Lobster Post-Larval Collector Research Collaboration

Workshop Report

Hosted by
Fishermen and Scientists Research Society

February 21, 2008
Best Western Glengarry Hotel, Truro, NS

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1.0 Introduction

1.1 Agenda

Lobster Post-Larval Collector Research Collaboration

Time	Topic and Speaker
1:00 -1:30	Welcome/ Overview of the Broader Collaboration - Rick Wahle
	Summaries of Individual Projects
1:30-1:50	Lobster Bay and Sambro, NS Summary - John Tremblay
1:50-2:05	Beaver Harbour, NB Summary- Remy Rochette
2:05-2:20	Bonne Bay and Eastport, NL Summary - Victoria Burdett-Coutts
2:20-2:35	Canso, NS – GCIFA Summary – Katherine Newell
2:35-2:50	Buzzards Bay, Ma – Peter Milligan
2:50-3:15	Break
3:15-3:35	Thoughts on Monitoring Biological Diversity and Artificial Collectors for Lobsters – Angelica Silva
	General Discussion/Plenary
3:35-3:50	Collector Design, Deployment and Retrieval • How should collector design be standardized? • What improvements are needed to the design? • Recommendations for easy deployment and retrieval. • Recommendations for choosing deployment sites (e.g.: bottom type, depth, etc.). • What data should be collected upon deployment (location, depth, bottom type, temp recorder attached, etc.)?
3:50-4:20	Data Collection, Use and Management 6. What data should be collected and how detailed does it need to be (e.g.: for which organisms do we need to measure and count, just count, or just record presence, or ignore, etc.)? 7. What is the minimum data that all projects will collect? 8. How will the data be collected (e.g.: should we have a standard data sheet for all projects)? 9. Data entry – what data entry tool should be used (e.g.: Excel, Access, Oracle, etc.), who will design the tool, and who will do the data entry? 10. Data Sharing 11. What data should be contributed to a central database for the collaboration? 12. Who should manage the larger data set? 13. Data Sharing Policies and Intellectual Property Guidelines. 14. Data Archiving. 15. Creating Metadata. • Analysis to be done – who will be using the data and how? • Presentation of data – what should be presented, where, when and how? (e.g.: should it be by project or a joint presentation of all projects or both, etc.)?
4:20-4:35	Formalizing the Collaboration • What is the nature of the collaboration? • Confirm current partners in the collaboration on Lobster Collector Research and identify potential new partners. • Oversight/Coordination of the Collaboration (Rick has been doing this, maintaining a database with information on the various projects. What information is needed and when, what else needs to be done, should this only be Rick's responsibility or can/should others help, etc.)? • Future direction and expansion of the projects/collaboration. (potential new project partners, how to maintain the collaboration, etc.).
4:35-4:45	Wrap up/ Next steps

1.2 Introduction

A workshop was held at the Best Western Glengarry Hotel in Truro, Nova Scotia on February 21, 2008 to discuss the results of the Lobster Post-Larval Collector Research Collaboration that was conducted at seven locations along the Atlantic East Coast from Buzzards Bay, Massachusetts, United States to Eastport, Newfoundland, Canada. Specifically the projects were conducted at Buzzards Bay, Massachusetts; Beaver Harbour, New Brunswick; Lobster Bay, Sambro and Canso, Nova Scotia; and Bonne Bay and Eastport, Newfoundland.

The following is a summary of the project presentations discussed at the workshop, including an overview of the goals of the collaboration presented by Rick Wahle of the Bigelow Laboratory of Ocean Sciences. These summaries contain statements, figures and facts/results taken directly from the workshop presentations in an effort to give an accurate, clear and concise summary of the various projects and their results as presented at the workshop.

1.3 Overview of the Broader Collaboration

Presented by Rick Wahle, Bigelow Laboratory of Ocean Sciences

The Postlarval Lobster Collector Research Group was catalyzed by a research project in the New England states supported by the Northeast Consortium (NEC), a cooperative research program under the National Oceanographic and Atmospheric Administration. From it grew an expanded collaboration. As of February 2008, this larger collaboration included scientists and fishermen in New Brunswick, Nova Scotia, Newfoundland, Massachusetts and Norway who were able to find support independently to more than double the NEC-supported effort. For the past two decades diver-based suction sampling has been the only other way to quantify newly settled, young-of-year (YoY) lobsters. Traps and trawl surveys have long been used to monitor larger lobsters but are ineffective at sampling the smallest cryptic lobsters in their first few years of life,

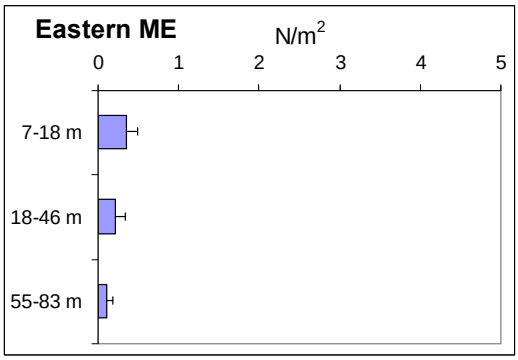
Passive-postlarval Collectors

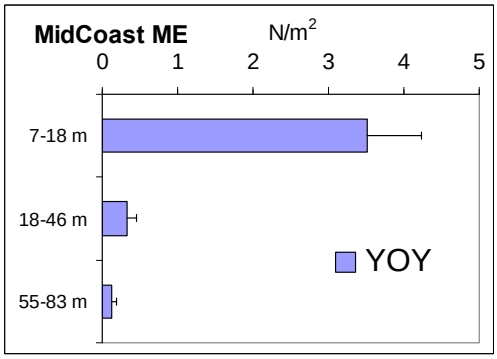
Passive-postlarval collectors consist of a wire mesh tray and cover lined on the floor and walls with a finer mesh and filled with cobbles. As with suction sampling, passive-postlarval collectors sample both postlarval lobsters settling from the plankton, as well as the older small juveniles moving in from the surrounding sea bed. The word ‘passive’ refers to the fact that unlike a plankton net, which is pulled though the water, the collector sits on the sea bed and accumulates any postlarvae that drift into it or are attracted to it from the water column. Collectors enable researchers to sample the youngest benthic lobster in places that are inaccessible to divers. Wahle and co-workers deployed collectors across a range of depths (> 80 m) to evaluate depth-wise patterns of YoY settlement in oceanographically contrasting conditions, ranging from the summer-stratified southern New England shelf waters to the well mixed cold waters at the mouth of the Bay of Fundy. The collectors utilize standard lobster fishing gear making it a relatively practical and inexpensive tool. Data from passive collectors are comparable to data from suction sampling but collectors may get slightly more YoY lobsters. First year lobsters seem to prefer shallower/warmer water.

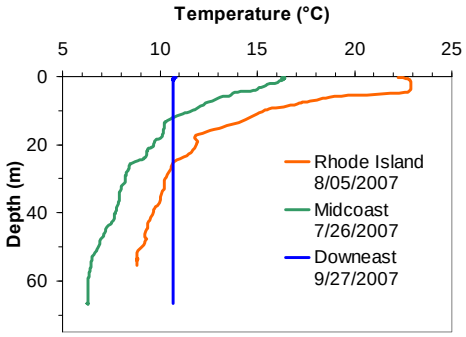
Results

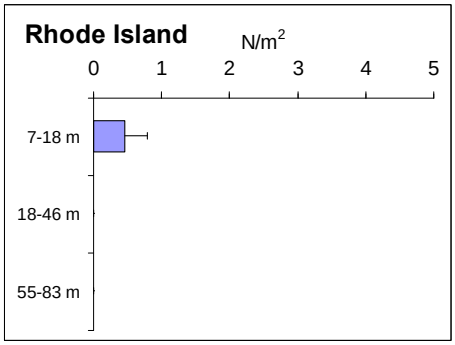
The expanded collaboration has resulted in the largest scale synoptic view of the American lobster settlement ever conducted, stretching from Rhode Island to Newfoundland. The collectors also catch a wide variety of others species and may be a possible tool for biodiversity research.

