
HOOK, LINE AND THINKER

The Newsletter of the Fishermen and Scientists Research Society

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Summer 2011

UNDERSTANDING LOBSTER POPULATION CONNECTIVITY – WHO IS HELPING WHO?

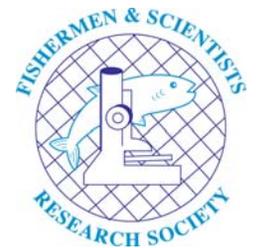
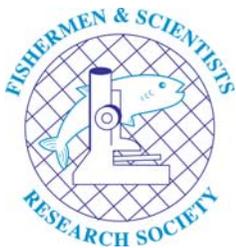
By Patty King, General Manager, Fishermen and Scientists Research Society and Marc Allain, Network Facilitator, Canadian Capture Fisheries Research Network

Where are they from? Where do they end up? These are common questions fishermen ask about lobster larvae in their area. Are the larvae that settle in their area from somewhere else? Do the larvae produced in their area settle there or are they transported to another area? They want to know if their efforts to increase larval input into the system are helping their own Lobster Fishing Area (LFA) or other LFAs. The newly formed Lobster Node of the Canadian Capture Fisheries Research Network (CCFRN) hopes to answer these and other questions through collaborative research on berried lobsters.

The CCFRN is a unique collaboration that brings together researchers from Canadian universities, government scientists and representatives of owner-operator fishing fleets from the Atlantic, Pacific and fresh water fisheries to answer a series of strategic research questions identified by the fishing industry. In the Atlantic provinces, a major focus of the Network's research is on lobster. Through funding from NSERC, the Natural Sciences and Engineering Research Council of Canada, fishermen's organizations from across the Atlantic region are collaborating with scientists from Fisheries and Oceans Canada (DFO) and five Canadian universities to answer important questions about lobster through the Lobster Node of the recently formed CCFRN. NSERC is funding this collaboration for five years.

NSERC funds 5-year lobster research initiative

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The goal of the Network's research is to answer questions about lobster stock structure and the links between management areas and other related topics, to help us better understand our lobster fishery. The research will address such questions as:

Project to answer questions on lobster stock structure and links between LFAs

- Are lobsters made up of one or many populations or stocks?
- Are lobsters from one management area connected to lobsters in another?
- What is the best way to measure the overall health and sustainability of this vital resource?

Currently Lobster Fishing Areas (LFAs) are based on administrative, not biological considerations. We don't know the extent of the connections between LFAs. Our working theory is that many of the connections between LFAs occur through the transport of lobster larvae. In fact, some scientists think that the larval stage in the lobster's life cycle might be the most significant in terms of movement. As a result of the Network's research, four or five years from now, a picture should emerge about where lobster larvae are produced, and how they are transported across large areas.

"....a picture should emerge about where lobster larvae are produced, and how they are transported across large areas."

