grey seals are meat or fish.

Ecosystem Working Group Report

Inshore Ecosystem Project Update

Please see the article titled "The DFO-FSRS Inshore Ecosystem Research Project Progress Report" on Page 10.

Grey Seal Pupping Survey Results

The Inshore Ecosystem Research Project on the Scotian Shelf included an Inshore Grey Seal Pupping Survey. Anecdotal reports suggested an increase in the number of grey seal pups born along the eastern shore. However, these locations and an estimate of the number of pups born were largely unknown. A verbal questionnaire was designed to identify these sites and provide a crude estimate of the number of pups born. The results from the questionnaire were to be used to design an aerial survey to provide a better estimate of the population size along the eastern shore. The questionnaire was designed to collect information from fishermen on the location and size of grey seal pupping sites along the eastern shore. The following questions were asked: where have you seen grey seal pups; when did you see them; how many did you see; what type of habitat were they seen on; and are there sites where you use to see pups but no longer do.

Damian Lidgard and Jim McMillan with the Population Ecology Division at DFO, were responsible for doing the analysis of the survey results. In doing the analysis, the following survey data were excluded: counts taken outside of the grey seal breeding period, i.e. March – November, and sightings of more than 10 years old. Count data taken from the same location were averaged. In summary, the survey provided reasonable coverage of the Eastern Shore. The largest breeding colonies identified (>100 pups) were: Noddy Island, Cape Sable, Inshore islands off Ecum Secum and Scatarie Island. Many smaller colonies were located in Mahone Bay. Based on these data, a thorough grey seal survey was to be done in January 2007.

Please see the article "Inshore Ecosystem Research Project on the Scotian Shelf - Nova Scotian Shore Grey Seal Pup Survey" on Page 32 for more details on the results of this survey and the aerial survey conducted in January 2007.

Data Management Working Group Report

The Data Management Working Group was formerly called the Lobster Recruitment Project Data Management Working Group. The Group was renamed this year when it expanded its objectives to included other data sets. The Lobster Recruitment data is still the cornerstone data set. The Working Group deals with:

- database design, data entry and error checking;
- data sharing - structure should conform to a recognized international standard, let people know what data exits (develop metadata); and
- data management - security, backups and long-term storage.

FSRS Data Sets:

- Lobster Moult and Quality Project data
- Commercial Trap Sampling and Lobster Recruitment data
- Minilog temperature data;
- 4VsW Sentinel Program Commercial Index data;
- 4VsW Sentinel Program Random Survey data;
- Condition Sampling data;
- Stomach database;
- At-sea sampling data; and
- Inshore Ecosystem Project data.

Some metadata has been written for the Lobster Recruitment Project data. A draft data dictionary has been written for the Lobster Recruitment Project data.

US Data Sets:

- Ventless Trap Survey;
- Whale Rope Testing;
- Minilog temperature data – Jim Manning is handling this data; and
- DMR At-sea Sampling database

2007/08 WORKPLAN

PROJECT	STATUS	PROPOSED PLAN FOR 2007/08
4VsW Sentinel Monitoring Project	Finish date is March 31/07; 53 stations completed in Random Phase; to date, 6 fishing days have been done on the Commercial Index. (price of fish/bait/fuel and availability of fish factors in low participation in CI) Results will be sent to fishermen and will be posted to web site.	Continue as is.
Condition Study	Efforts made in 2006 to revitalize program. Limited number of samples done. Factors affecting the project included ability to get round cod and haddock and availability of technician.	• Focus sampling on particular species and areas, where we can get good seasonal coverage. • Improve quality assurance in data collection/entry, including doing it in a more timely manner. • Improve techniques – improve precision. • Increase focus on evaluating impacts on maturity and spawning. • Improve maturity staging. • Include fecundity determination (number of eggs a female produces). • Involve Ed Trippel – couple field work to lab work. Ask him to be on the Groundfish Working Group.