Young of Year Lobster

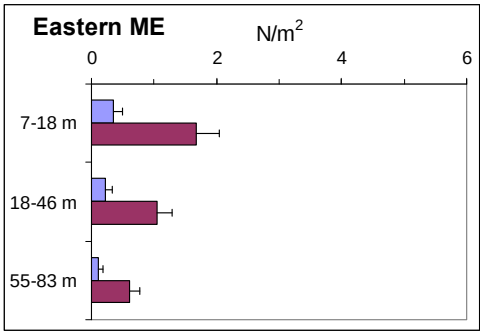


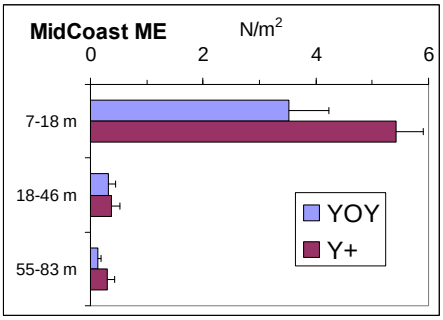


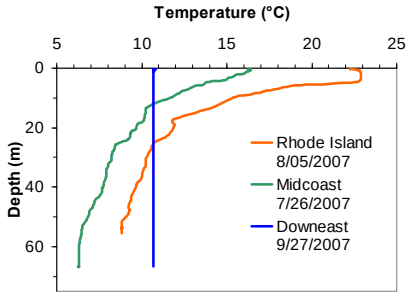


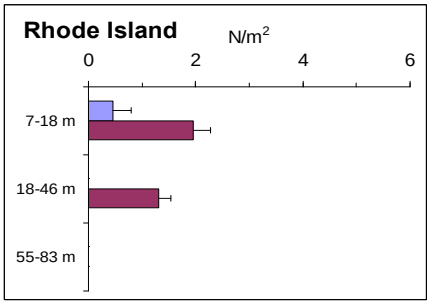


Young of Year + Older Lobsters

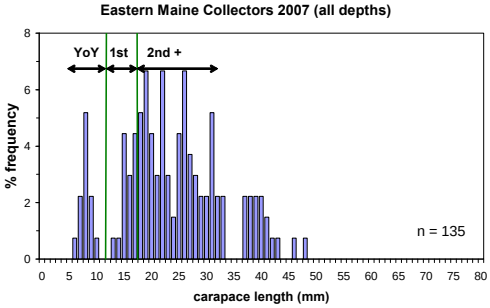


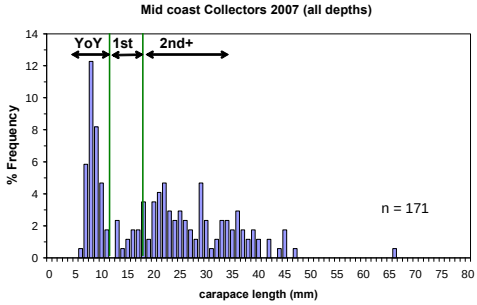


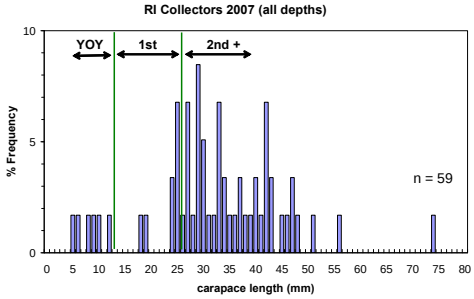




Size composition







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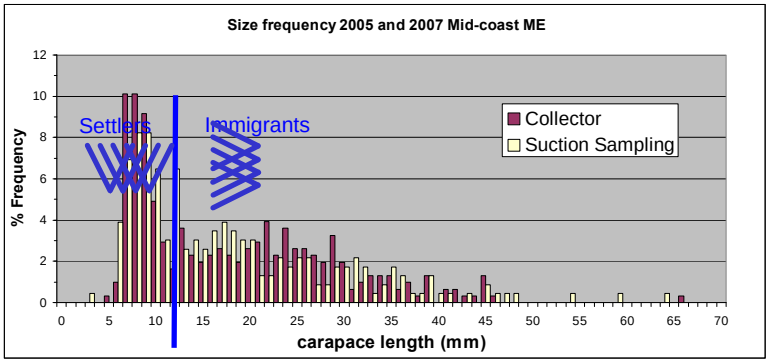
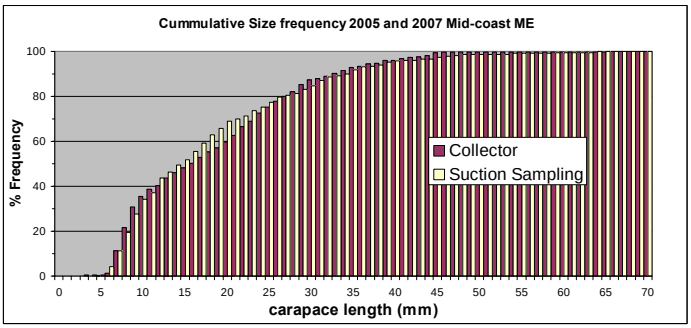
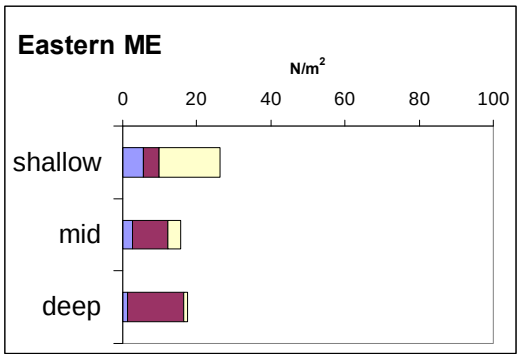
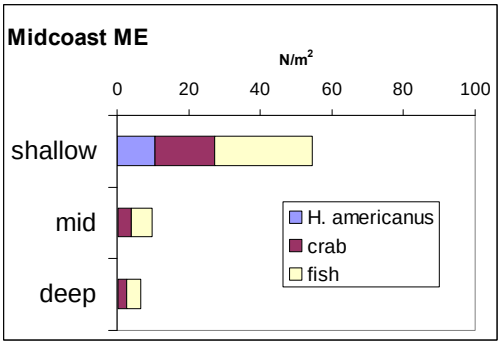
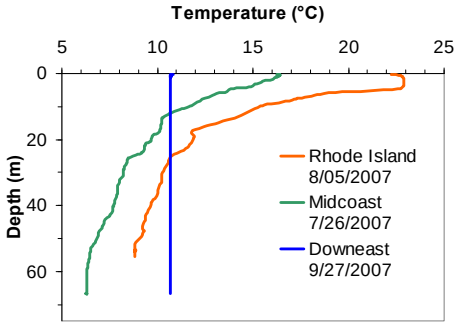


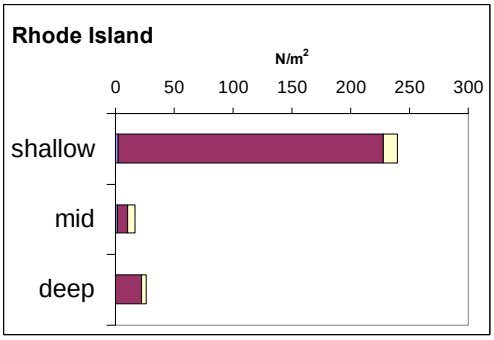


Lobster + Crab + Fish



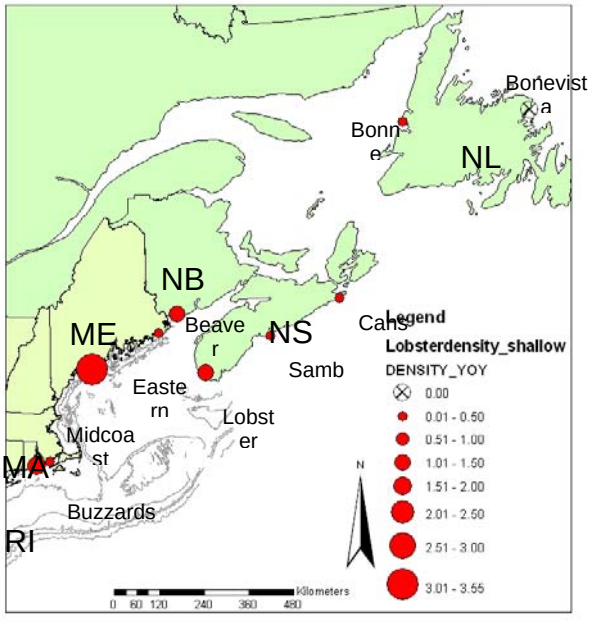




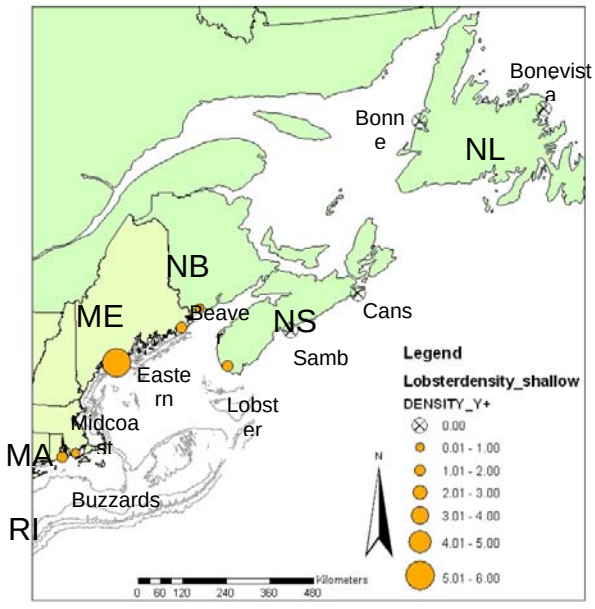


Lobster Collector Research Collaboration Results from Shallow Sites

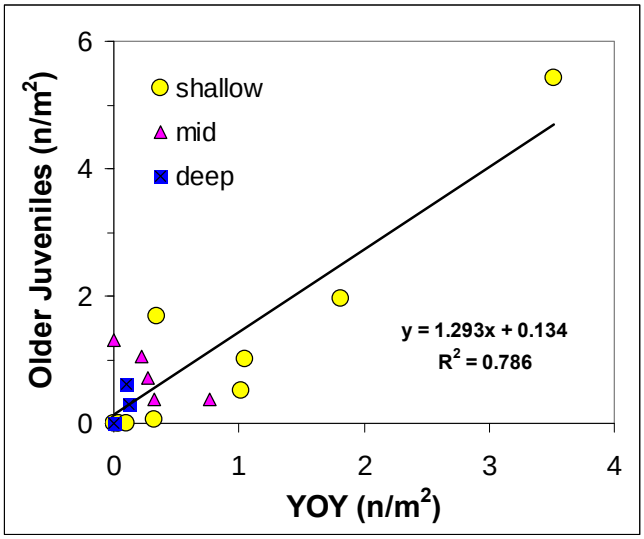
Young-of-Year



Older



Lobster Collector Research Collaboration
All Depths
Young-of-Year vs. Older Juveniles