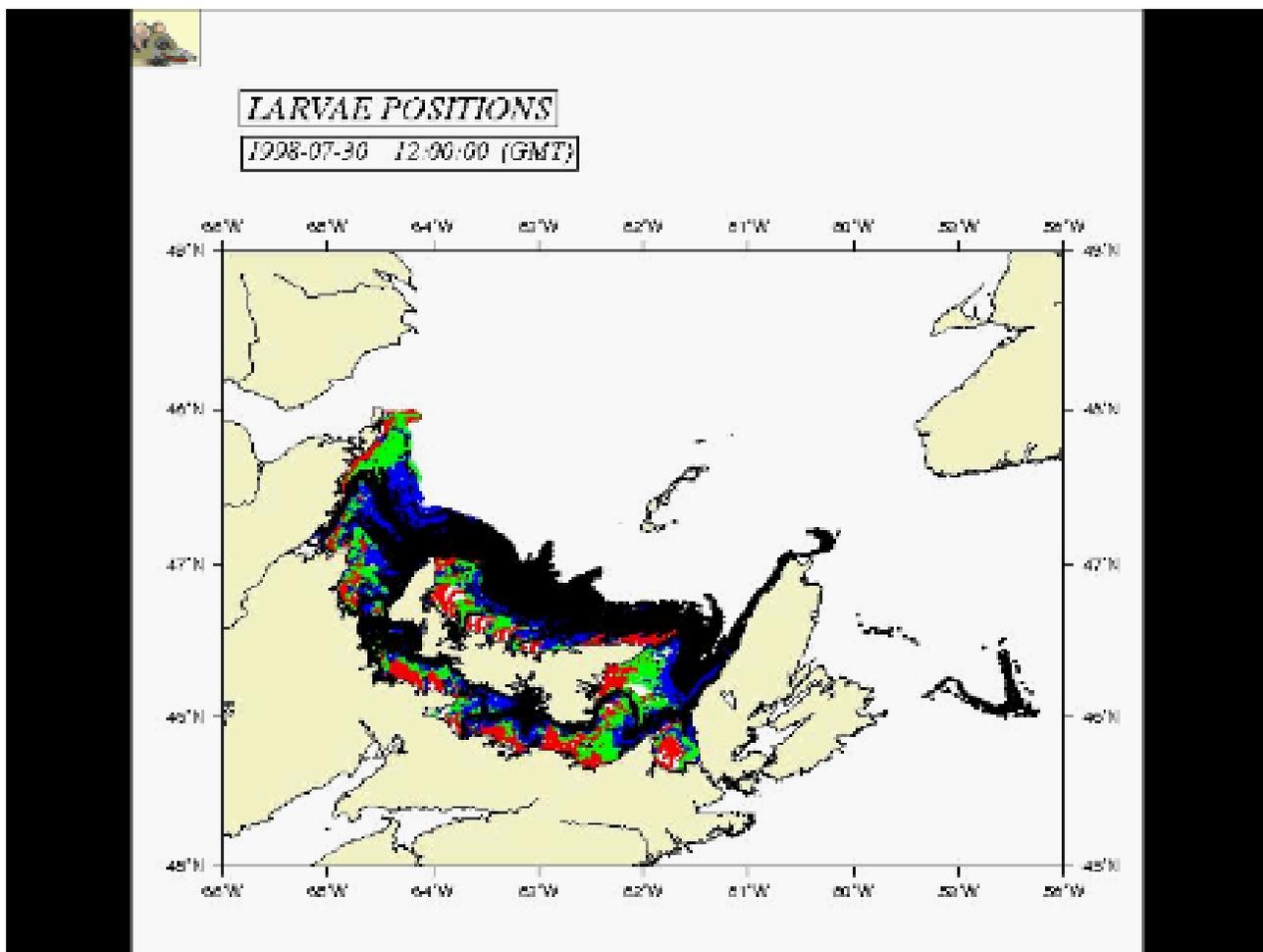
The Fishermen and Scientists Research Society (FSRS) is one of the founding members of the Network's Lobster Node and has played a key role in coordinating data collection and preparing training tools for participating fish harvesters. Data collection on berried females - their

size, location, and stage and quality of their clutch development - began this past spring. The FSRS, in collaboration with the Eastern Shore Fishermen's Protective Association (ESFPA), Guysborough County Inshore Fishermen's Association (GCIFA), LFA 27 Management Board, Fundy North Fishermen's Association, and Université Sainte-Anne Marine Research Centre in Petit de Grat, worked with fishermen in LFAs 32, 31B, 31A, 30, 29, 27 and 36 to collect the required data. A special thank you to all the fishermen who participated this season for their data collection efforts and willingness to take technicians out on their boats to do sampling: Hubert Boutilier, Terry Baker, Hugh MacDonald, Basil Dobson, Duncan Bellefontaine, Kevin Squires, Keith Green, Carlton Lunn, Jay MacDonald, Carla Samson, Malcolm MacDonald, Fred Lawrence, Greg Organ, Matthew Smith, Kevin Green, Allan Kennedy and Jeff MacQuire. Data collection also began this Spring in Newfoundland, parts of the Gulf Region, Gaspé and the Magdalen Islands and will be expanded into other areas next season.

The objective of this data collection is to get the most complete information possible on larval production ever collected before in the Canadian lobster fishery. The objective is to collect this data at 50 to 75 km intervals all along the Atlantic coast, from Newfoundland to the Gulf of Maine. Only fishermen can provide this level of coverage, therefore the success of the Network's Lobster Node depends on the participation of fishermen.

Berried lobster data being collected from Newfoundland to the Gulf of Maine

This data will be used to feed oceanographic models that predict what will happen to lobster larvae once they are released into the marine environment. The models follow individual lobster larvae over time from when and where they are released to when and where they are ready to settle on the seabed. We will ground truth this information with lobster settlement traps in areas where the models show lobster settlement should be particularly high or low.



Excerpt from video of larval transport model simulation showing larval movement. Each color depicts a different larval stage, with black representing the stage at which settlement begins to occur.