PROJECT	STATUS	PROPOSED PLAN FOR 2007/08
Predator/Prey Relationships Project	Collection of stomachs was put on hold pending analysis of what we already have and review where to go. Shannon to work with Alida on analysis. Alida not available due to time commitments with Inshore Ecosystem Project.	Alida intends to start work on analysis after April 1.
Lobster Recruitment Project	Currently 180+ fishermen participating in LFA's 27, 28, 29, 30 31A, 31B, 32, 33, 34 & 35. Individuals receive own results. Group results presented at LFA and other meetings. Results available to others by contacting Carl MacDonald. Program working well.	Fill in any gaps. Continue attending LFA meetings to present results. Try to increase number of fishermen participating in LFA 35.
Commercial Trap Sampling Project	52 participants in LFA 33. Individuals receive own results. Group results presented at LFA and other meetings. Results available to others by contacting Carl MacDonald. Program working well. Project tried without success in LFA 34.	LFA 35 may be interested in project once they see how the recruitment project goes. Consider expanding project into other LFAs if fishermen are interested and we have the personnel, equipment and financial resources to expand.
Lobster At-Sea and Shore-Based Sampling	Focus has been on at-sea sampling. Samples done in Cape Breton. Sampling in LFA 34 and 35 done under contract to DFO.	Continue. At-sea sampling should be focus, particularly on vessels in the recruitment trap project.
Inshore Ecosystem Project	Current phase of project ending March 31	Ecosystem Working Group to prepare proposal to continue sampling and LEK survey and seek funding.
Lobster Blood Protein and Molt Staging Project	Shore based and at-sea samples completed throughout past year, shore based sampling continuing.	Finalize funding with AVC-LSC; develop sampling plan; hire technician.
Multi-panel Gillnet Pollock Survey	Nets are purchased. John Levy to do once quota is obtained and weather, etc. permits.	Obtain quota and complete.
Lobster Collector Proposal	Request for funding has been submitted to NS Fisheries. Ashton Spinney working on in-kind contributions for construction of collector. John Tremblay working on getting a model of the collector from Rick Wahle.	Get funding. Finalize design of collectors and build them. Deploy collectors in June.

POSTERS AND DISPLAYS

Thank you to all contributors of posters and displays

Displays:

- AMIRIX Systems Inc. (VEMCO Division) - *Matthew Holland and Dale Webber*
- Atlantic Electronics
- AVC Lobster Science Centre - *Jean Lavallée*
- Lobster Institute - *Cathy Billings and Bob Bayer*
- Nova Scotia Museum - *Andrew Hebda and John Gilhen*
- Underwater Video of Lobster: A Potential Survey Tool - *John Tremblay and Cheryl Frail*
- WWF-Canada - *Jennifer Smith*

Posters:

- Application of DNA Barcodes to the Marine Fishes of Atlantic Canada - *S. L. Clifford, E. L. Kenchington, L. Van Guelpen and P. Bentzen*
- Calibration of American Lobster (*Homarus americanus*) Ventless Trap Study - Determining Efficiency and Selectivity - *Brent Courchene and Kevin Stokesbury*
- Determining the Distribution and Abundance of American Lobster (*Homarus americanus*) Through Space and Time Within Buzzards Bay Massachusetts - *Peter J Milligan, Jefferson T. Turner, Kevin D. Stokesbury*
- Fishermen and Scientists Research Society Code of Ethics
- Fishermen And Scientists Research Society Lobster Recruitment Index From Standard Traps (LRIST) - *Carl MacDonald and John Tremblay*
- Habitat Enhancement in Boston Harbor: Site Selection and Reef Design - *Julie S. Barber, David M. Chosid, Robert Glenn, Kelly Whitmore*
- Identifying Factors that Influence Trap Placement Strategies - *Chris Brehme*
- NAFO and the Ecosystem Approach - *NAFO Secretariat*
- Nova Scotia's Tropical Fish Fauna - *Andrew Hebda, Leslie Pezzack and John Gilhen*
- Size-at-age 7 of Haddock on the Scotian Shelf and Georges Bank - *Peter Hurley*
- Western Scotian Shelf and Bay of Fundy Haddock Size-at-age 7 - *Peter Hurley*
- Why an Ecosystem Approach is the Wrong Paradigm for the Next Stage of Fisheries Management - *Chris Corkett*

ABSTRACTS

Application of DNA Barcodes to the Marine Fishes of Atlantic Canada.