* Black Pt RI not included bec of only 2

2.0 Presentations - Summaries of Individual Projects and Using Collectors to Assess Biodiversity

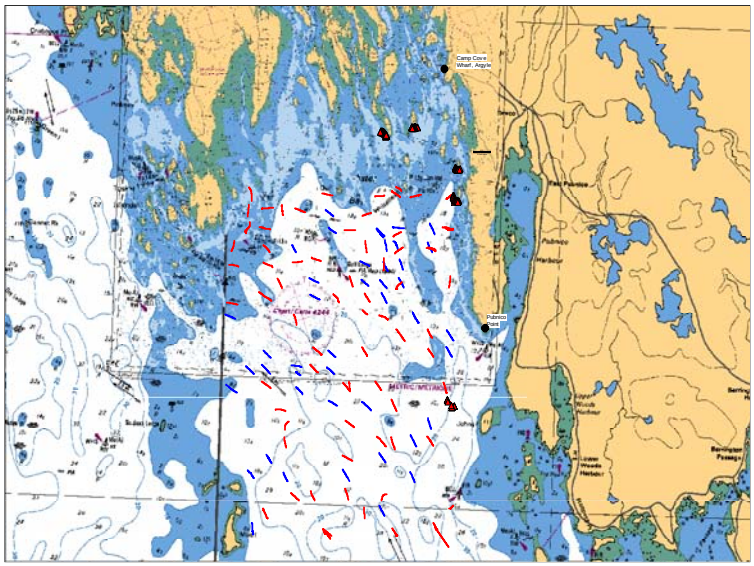
2.1 Lobster Bay and Sambro, Nova Scotia

Presented by John Tremblay, Fisheries and Oceans Canada

2.1.1 Lobster Bay

The Lobster Bay Collectors Project was a joint project of Fisheries and Oceans Canada (DFO), the Fishermen and Scientists Research Society (FSRS) and Lower Argyle fishermen. Collectors were deployed on June 26, 2007 to the inside islands of the Lobster Bay area and on July 2, 2007 to the outside islands, making a total of 140 collectors deployed in the area. Tag lines were used instead of buoys. Divers examined the collectors on June 27, 2007 to make sure they settled correctly. One in nine did not settle correctly.

A.



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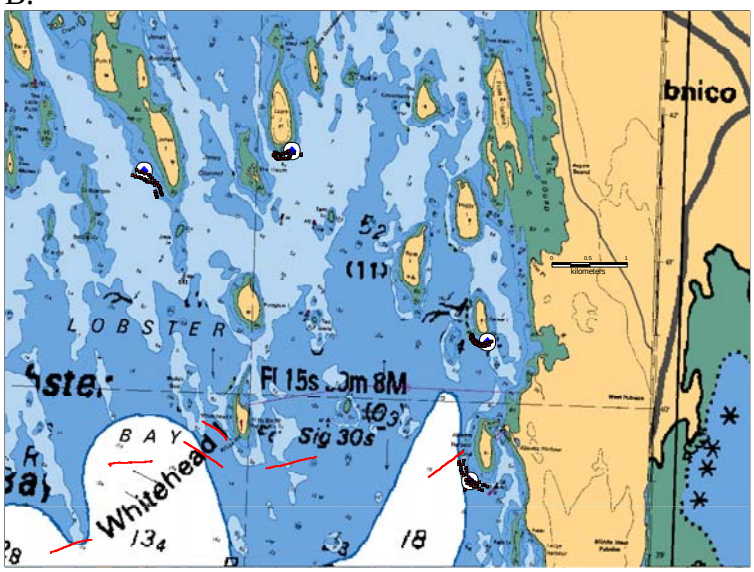


Figure 1A & B. Location of collectors.

The collectors were retrieved using a boom and grapples with a hookchain; they were lifted using hauling gear and moved onto a sorting table on deck. All rocks were hosed off and the mesh rinsed into a sieve. The contents were then sorted and the results recorded. Of the 140 deployed, 138 were retrieved.

In the 138 collectors:

- 147 lobster <+ 42 mm CL
- 133 < 30mm CL
- 71 settlers (<+ 12 mm CL) in the 138 collectors and 68 at shallow sites

Settler Densities:

- From suction sampling: 15/46 quadrats = 0.7 m^2
- All shallow sites: 68/118 collectors = 1.0 m^2

Also found in the collectors were tunicates, fish, Greenland shrimp, starfish, shellfish and various other marine life.

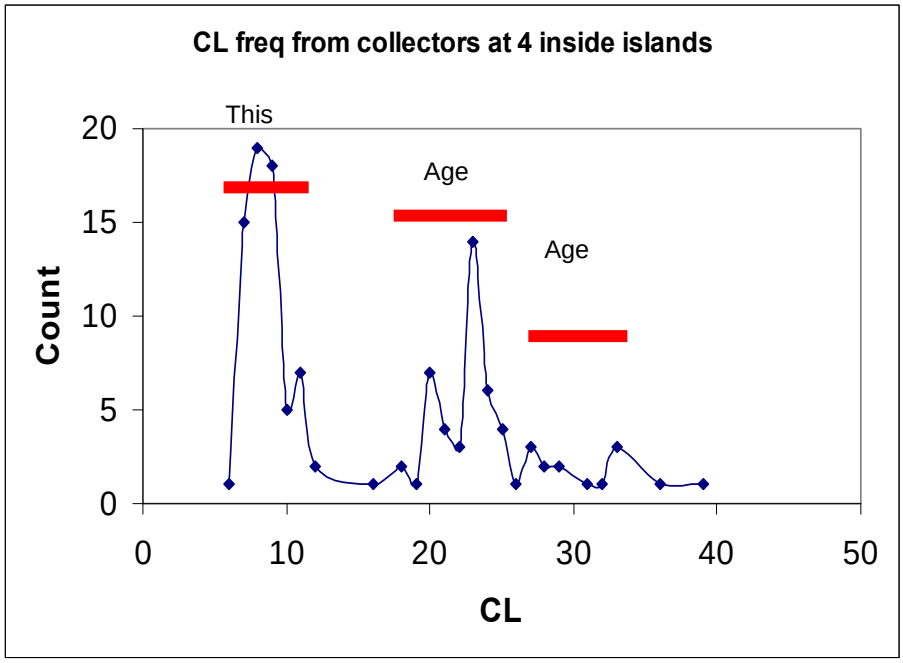


Figure 2. Size and age from collectors at four inside islands.

2.1.2 Sambro

The Sambro location was a DFO project. Forty collectors were deployed in the Sambro area. These were set near artificial reefs that were already in place. Only one lobster was found. The bottom type of the area was soft.

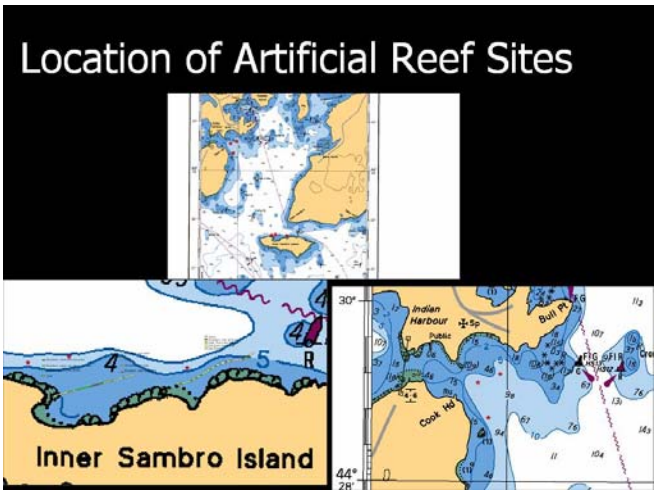


Figure 3. Locations for Artificial Reefs.

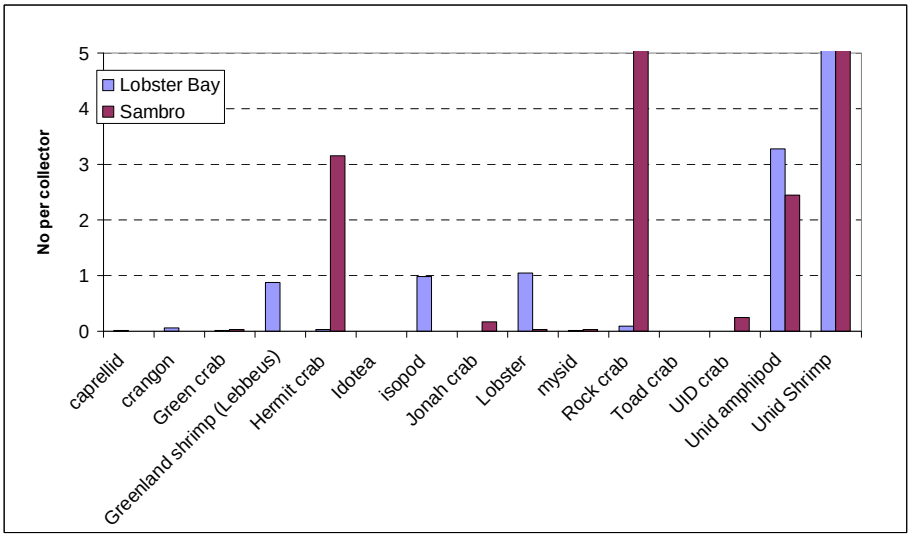


Figure 4. Crustaceans recorded in collectors.