*Larval Transport Model Simulation - Chassé J. and Miller R. 2010.
Lobster Larval Transport in the Southern Gulf of St. Lawrence. 19: 319-338.*

Next year we will also start collecting lobster specimens for genetic testing to see if there are differences in lobster in different parts of the range. We will also study whether differences in the temperature of the water column act as barriers to the movement, survival and settlement of lobster larvae, what happens to larvae after they settle on the seabed and track adult lobster movements.

This is a long-term initiative, the first phase of which is to assemble the best and most complete information on larval production: its abundance, origins and quality. This research stage hinges on the collection of data on berried females: their size, abundance, location, the quality of their egg clutches, and when they release their larvae. Knowing more about berried females, the brood stock that underpins our lobster fishery, is critical to understanding the amount of larvae in our system and, eventually, the biological connections between different areas.

Solid, reliable data on berried females will provide us with useful knowledge about our lobster resource, its health and the kind of recruitment we might expect in the future. This information on berried females will fill significant gaps in our understanding of the differences that might exist across the Atlantic in the size and productivity of female lobsters. Our current knowledge is patchy; good for some areas, less so for

others. This research will also allow us to update important benchmarks, such as size at sexual maturity, and improve our knowledge about the overall health of our brood stock.

The information collected, combined with fishermen's knowledge, could also allow us to identify areas crucial to lobster production, such as hot spots, where there are more or larger reproductive females or where lobster larvae settlement is particularly high. This information could then help support measures to protect critical areas, including the restriction of salmon aquaculture, dredging, seabed mining or other activities that could disrupt and damage lobster stock health and reproduction.

If you would like to learn more about the Network's Lobster Node and the research being done, please contact FSRS General Manager Patty King at info@fsrs.ns.ca or by calling 902-876-1160.

GREETINGS FROM THE RESEARCH DESK

By Shannon Scott Tibbetts, Research Biologist, Fishermen and Scientists Research Society



Just a short note to say that I have returned to the Research Biologist chair after a wonderful year off with my second child. As everyone gets back into the work routine after summer vacations, I hope you will continue to follow and support our various research projects.

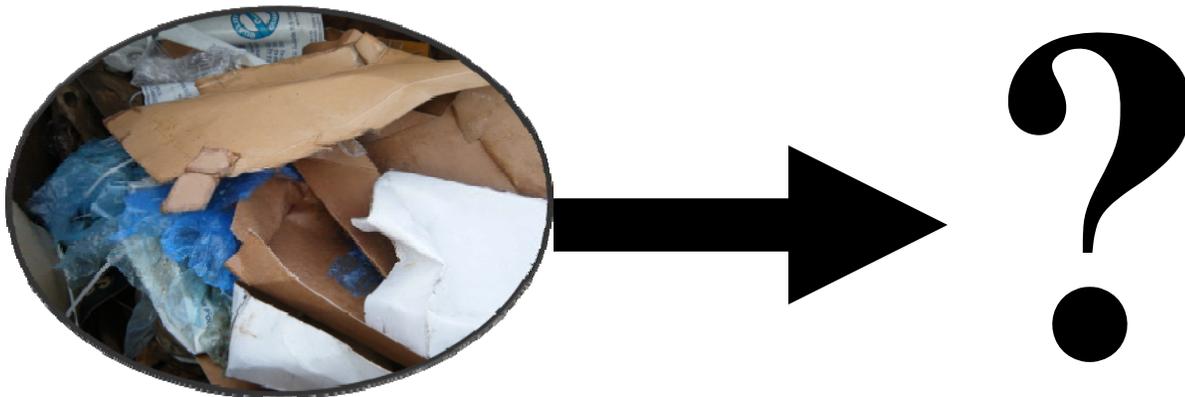
The FSRS office has moved to a different location. We are still located in the Argo Building of the Bedford Institute of Oceanography but just a few doors down the hall from the previous location.

Please feel free to contact me with any questions or concerns. shantibbetts@gmail.com or 1-800-226-3777.

Hope to hear from you soon.

CLEAN NOVA SCOTIA SHIP TO SHORE PROGRAM SEEKING FISHERMEN'S PARTICIPATION IN BAIT BOX STUDY

By Robin McCullough, Ship to Shore Intern, Clean Nova Scotia



The Ship to Shore program works with commercial fishermen in Nova Scotia to improve how waste is managed at sea and on land. The program is administered by Clean Nova Scotia, a not-for-profit environmental organization dedicated to inspiring environmental change.

Ship to Shore is conducting a research initiative funded by RRFB Nova Scotia (Resource Recovery Fund Board Nova Scotia) and through partnership with Dalhousie University to determine the feasibility of an alternative bait box. Bait packaging is the container that fishers purchase their bait in and is commonly composed of a cardboard box, a plastic bag and white strapping. Over three million bait boxes are used in the Maritime lobster industry every year*.