Authors: *S. L. Clifford*[1], E. L. Kenchington[1,2], L. Van Guelpen[3], P. Bentzen[1].*
[1]Dept. of Biology, Dalhousie University, NS, [2]Bedford Institute of Oceanography, Fisheries and Oceans Canada, NS, [3]Atlantic Reference Centre, Huntsman Marine Science Centre, St. Andrews, NB. (Stephen.Clifford@dal.ca)

Abstract

Fishes are the most diverse group of vertebrates with approximately 650 marine species resident in Atlantic Canada. The identification of fish species can be difficult because of the large number of species, and because the body forms of most fishes change dramatically during development. DNA-based approaches have the potential to transform the task of identification by providing rapid diagnosis of species identity across all life stages including eggs and larvae. In addition, DNA-based approaches have applications in delimiting cryptic species, and enable identifications where traditional methods are not possible, such as from fish scales and other body parts. More than 1500 specimens representing 250 species of marine fish have been collected and DNA barcodes are being generated using the mitochondrial Cytochrome Oxidase I (COI) gene. To test the utility of DNA barcodes in facilitating species identification, COI sequences were obtained from 122 unidentified fish collected in Atlantic groundfish surveys between 1996 and 2006 and compared to DNA barcodes generated from known individuals. The results obtained, as well as other applications of DNA barcoding, are discussed in relation to the marine fishes of Atlantic Canada.

Calibration of American Lobster (*Homarus americanus*) Ventless Trap Study - Determining Efficiency and Selectivity

Authors: *Brent Courchene and Kevin Stokesbury; School for Marine Science and Technology-Department of Fisheries Oceanography*

Abstract

American lobster (*Homarus americanus*) landings in Buzzards Bay, Massachusetts were worth approximately 7,000,000 USD in the early 1990's. In 1997 landings declined, this forced the fishery offshore and left limited data for stock assessment. In 2005 the Massachusetts Division of Marine Fisheries (MADMF) began a ventless trap survey to obtain relative estimates of lobster density and size distribution in the area. Ventless traps are identical to commercial traps except they lack the escape device that allows smaller individuals to escape. Researchers at the School for Marine Science and Technology (SMAST) are conducting transect surveys using SCUBA, deploying ventless traps in the same area, and comparing the results of each method to calibrate the MADMF survey. Lobsters captured by both methods were collected, measured, tagged, and released. Average length and sex ratio from traps differ from the average lengths and sex ratios caught along transects. Catchability of lobsters appears to vary with both lobster size and substrate type. It appears as though relative trap estimates select for larger animals and do not reflect the absolute density on the sea floor.

Determining the Distribution and Abundance of American Lobster (*Homarus americanus*) Through Space and Time Within Buzzards Bay Massachusetts

Authors: Peter J Milligan, Jefferson T. Turner, Kevin D. Stokesbury; SMAST - Umass Dartmouth

Abstract

The health of the lobster population in Southern New England waters has been a major concern since the decline of the population in 1999. Many factors may have contributed to the decline, and all life history stages need to be examined. The last study of lobster larvae abundance and distribution in Buzzards Bay was conducted in 1976-79. This present study was designed to test the hypothesis that lobster larvae abundance and distribution vary on a temporal and spatial scale in Buzzards Bay. Sampling was conducted with a 1300 micron nueston net from June 1st through August 17th during daylight hours. Seven Stations sampled weekly with three fifteen minute tows, were fixed in formalin and stored in ethanol. Lobsters were sorted from the raw sample counted and staged.