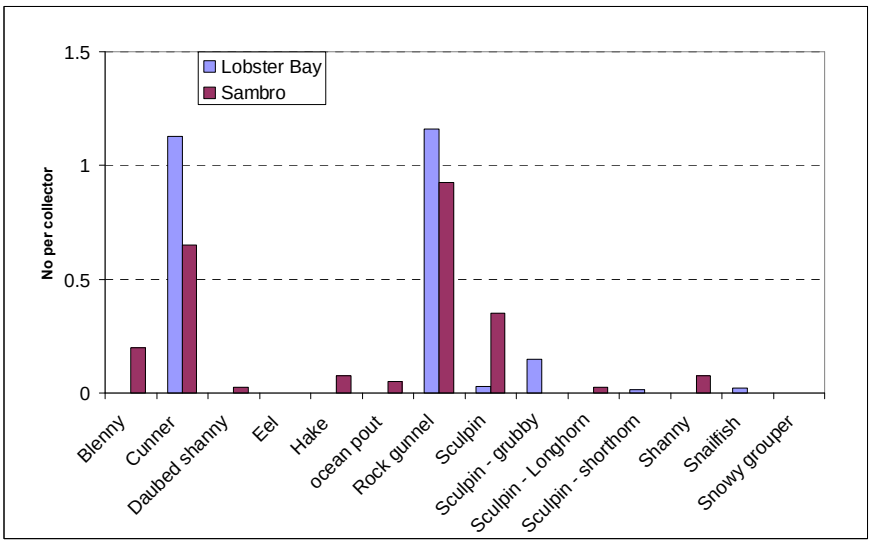


Figure 5. Fish Recorded in Collectors

FSRS Project Proposal, 2008

The FSRS is proposing to expand to additional locations in 2008. Four locations for lobster collector sampling are being proposed for 2008:

1. Lobster Bay
2. Sambro/Prospect
3. Shelburne County
4. Cape Breton

Canso will also be given some consideration, working in conjunction with the Guysborough County Inshore Fishermen's Association (GCIFA) who is already doing lobster collector research.

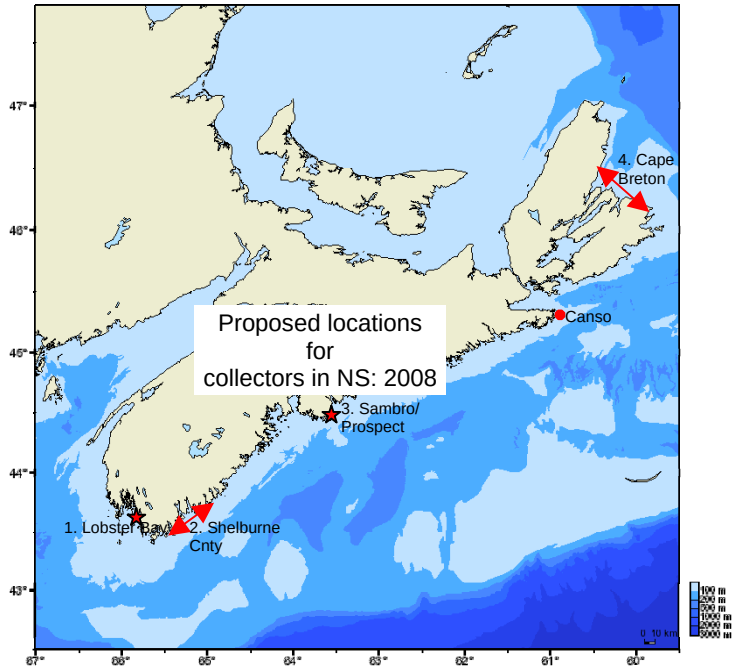


Figure 6. Proposed 2008 collector sites.

2.2 Beaver Harbor, Bay of Fundy, New Brunswick

Presented by Rémy Rochette, University of New Brunswick

The goal of the Beaver Harbor Lobster Settlement/Collector Project was to examine the biodiversity of the area.

2.2.1 Collector Design

The collector has a similar design and construction as a lobster trap. Made out of wire mesh, it is 2' x 3' x 6" (~0.56m^2). The collector is filled with smooth and rounded quarry rocks that are approximately 8 to 12 cm in diameter giving it a total weight of approximately 150 to 200 lbs (68-91 kg).

2.2.2 Spatial Layout

A total of 32 collectors were deployed in Beaver Harbor. Fourteen of which were placed in "shallow" water (~10 m Lowest Astronomical Tide (LAT)). These were placed in two lines (n = 7 per line) on a fine-sediment bottom. No temperature gauge was used. The eighteen remaining collectors were placed at "mid-depth" (~25-30 m LAT). Four lines were set (n = 4 or 5 per line) on a fine-sediment bottom and again no temperature gauge was used. The tide range for Beaver Harbor is -0.2 to 7.5 m. Traps were not set in the same area where suction sampling occurred.

2.2.3 Problems

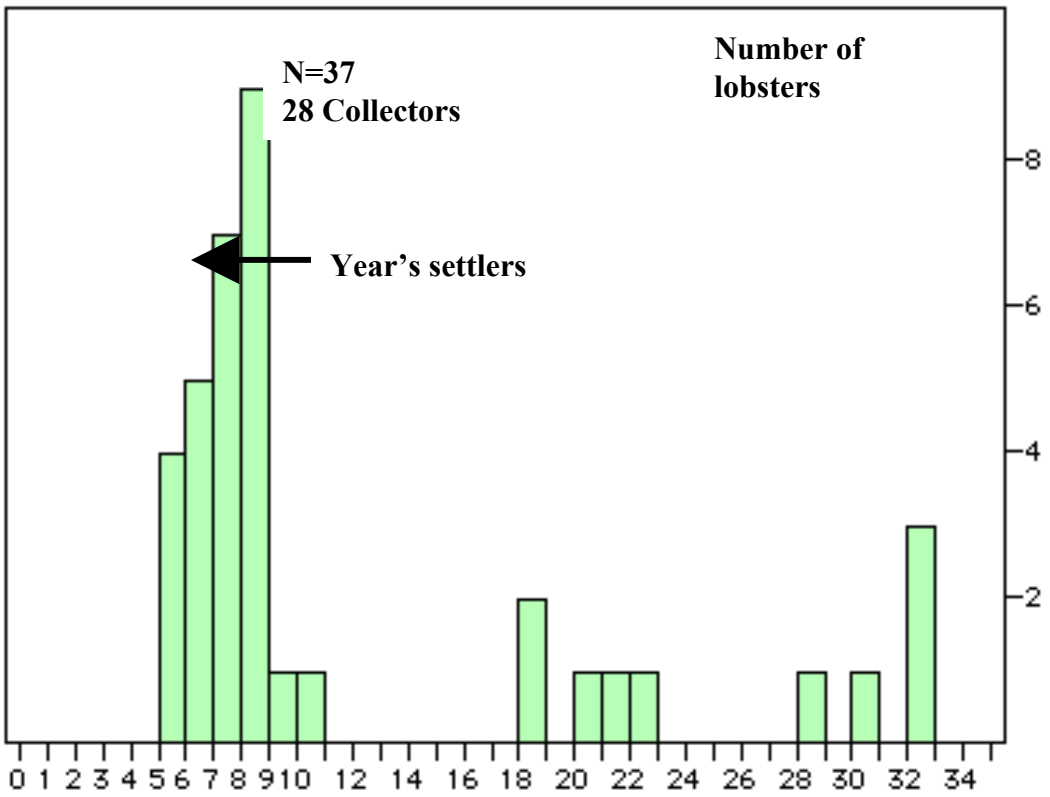
There were a few issues with the project including the cost of deployment and retrieval of the collectors and securing fishermen to assist in the retrieval and deployment process. Another issue was the amount of traffic in Beaver Harbor. It is a very busy harbour.

There were also some problems with the collectors themselves. The weight of the cages (~150 to 200 lbs) was prohibitive. Damage to the lobsters occurred when the collectors were dragged along the bottom during retrieval. This is probably due to the fact that the collectors were not full of rocks and the rocks rolled around in the cage during retrieval. Many lobster parts (legs & claws) were found in the collectors.

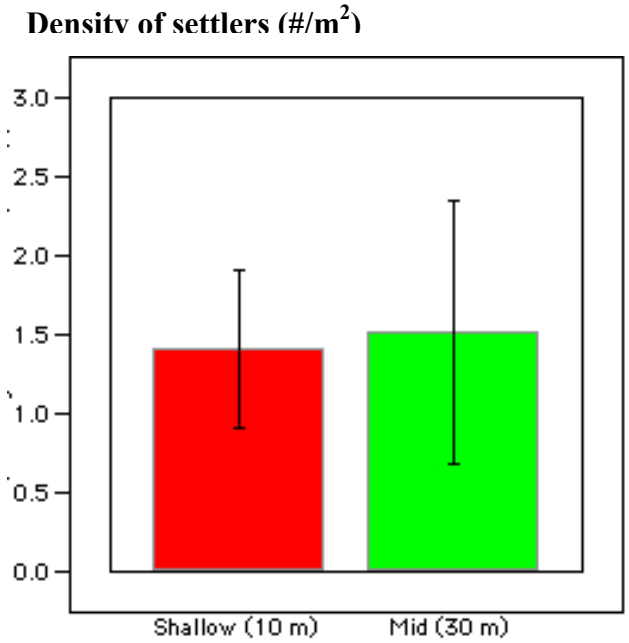
2.2.4 Data

Everything collected from the 1mm sieve was identified and recorded. Twenty-seven lobsters were found in the 32 collectors. The settlement density was the same for both depths.