Fishers from across Nova Scotia have expressed interest in an alternative bait box design. Fishing harbours rank waste disposal as a high stress item in their operations and bait boxes amount to over 1,400 tonnes of garbage per year by the lobster fishing industry in the Maritimes. In addition, nearly 600,000 boxes are thrown overboard every year*. Consequently, traditional bait boxes contribute to a number of environmental and operational issues. This project is a response to these concerns.

To ensure that an alternative bait box model will meet industry standards and needs, the Ship to Shore program is calling on industry members such as fishers and bait suppliers to have their say in what they envision as an appropriate alternative design.

The results of the research will contribute to a cost/benefit analysis of using an alternative bait box versus a traditional box. The analysis will evaluate both the economical and environmental costs associated with an alternative bait box model.

If you would like to contribute to the design of an alternative bait box, or have suggestions on how to remedy this waste issue, we would be grateful for your input. Some important considerations include cost, size, weight and compatibility with machinery. Participants will be contacted for a 10 to 20 minute telephone interview.

To enter your name as a contact for this initiative you can reach us:

By email: Robin McCullough, rmccullough@clean.ns.ca

By phone: Ashley David, **420-7940** (toll-free: **1-800-665-5377**)

*Fisheries and Ocean Canada, Bait Box Study, 2006

UPPER BAY OF FUNDY LOBSTER FISHERY MONITORING PROJECT 2011 UPDATE

By Monica Finley, Project Biologist, Fisheries and Oceans Canada

The Environmental Impact Assessment (EIA) for the Modifications to the Petitcodiac River Causeway Project predicted no significant impact on commercial fisheries, however, as a precautionary measure, one of the conditions of EIA approval was that a Commercial Fisheries Follow-up Program, be implemented. The Fishermen and Scientists Research Society (FSRS), in collaboration with Fisheries and Oceans Canada (DFO), the AMEC Study Team (consultants retained by the NB Department of Supply and Services (DSS) for the Project), and the fishing industry, developed the Upper Bay of Fundy Lobster Fishery Monitoring Program to address the need for monitoring the lobster resource and fishery as part of the Commercial Fisheries Follow-up Program. In September, 2008, the FSRS was awarded a contract from AMEC Earth and Environmental to implement a monitoring program comprising of:

- 1) an at-sea sampling program in exposure and control zones before and after opening the gates in the causeway; and
- 2) a juvenile trapping program in exposure and control zones before and after opening the gates in the causeway .

Sampling for Stage 1 of the Commercial Fisheries Lobster Monitoring Program was completed December 2009. This stage involved gathering data to determine a baseline before the opening of the causeway gates. Lobster catch rates in commercial and FSRS juvenile recruitment traps were monitored during the open fishing seasons between October 14- December 31, 2008, April 1 - July 31, 2009 and October 15 - December 31, 2009, and during an out-of-season trapping survey between August 10 and September 20, 2009.

The Petitcodiac River causeway gates were opened by NB DSS on April 14, 2010 restoring tidal exchange. Data collection for the second stage of the Commercial Fisheries Lobster Monitoring Program commenced April 26, 2010. Lobster catch rates in commercial and FSRS juvenile traps were monitored during the open fishing season between April 26 and July 31, 2010, October 17 and December 16, 2010, April 29 and July 31 2011, and during an out-of-season trapping survey between August 10 and September 20, 2010. The 2011 out-of-season survey commenced August 12th and was in progress during the month of September. Lobster catch rates in commercial and FSRS juvenile traps will continue to be monitored during the fall 2011 fishing season.

In-Season Sampling

During the open fishing season, aboard commercial fishing vessels, the FSRS technicians record the lobster carapace length, sex and the number of berried individuals in each trap they sample. In addition to the data collected from commercial traps by the technicians, fishermen also collect data during the season from FSRS juvenile traps. During the fall 2010, ten fishermen each deployed five FSRS juvenile recruitment traps. The traps are set in close proximity to the commercial traps in a location determined by the fishermen to have a reasonable expectation of catching juvenile lobsters. The fishermen measure the lobsters from the juvenile traps and record the sex and if the lobsters are berried.

Table 1. A summary of the lobster (legal, sublegal, berried) sampling during the fall 2010 season.

Season	Trap type	Number of sampled trap hauls	Number of lobsters sampled
Fall 2010	Commercial	4,031	23,366
Fall 2010	Juvenile	655	4,611

Table 2. A preliminary summary of lobster (legal, sublegal, berried) sampling during the spring 2011 season.