Fishermen and Scientists Research Society Lobster Recruitment Index From Standard Traps (LRIST)

Authors: Carl MacDonald, Fishermen and Scientists Research Society and John Tremblay, Population Ecology Division, Fisheries and Oceans Canada

Abstract

The Lobster Recruitment Index from Standard Traps (LRIST) project began in the spring of 1999. The goal of the project is to provide an index of the number of lobsters that will molt into the legal sizes in the coming seasons. The project was initiated by the Fishermen and Scientists Research Society (FSRS) in cooperation with the Invertebrate Fisheries Division, DFO at the Bedford Institute of Oceanography (BIO). The initial phase of the project was planned for five years but after reviewing the project's usefulness, it is scheduled to continue for the foreseeable future.

The project involves over 180 volunteer fishermen fishing 2, 3 or 5 standard traps each in fixed locations. The traps are fished in locations from the northern tip of Cape Breton around the southern tip of Nova Scotia and up the Bay of Fundy. The lobster fishing areas (LFAs) represented are 27, 28, 29, 30, 31a, 31b, 32, 33, 34 and 35.

The standard trap is a trap with one inch mesh, wire construction, five inch entrance rings, without escape mechanisms. The fishermen sex and measure all the lobsters they catch in the standard traps. The lobster's carapace is measured into one of 15 size groups using a specially designed gauge.

Participating fishermen also monitor bottom temperatures with a minilog temperature gauge in one of the standard traps. These bottom water temperatures are forwarded to the oceanographers at the BIO and are a great addition to their coastal temperature monitoring database.

Habitat Enhancement in Boston Harbor: Site Selection and Reef Design

Authors: Julie S. Barber, David M. Chosid, Robert Glenn, Kelly Whitmore; Massachusetts Division of Marine Fisheries

Abstract

A cobble/boulder reef was deployed in Massachusetts Bay as part of a mitigation effort to enhance habitat for lobsters and finfish near a recently constructed natural gas pipeline. Criteria for use in site selection were determined prior to field sampling and included: proximity to the pipeline, species abundance and diversity, natural larval supply, cost effectiveness, accessibility, and acceptable depth, substrate, slope, current, and water quality. A model was developed using ESRI's ArcGIS 9.0 that incorporated bathymetry, substrate, and pipeline proximity, which narrowed our potential selection

area by 80 percent. Underwater transect surveys were then conducted to classify and quantify the substrate, ultimately allowing us to select three final sites for consideration. Species abundance and diversity, as well as the potential for larval recruitment, were determined at these three sites using suction sampling and settlement collectors. Data were also collected at a nearby natural reef. Upon completion of multiple analyses, including diversity indices and site ranking, we selected a site in Boston Harbor for the habitat enhancement project.

Identifying Factors that Influence Trap Placement Strategies

Author: Chris Brehme University at Buffalo, State University of New York

Abstract

Strategies used in lobster trap placement are expected to vary based on a number of factors including: fishing experience, use of technology, level of engagement in current scientific research, and social networks. This research elicits and examines the mental models of lobster fishermen as they establish and refine their trap placement strategies and compares these models to current scientific theories and spatial databases of fishing patterns. The research is based on field work in Maine and Western Australia and involves a mixed-methods approach that includes spatial analysis in GIS, ethnography, and historical research. Sources include spatial data from government logbook programs, historic records, reports, oral histories, and interviews with fishermen and scientists in Maine and Western Australia.