Size Frequency Distribution



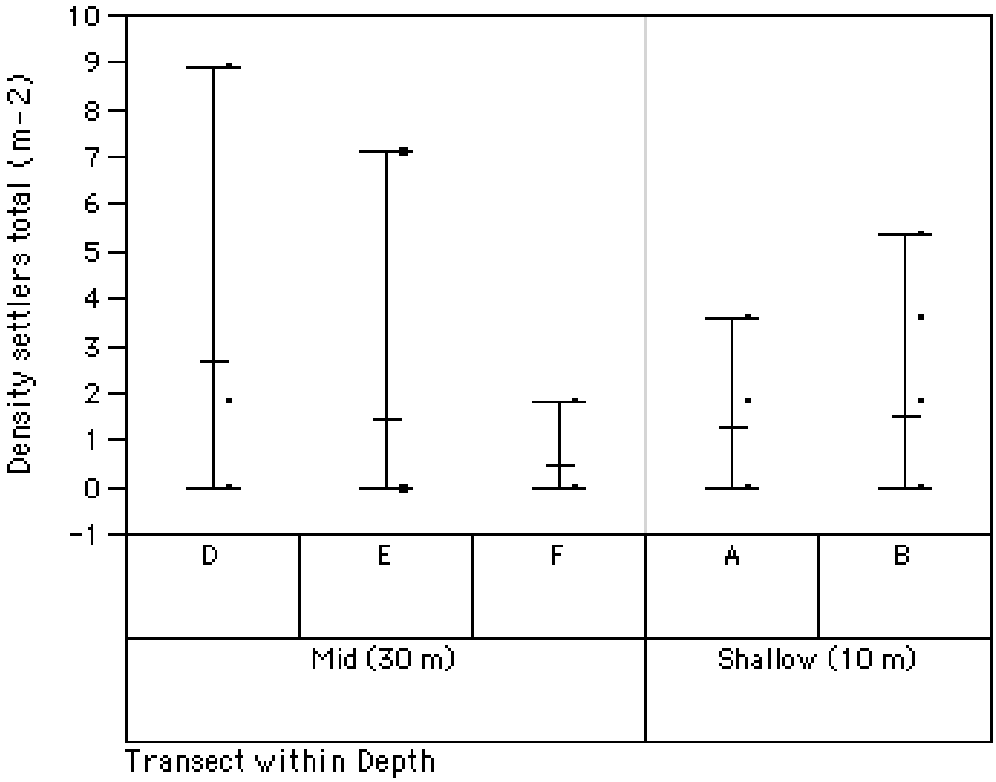
Density of settlers (≤ 11 mm)
High variability between collectors



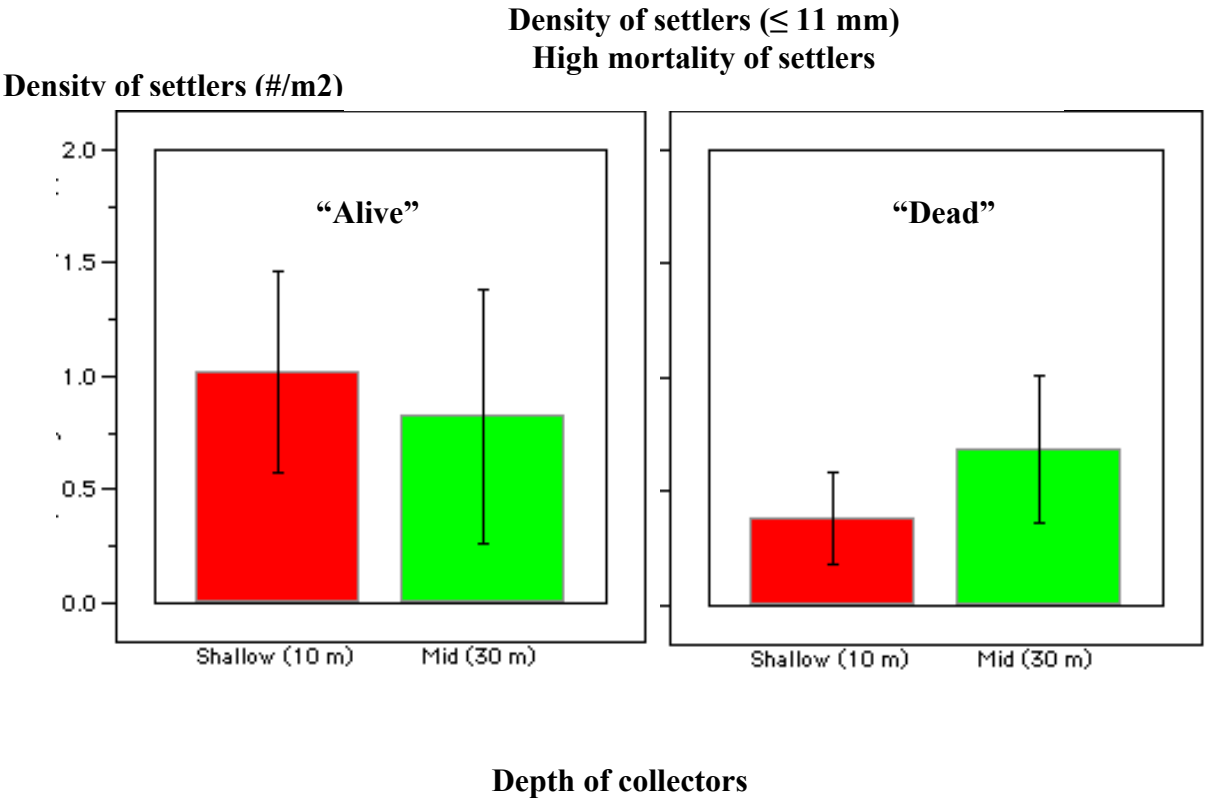
Depth: $F_{1,22} = 0.14$; P= 0.91
Transect [Depth]: $F_{3,22}$=0.53; P=0.67

Depth of collectors

Density of settlers (Total ≤ 11 mm)
Variance components



Note: variance partitioning not possible due to unbalanced design.



2.2.5 Plans for 2008

The plan for the 2008 sampling season is to attempt to continue sampling in Beaver Harbor and maybe add a <10 m strata to be inside what is believed to be the lobster nursery area. There are also plans to design projects adequate for graduate students (e.g. add predator treatment). All this is contingent on finding dedicated funding to continue and expand the project. Future work of interest also includes looking at linking lobster mortality to what other organisms are found in the collectors. Many organisms were dragged into the collectors when they were retrieved.

2.3 Lobster Settlement in Coastal Newfoundland – Bonne Bay and Eastport

Presented by Victoria Burdett-Coutts

Bonne Bay is located on the west side of the island of Newfoundland in Lobster Fishing Area (LFA)14 and Eastport is located on the east side in LFA 5.

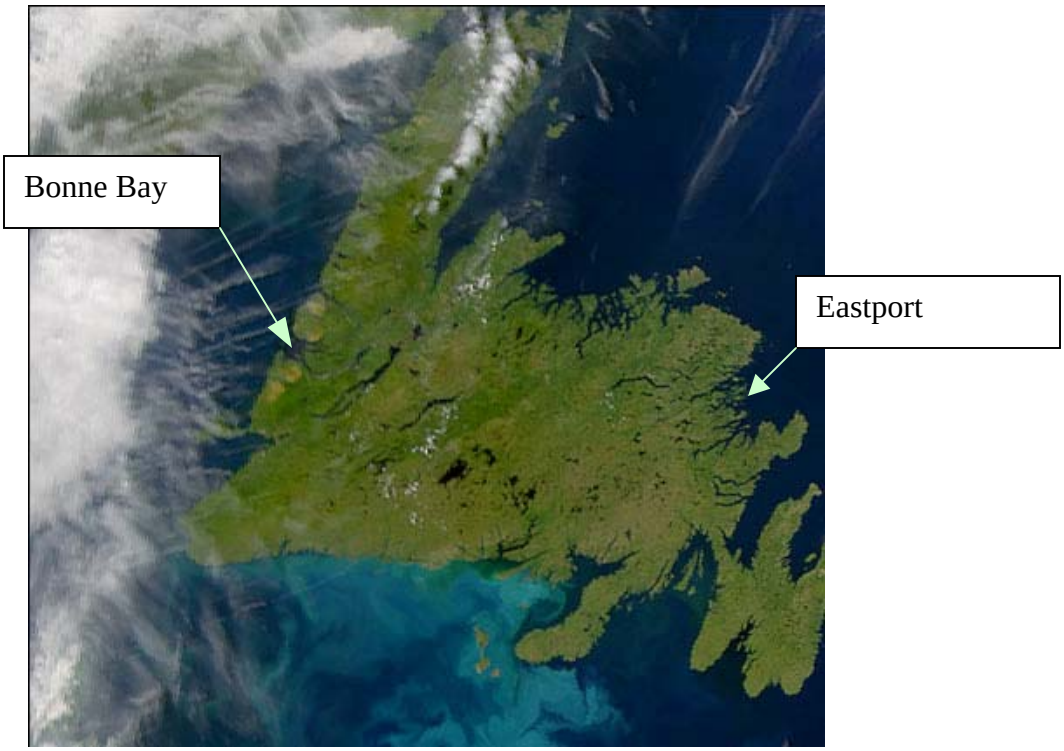
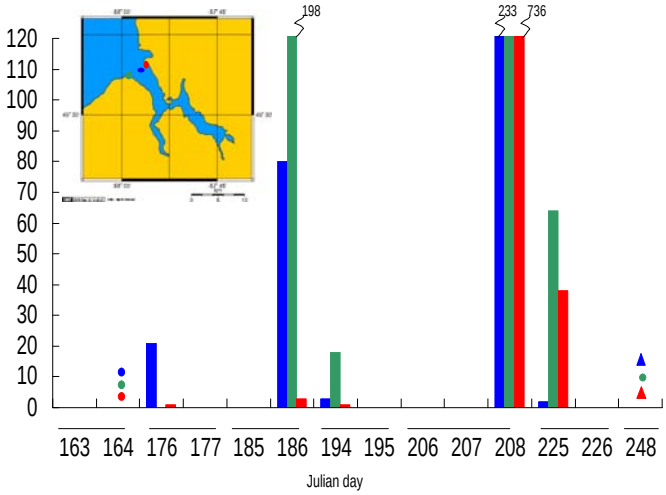


Figure 1. Map of Newfoundland indicating Bonne Bay and Eastpport.

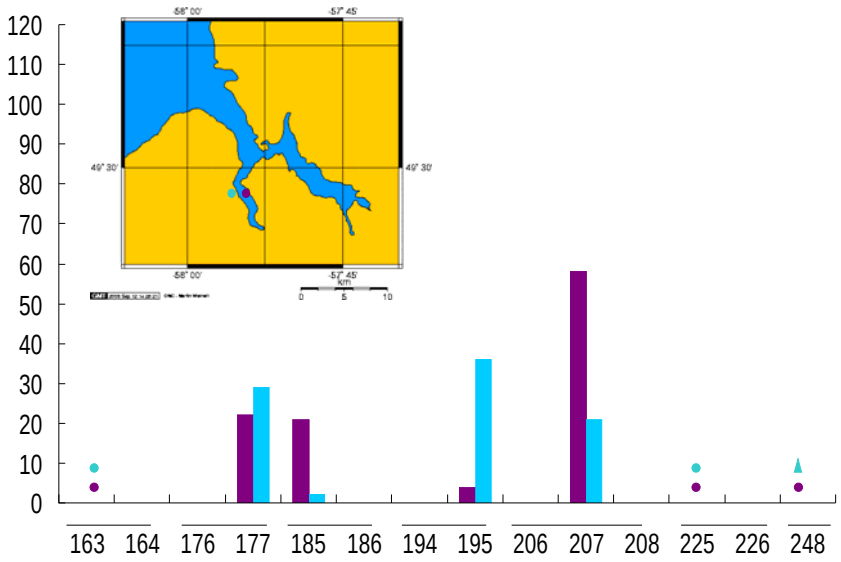
2.3.1 Bonne Bay

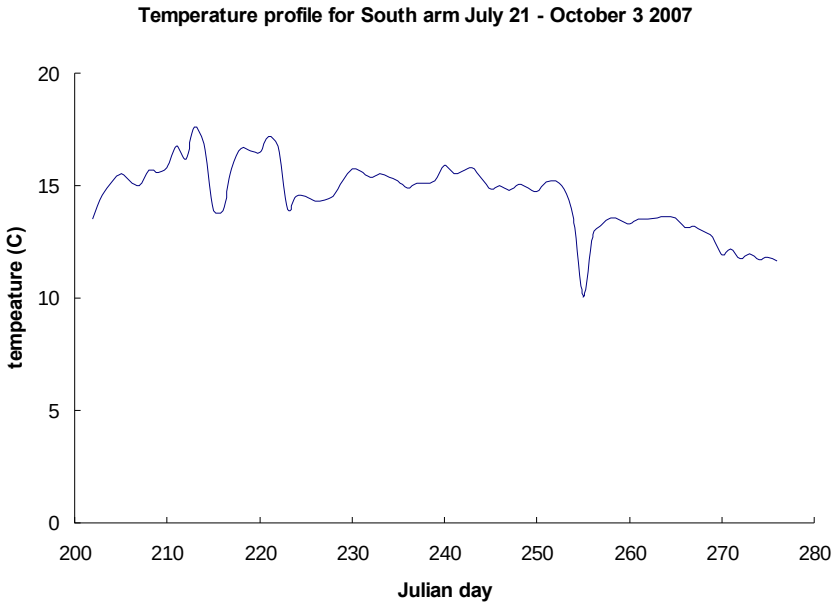
Seventy collectors were deployed in Bonne Bay. Five sets were placed in shallow (5-10 m) water and two sets were placed in mid-depth (10-20 m) water. Only one lobster was found at the mouth of the bay.

Stage I American lobster larvae abundance at the mouth of Bonne Bay

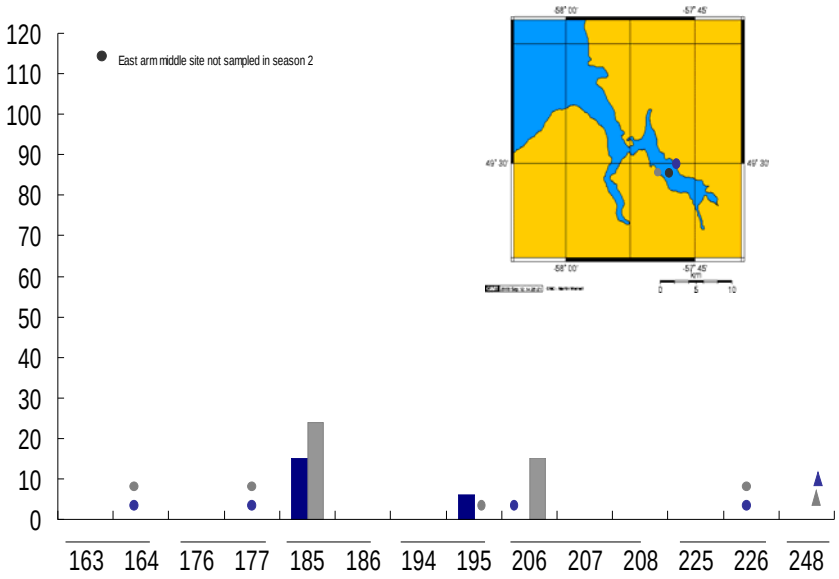


Stage I American lobster larvae abundance in the South arm

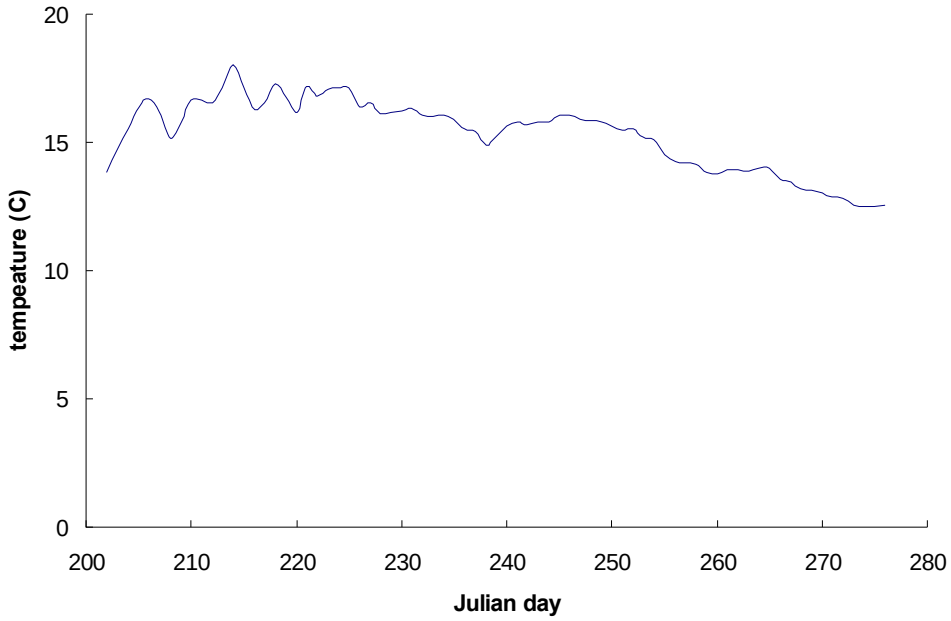




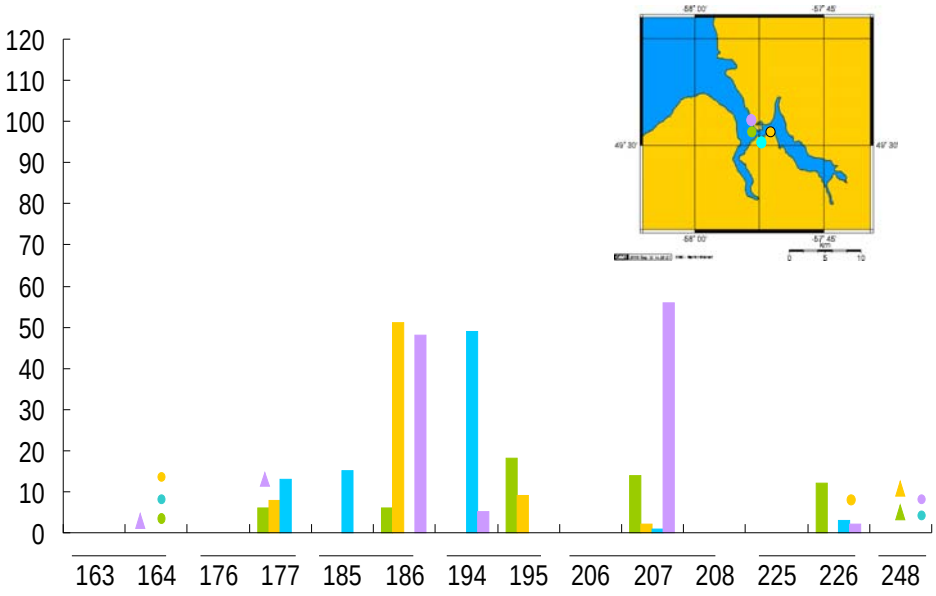
Stage I American lobster larvae abundance in the East arm