NAFO and the Ecosystem Approach

Authors: NAFO Secretariat; NAFO

Abstract

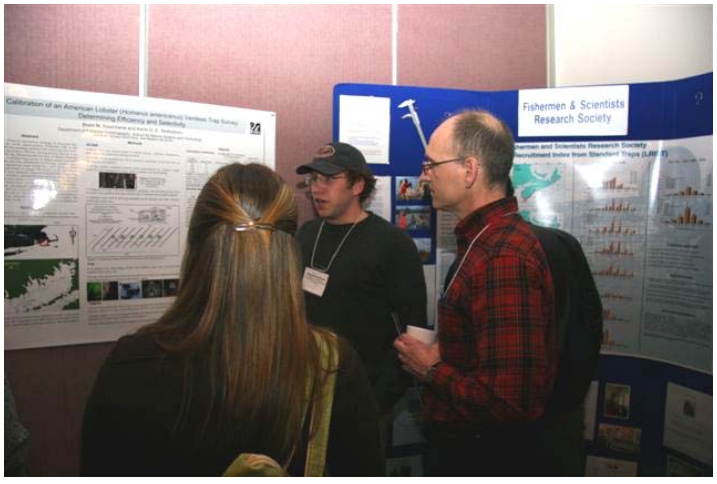
An overview of what NAFO is doing in its Regulatory Area regarding the Ecosystem Approach to Fisheries Management.

Nova Scotia's Tropical Fish Fauna

Authors: Andrew Hebda, Leslie Pezzack and John Gilhen; Nova Scotia Museum

Abstract

Tropical (warm-water) fish have been recorded by fishermen and scientists as visiting Nova Scotia waters for at least 100 years. We summarize the Nova Scotia Museum records of these occurrences and present interpretation of changes in patterns in this period of time.



(Photo courtesy of L. Wayne Spinney)

Size-at-age 7 of Haddock on the Scotian Shelf and Georges Bank

Author: Peter Hurley , DFO

Abstract

This poster demonstrates differences in size-at-age of haddock from four areas in the Northwest Atlantic.

Western Scotian Shelf and Bay of Fundy Haddock Size-at-age 7

Author: *Peter Hurley*

Abstract

This poster demonstrates changes in size-at-age of haddock on the western Scotian Shelf and Bay of Fundy that have occurred over the last 30 years.

Underwater Video of Lobster: A Potential Survey Tool

Authors: *John Tremblay and Cheryl Frail, DFO*

Abstract

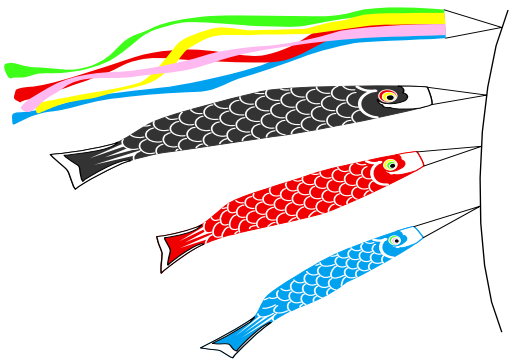
In some areas lobsters are found in some abundance on low complexity bottoms (mud, sand, gravel, small cobble) during late summer and fall. As such indicators of abundance could be developed based on counts of lobsters on video transects. This display provides some example video clips and results of sampling in two areas of southwest Nova Scotia (Lobster Bay and Saint Mary's Bay). We completed 71 transects in Lobster Bay and 57 in Saint Mary's Bay. Lobsters were seen on all completed transects and lobsters ranged in size from 40 mm CL to nearly 200 mm CL.

Why an Ecosystem Approach is the Wrong Paradigm for the Next Stage of Fisheries Management

Author: *Chris Corkett, Dalhousie University*

Abstract

Better management decisions do not come from basing them on better data: decisions have to be taken.



THE FSRS WELCOMES NEW MEMBERS

The Fishermen and Scientists Research Society would like to welcome the following members, whose applications were approved at the January 25, 2007 Executive Committee meeting. We trust that this expansion of the FSRS's membership will prove to be beneficial to all involved.