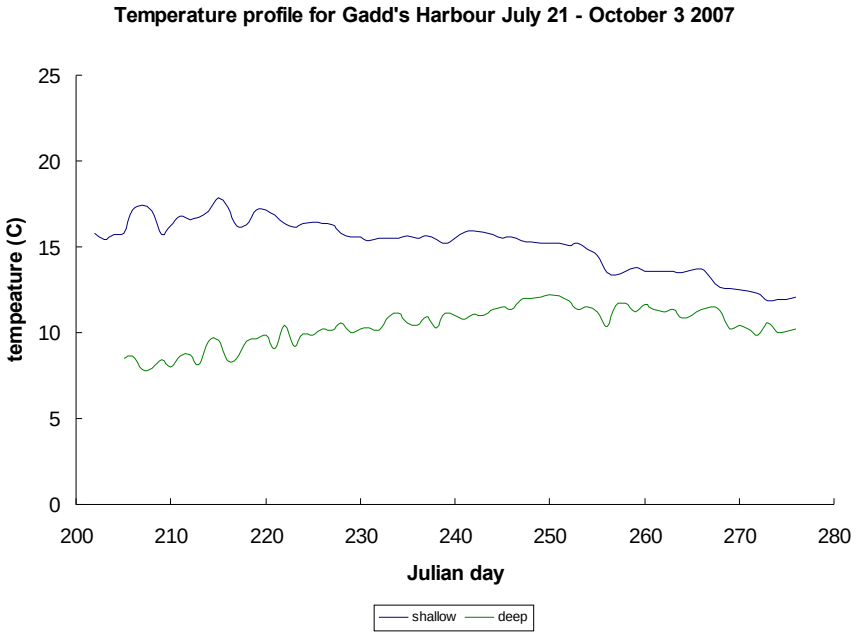


Temperature profile for East arm July 21 - October 3 2007

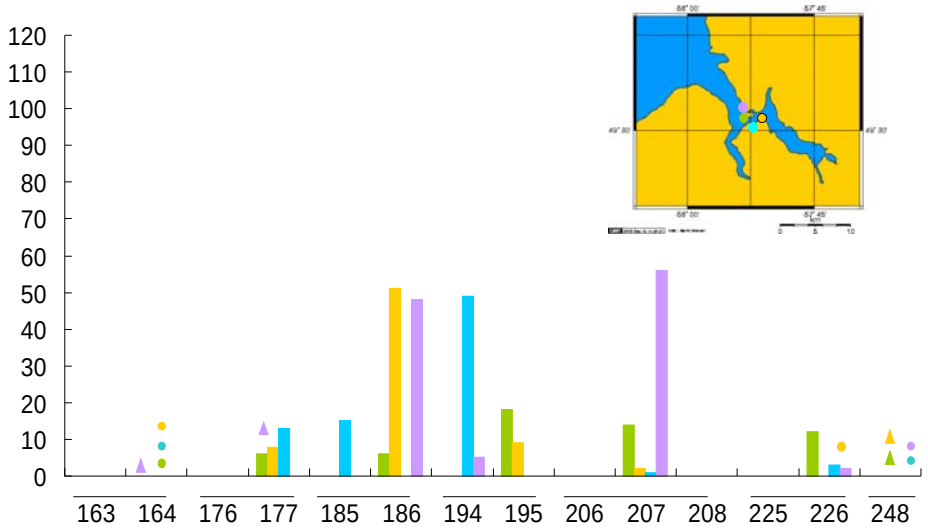


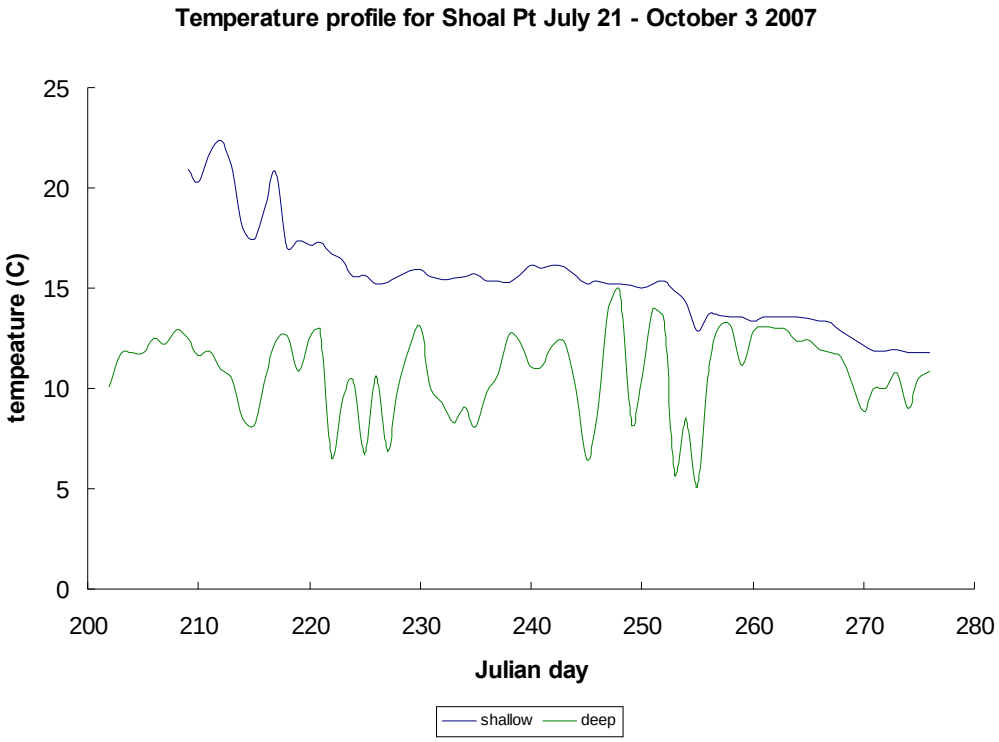
Stage I American lobster larvae abundance in Gadd's Harbour





Stage I American lobster larvae abundance in Shoal Point





2.3.2 Eastport
No larval lobsters were found in Eastport, although an abundance of larger lobster were present. Sampling proved difficult in Eastport because of fishing activity in the area.

2.3.3 Plans for 2008
There are plans to deploy more collector trays and do suction sampling in 2008. There are also plans for taking a look at sampling outside the bay.

2.4 Canso, Nova Scotia
Presented by Katherine Newell, Guysborough County Inshore Fishermen's Association

The Guysborough County Inshore Fishermen's Association (GCIFA) deployed 20 lobster collectors in the Canso area of Nova Scotia. Ten were deployed on a hard, rocky bottom and ten on a soft, sandy bottom. Sampling was also done with larval tows and the collectors were set where the tows had been performed.

The collectors are made of a fine mesh box, similar in shape to a lobster trap, 2' wide x 3' long x 4" deep. They are filled with an array of various sizes of rocks. These were set on the ocean floor with the help of a dive team. The divers connected buoys to the collectors for retrieval purposes. The buoys enabled the divers to find the collectors more readily.

The collectors remained on the ocean floor until mid-October and were then raised and examined for stage 4 lobster larvae. The objective of this research was to hopefully round out previously collected data with information on stage 4 lobster larvae that the GCIFA had previously been unable to obtain.

2.4.1 Results
Nineteen of the 20 collectors deployed were recovered. Only one male lobster measuring 9.8 mm was found in the collectors but approximately 39 other marine species were recorded. It should be noted that several lobsters were found underneath the collectors. The temperature gauges have yet to be retrieved.

2.5 Buzzards Bay, Massachusetts
Presented by Peter Milligan, UMASS Dartmouth

2.5.1 Construction
Ketchum Traps Co. of New Bedford, Massachusetts constructed the collectors using two layers of mesh, one ¼ inch and one 1/8 inch. The collectors were then filled with 4-6 inch field stone cobbles with a 2 inch field stone base layer. A rope harness was created by tying rope from the corners of the collector to a central loop to be used during deployment and retrieval of the collectors.

2.5.2 Deployment/Retrieval
A 24 foot lobster boat was used to deploy the collectors. It took two days to deploy them. A sub-surface buoy was attached to the corner. A diver was used to assess the condition on the bottom and the bottom type. The collectors were deposited at three locations with ten collectors per area. Two of the areas had cobble bottom and one area had sand.

In order to retrieve the collectors, two divers attached buoyed lines to the collectors and three technicians pulled and sorted all the traps on deck. All components of the collectors were placed in 16 oz. jars and labeled, and the number of lobsters noted.

2.5.3 Results
Five settlers and one juvenile lobster were found in the collectors. Plankton sampling was also performed. Samples were fixed in Formalin and seawater and stored in ETOH. Excess debris was removed from the samples and identification, counts and measurements were taken at a rate of approximately 15 samples per day.

2.5.4 Future Sampling
A comparison of the two locations will take place in 2008 and an additional two locations will be added in 2009 (15-20 collectors per site), with plankton and SCUBA surveys performed on 30-40 additional collectors randomly allocated by depth and substrate, with plankton tows. A study of the growth of settlers (early, mid, late) and the growth of early juveniles is also planned.

2.6 Thoughts on Monitoring Biological Diversity and Artificial Collectors for Lobsters
Presented by Angelica Silva, Fisheries and Oceans Canada

2.6.1 Biological Diversity and Lobster Habitat
Artificial collectors provide a unique opportunity to understand lobster habitat selection using "additional habitat". Previous studies using suction samples have shown evidence of habitat selection by juvenile settlers on cobble when compared with other crustaceans. Using artificial collectors as additional nursery areas could be a long term project, with monitoring every three months to establish a baseline for distinct areas, and could potentially be a valuable tool in long term monitoring of biological diversity with the use of the proper protocols.

As an example, the Guysborough County Inshore Fishermen's Association (GCIFA) set up two sites, each with a different habitat. One had a soft, sandy bottom and the other a hard substrate. Ten collectors were placed at each site and were left for three months undisturbed. It was observed that colonization was made up of mostly mobile organisms. The organisms were counted and the larger crabs of 30 mm or greater were measured from each collector.

From the Whitehead, Nova Scotia site for the GCIFA project, one settler in nine collectors from the cobble, hard bottom was collected. Most of the samples collected were of juvenile stages of invertebrates and fish. Thirty-three species of invertebrates (24 v/s 20), 5 species of fish (4 v/s 2) and 6 species of algae and eelgrass (4 v/s 2) were observed.

2.6.2 Suggestions for Standard Sample Treatment
In order to standardize the collector projects across the board, it will be necessary to establish a standard artificial collector. There needs to be a standard design for the collectors and they need to be filled with cobbles to capacity. It is also important to keep photographic records of each labelled collector and keep latitude and longitude information for each location. Collectors should be placed along a transect, if feasible, and one to two temperature data loggers should be deployed at the bottom or at various depths at each location.

2.6.3 Suggestions for Standard Species Identification and Quantification
The design of a standard data sheet to collect information that covers all species should be developed, if it is not already available, so that visible organisms can be collected, counted and recorded. A photographic record of each species or group of species should also be created.

It is also important to measure all carapace length, carapace width for crustaceans (if too many, register frequency per size category), and total length for fish. Weight of algae and eelgrass should be estimated. All species should be identified and a voucher sample should be kept of each species to confirm identification.

Specialists should be consulted if necessary. If feasible, take a wet sample of each group of organisms and/or keep a representative sample for estimating dry weight.

When archiving samples a voucher sample of each species should be kept. It is especially important to record new species, rare species and invasive species. Data can be archived using Excel or maybe an alternative such as ACCESS or ORACLE. Analysis of the data could be used by individual groups or potentially for collaboration and comparisons across a latitudinal range.

2.6.4 Future Plans 2008

There is potential for organizing a workshop on methods for collection, preservation, and analysis of samples for the summer of 2008. This could be combined with other efforts to monitor coastal ecosystems (NaGISA; CoML; EMAN).

3.0 General Discussion/Plenary

Three topics were discussed during the general discussion period of the workshop. The following discussion summary provides the questions considered during these discussions followed by a summary of the discussions that took place.

3.1 Collector Design, Deployment and Retrieval

3.1.1 Questions

1. How should collector design be standardized?
2. What improvements are needed to the design?
3. Recommendations for easy deployment and retrieval.
4. Recommendations for choosing deployment sites (e.g.: bottom type, depth, etc.).
5. What data should be collected upon deployment (location, depth, bottom type, temp recorder attached, etc.)?

3.1.2 Discussion

Design

- Colour – does it affect catchability? The costs and availability of different colour collectors is an issue for trying to answer this question. Rick indicated his group could compare the affect of colour on catchability.
- Build collectors in bulk.
- Dimensions of mesh liner – Rick indicated he used 2mm pet mesh; John indicated they used a finer mesh. Coarser is better.
- Collector dimensions – approximately 2” x 3” x 6”
- Rock sizes – 4-6 inches, grapefruit size rounded cobble. Rinse rocks. Duplicate type of bottom. Fill collectors to the brim.
- Extra wooden runners to strengthen traps (cross runners for support).

Deployment and Retrieval

- Use a winch to handle the collectors.
- Attach temperature loggers.
- Single vs. trawl – setting single collectors is preferable as there is less dragging during retrieval.
- Smooth, steady haul back.
- Use a wharf hoist to load/unload collectors.
- A flat bed and forklift are needed for transporting the collectors.
- Inside storage is preferred.
- Standardize the distance between collectors. The distance between collectors depends on the depth, 5 – 40 m, consistent with suction sampling. In shallower sites, traps should be closer, comparable to suction sampling.
- Set in singles to avoid hauling entire line.
- Collectors have more randomness than suction sampling.
- Set collectors one month before stage IV are present. Timing of/conflict with fishing seasons is an issue which can affect when collectors are set.
- Standardize soak times. Haul by October 31st.
- Set in a transect.

- When deciding where to set consider:
    - Bottom temperature, depth and bottom type.
    - 7-10 m if just want to monitor settlement. If you have other things you want to look at go deeper.
    - Could have deep areas with low density settlement but that are still worth looking at, if you want to look at geographic area of settlement.
    - Try for gravel/cobble bottom or adjacent to it.
- Data Collected
    - temperature
    - latitude/longitude
    - photo records
    - bottom type
    - type of vegetation
    - depth
    - number each collector

3.2 Data Collection, Use and Management

3.2.1 Questions

1. What data should be collected and how detailed does it need to be (e.g.: for which organisms do we need to measure and count, just count, or just record presence, or ignore, etc.)?
2. What is the minimum data that all projects will collect?
3. How will the data be collected (e.g.: should we have a standard data sheet for all projects)?
4. Data entry – what data entry tool should be used (e.g.: Excel, Access, Oracle, etc.), who will design the tool, and who will do the data entry?
5. Data Sharing
    1. What data should be contributed to a central database for the collaboration?
    2. Who should manage the larger data set?
    3. Data Sharing Policies and Intellectual Property Guidelines.
6. Data Archiving.
7. Creating Metadata.
8. Analysis to be done – who will be using the data and how?
9. Presentation of data – what should be presented, where, when and how? (eg: should it be by project or a joint presentation of all projects or both, etc.)?

3.2.2 Discussion

- Count and measure lobsters, crabs, and fish.
- Identify invasive species.
- Count shrimp, bivalves, gastropods, and tunicates.
- Note presence of echinoderms and count if possible.
- Record presence/absence of the following. There is a time consideration; may only be able to sample a subset of the collectors:
    - Flora
    - Sponges
    - Polycheates
    - Nematodes
    - Wiggly long things with no legs

- Foreign species
- Urchins
- Star fish
- Amphipods (may need to preserve)

- Preserve settlers in alcohol for genetics study. Rick will check on the number of samples needed.

Data sheet

- Rick Wahle and John Tremblay will prepare a draft data sheet.
- Which database should be used, whether it should be Access or Oracle instead of Excel, was discussed. It was decided that for now we will continue to use Rick's Excel format. Michel Comeau, Rémy Rochette and Rick Wahle will work on developing something in Access.

3.3 Formalizing the Collaboration

3.3.1 Questions

1. What is the nature of the collaboration?
2. Confirm current partners in the collaboration on Lobster Collector Research and identify potential new partners.
3. Oversight/Coordination of the Collaboration (Rick has been doing this, maintaining a database with information on the various projects. What information is needed and when, what else needs to be done, should this only be Rick's responsibility or can/should others help, etc.)?
4. Future direction and expansion of the projects/collaboration. (potential new project partners, how to maintain the collaboration, etc.).

3.3.2 Discussion

Currently there is a loose collaboration of post-larval lobster collector research projects. Formalizing the collaboration was discussed. It was agreed that it would be good to formalize the collaboration. There are a number of things, such as collector design that can be standardized. There is also a need to create standard protocols. The collaboration would also address such issues as having a consistent database and sharing data.

Formalizing the collaboration requires establishing short-term and long-term objectives. The main objective would be to develop a tool for analyzing recruitment along with suction sampling and ventless traps. In order for there to be continued industry support, the project needs to be applied science.

4.0 Conclusions

Lobster collectors have proven to be a useful tool to study lobster post-larval settlement. A number of lobster post-larval collector research projects are underway and have resulted in the largest scale synoptic view of lobster settlement ever conducted, stretching from Rhode Island to Newfoundland and across the Atlantic to Norway. The collectors are also a potential tool for biodiversity research.

The *Lobster Post-Larval Collector Research Collaboration Workshop* brought together participants from the various projects from throughout Atlantic Canada and New England to share their experiences and results, and to begin developing a standard approach to the basic design of the projects, such as collector design, minimum data collection requirements, and project protocols.

It was agreed that it would be beneficial to formalize what to this point has been a loose collaboration. Formalizing the collaboration requires establishing short-term and long-term objectives. The main objective would be to develop a tool for analyzing recruitment along with suction sampling and ventless traps. It was agreed to hold another workshop February 19, 2009 to follow up on formalizing the collaboration.

5.0 Appendices

5.1 Appendix I – Participants List

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Heather Hunt
Jean Lavallée
John Tremblay
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Kevin Squires
Linde Greening
Martina Kluge
Matt Parkhurst
Michel Comeau
Patty King
Peter Milligan
Rémy Rochette
Rick Wahle
Robert MacMillan
Victoria Burdett-Coutts
Wilford Smith