Larry Bell
Frederick (Jack) Fife
Erin Pelletier
Ross Dunphy
Kinfe Hagos Ghebremicae
Carla Samson
Steven Fancy
Timothy Lambert
Timothy Smith

OVERVIEW OF JOINT FSRS - GOMLF LOBSTER SCIENCE WORKSHOP

The Fishermen and Scientists Research Society (FSRS) and Gulf of Maine Lobster Foundation (GOMLF) held their third **Joint FSRS - GOMLF Lobster Science Workshop** on February 15, 2007 at the Best Western Glengarry Hotel in Truro, NS. The workshop built on the success of the workshops held in February 2003 and 2005 as part of the annual cross-boarder exchange. In 2004 and 2006 a lobster workshop was held as part of the Maine Fishermen's Forum.

The objective of the Lobster Science Workshop was to explore the relationship of various lobster recruitment and ventless trap projects and the advantages of the different methodologies. The Fishermen and Scientists Research Society (FSRS) Lobster Recruitment Project and the Gulf of Maine Lobster Foundation (GOMLF) Ventless Trap Survey rely on the efforts of volunteer fishermen. This differs from projects such as the New England Regional and Massachusetts Bay Ventless Trap Surveys which use a highly controlled survey design and provide compensation to fishermen who participate. This workshop explored the relationship of these projects and the advantages of the different methodologies. The workshop also continued the cross-border information sharing and collaboration initiated through previous workshops.

The workshop began with presentations on the various projects, including the FSRS Lobster Recruitment Project, GOMLF Ventless Trap Survey, Random Stratified Ventless Trap Survey in Massachusetts Bay, and Regional Ventless Trap Surveys. A presentation was also given on Using Artificial Collectors To Evaluate Post Larval Lobster Settlement and New England Lobster Settlement Index Project Update.

These presentations gave participants a good foundation for their breakout group discussions on the advantages of the different methodologies used for the various projects. The breakout groups were given a specific question to respond to - What are the advantages and disadvantages of the methodology of each of the projects and what recommendations, if any, would you make for the project?

The Honourable Ron Chisholm, Minister of NS Fisheries and Aquaculture, addresses Workshop participants at reception, expressing support for the FSRS and its valuable lobster research. *(Photos courtesy of L. Wayne Spinney)*

The Workshop report summarizes the presentations and discussions, as well as the results of the breakout group discussions presented in plenary. The report will be available soon on the website at www.fsrs.ns.ca or by contacting Patty King at 902-876-1160 or by e-mail at pmdservices@eastlink.ca.

INSHORE ECOSYSTEM RESEARCH PROJECT ON THE SCOTIAN SHELF: NOVA SCOTIAN SHORE GREY SEAL PUP SURVEY

By Damian Lidgard, Population Ecology Division, DFO

Introduction

The population size of grey seals on Sable Island has shown an exponential rate of increase since 1962 when surveys began. Although a recent aerial survey (2004) suggests that this rate of increase may have declined, there has been a growing interest in the possibility of breeding colonies developing along the Nova Scotian shore due to the limitations of space and food at Sable Island. A verbal questionnaire was designed to collect information from fishermen on the location and size of breeding colonies along the Nova Scotian shore. These data were used to design an aerial survey to provide a more accurate assessment of pup production in this region.

Methods

A verbal questionnaire was designed to collect information from fishermen on the location and size of grey seal breeding sites along the Nova Scotian shore. The following questions were asked:

- where have you seen grey seal pups
- when did you see them
- how many did you see (<10, 10-100 or >100)
- what type of habitat where they seen on
- are there sites where you use to see pups but no longer do

Based on the results of the questionnaire, a helicopter survey was conducted along the coastline between Brier Island (44° 16' 00" N - 66° 21' 57" W) and Cape North (46° 53' 04" N - 60° 30' 21" W). All of the sites identified by the questionnaire as potential grey seal breeding sites were surveyed.

Results

Between January 2005 and October 2006, 149 fishermen were interviewed either by phone (83) or in person (66). The data collected from the questionnaire provided a reasonable coverage of the Nova Scotian shore from Cape North to Yarmouth. According to the questionnaire, the largest grey seal breeding colonies were located at Noddy Island, Cape Sable, inshore islands off Ecum Secum and Scatarie Island (Fig 1). The aerial survey was conducted over 4 days, 11th, 28th, 30th and 31st January 2007. The survey identified five breeding colonies: Noddy Island, Flat Island, White Island, Bowen's Ledge and Hay Island. The minimum estimate of pup production was 2,923 with 87% of pups born at Hay Island.

Conclusion

There was a poor correlation between the results of the questionnaire and those of the aerial survey; many of the sites identified as breeding sites by the questionnaire were found not to have pups or adults during the aerial survey. This is likely due to fishermen giving details on adults sighted rather than pups, and providing data on sightings outside of the breeding period. The aerial survey identified five breeding colonies, the largest being at Hay Island, Cape Breton. However, many potential breeding sites were observed. These data will be used as a baseline for future surveys to document the changes in the size of the breeding population along the Nova Scotian shore.

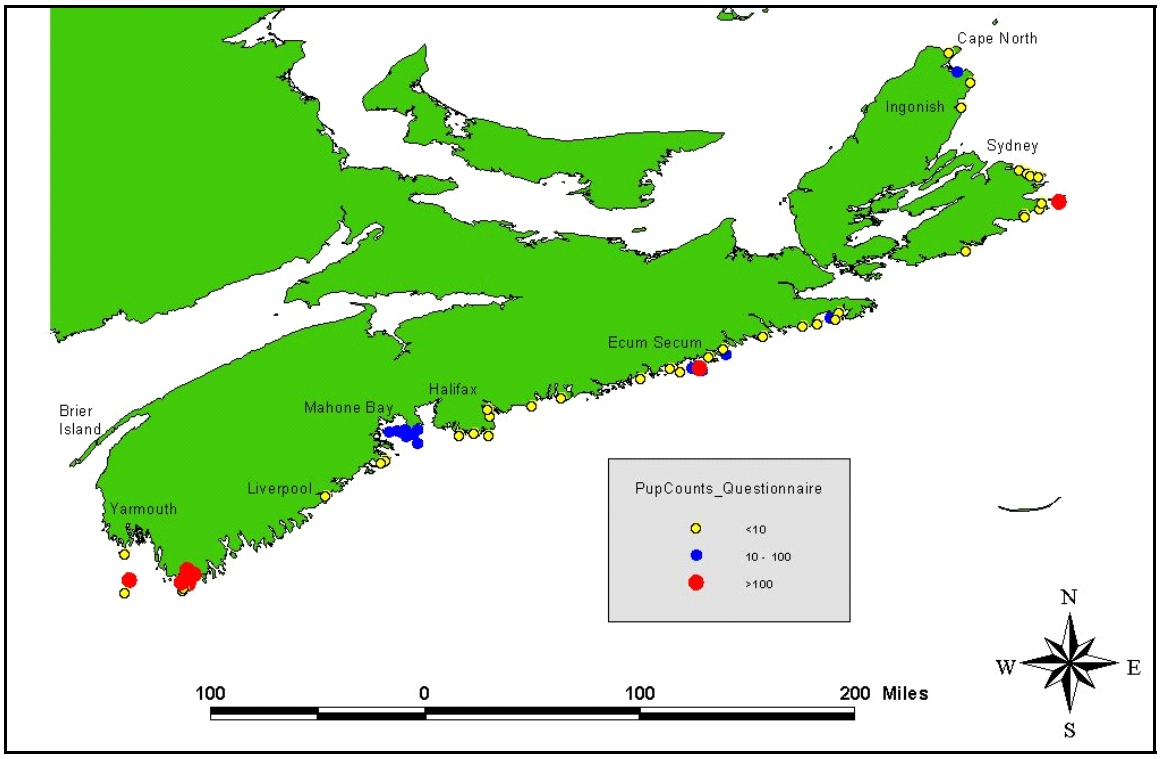


Fig. 1 A map of the Nova Scotian shore showing the location and size of grey seal breeding colonies identified from the questionnaire.

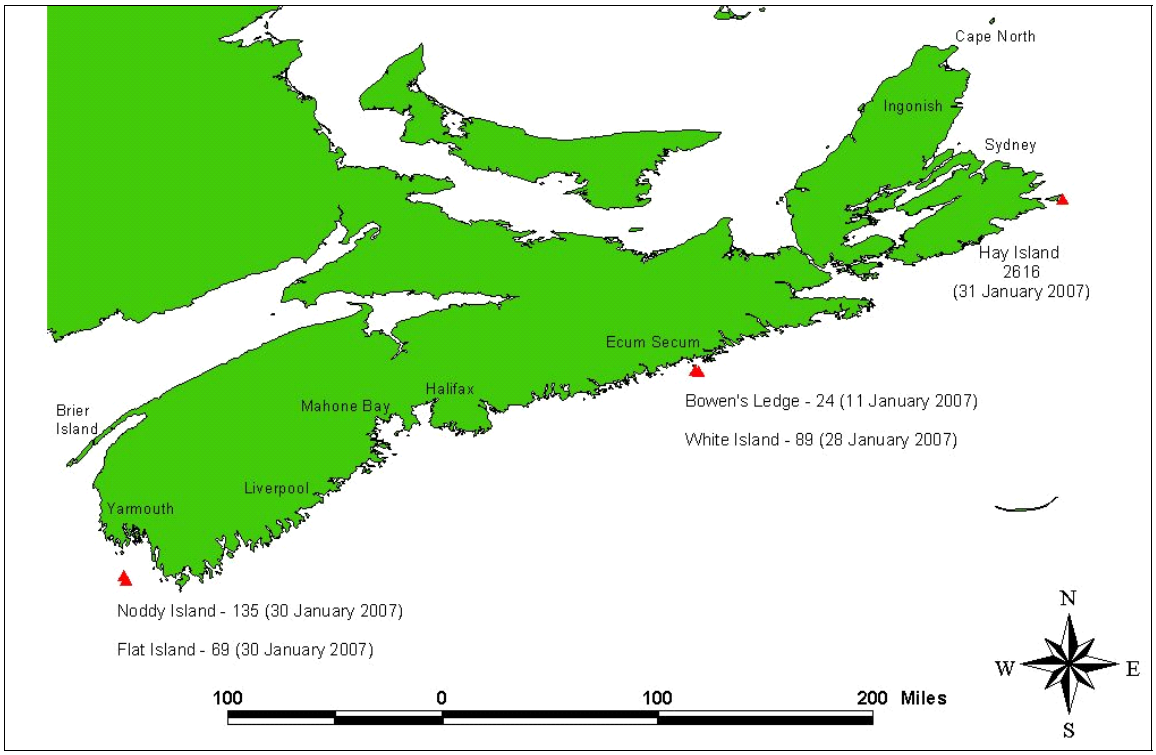


Fig. 2 A map of the Nova Scotian shore showing the location and size of grey seal breeding colonies identified from the aerial survey.

BEACHCOMBING – What's New in The News

Northwest Atlantic Lobster Tagging Program – 2006

As part of their Northwest Atlantic Lobster Tagging Program, fisheries biologists are tagging lobster with Maine and Massachusetts lobstermen in order to gather information on lobster migration rates and net directional movement among regions within the Gulf of Maine. They are encouraging fishermen to watch for yellow T-Bar tags and call in the information to receive a reward.

Anyone finding a tag should call the number on the tag, 617-727-0394 ext. 363 and provide the tag number, location in either GPS or LORAN and their name, vessel name, address and phone number.

Participating fishermen will receive a tagging project hat and entry into a raffle. You could win one of five $500 gift certificates to a marine supply store.

EXECUTIVE COMMITTEE

FISHERMEN AND SCIENTISTS RESEARCH SOCIETY

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Editor: PMD Services

UPCOMING EVENTS

Start Planning Now!!!

Fishermen and Scientists Research Society 15th Annual Conference

February 22-23, 2008
Best Western Glengarry Hotel , Truro, NS