Season	Trap type	Number of sampled trap hauls	Number of lobsters sampled
Spring 2011	Commercial	9,052*	50,899*
Spring 2011	Juvenile	TBA	TBA

*May change after data quality control is complete

Sediment samples were collected when sediment was present in the traps. Surface water samples were collected each sampling day and sent to a lab for TSS (Total Suspended Solids) analysis. A total of 417 water samples were collected during the fall 2010 (87 samples), out-of-season 2010 (147 samples), and spring 2011 (183 samples) for the second stage of the Commercial Fisheries Lobster Monitoring Program.

Out-of-Season Sampling

The out-of-season trapping survey commenced August 2011. The 2011 out-of-season trapping survey target areas (Figure 1) are the same as the trap locations during the 2009 and 2010 out-of-season survey; these locations were selected in direct consultation with DFO, the FSRS and LFA35 fishermen in 2009. Three vessels are participating in the out-of-season sampling in 2011. The FSRS technicians complete the sampling aboard these vessels. Out-of-season trapping surveys are planned at a similar time and location for the upcoming years.

A complete data report on the Upper Bay of Fundy Lobster Fishery Monitoring Program component of the Commercial Fisheries Monitoring Program: Stage 2 was submitted to AMEC in January 2011. Monica Finley has been rehired this year as the biologist for the project and is analyzing the data and preparing a data report on the Upper Bay of Fundy Lobster Fishery Monitoring Program 2011.

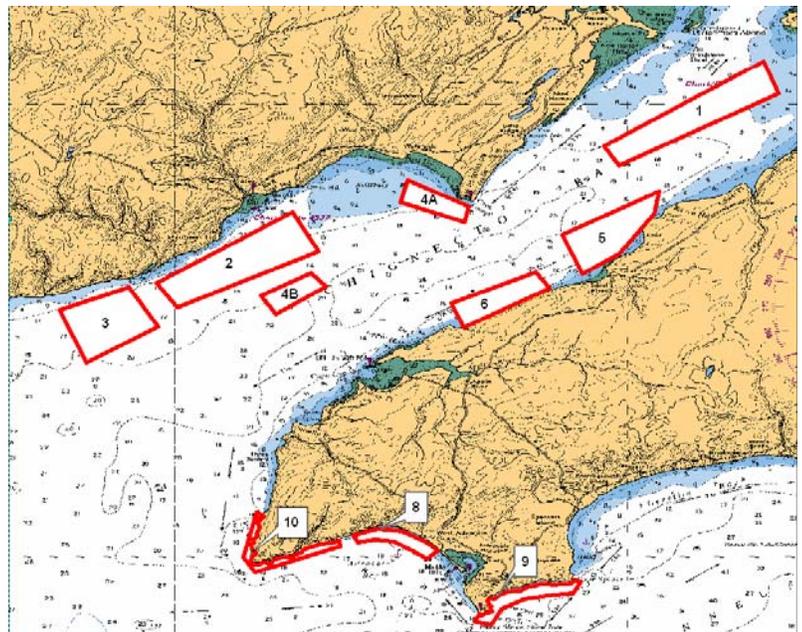


Figure 1. The boxes represent the out-of-season lobster trapping survey areas, 2011. Areas 1, 2, 3, 4A, 4B, 5, and 6 are located in the exposure zone and areas 8, 9, and 10 are located in the control zone.

THE LEATHERBACK SEA TURTLE IN CANADIAN WATERS

By Kelly Regan, Fisheries Technician, Fishermen and Scientists Research Society

The Leatherback sea turtle (*Dermochelys coriacea*) is the largest of the marine turtles with the average adult shell length ranging from 135-178 cm (Conant and Collins 1998). Although nesting sites for this species are generally found at tropical and subtropical latitudes, adult leatherback sea turtles have been spotted all over the world due to their migratory nature (Goff and Lien 1988, Eckert 2002, James 2004). In recent years, there has been more research done to assess the sightings of leatherback sea turtles in Canadian Atlantic waters. So far, the research indicates that the turtles are not only traveling here from warmer water locations, but that the Northern Atlantic, with its abundance of Jellyfish, may be an important foraging ground for these turtles (NSLTWG, n.d.).

The global conservation status of the leatherback turtle is ranked G2 for imperilled by NatureServe Canada and as of 2003, the leatherback turtle has been designated as an endangered species under the Species at Risk Act. This means that the species is at a high risk of extinction. Natural threats to leatherback populations include predation by a few natural predators, killer whales and sharks, and predation and loss of eggs due to foraging on beaches by terrestrial animals. The biggest threats to these turtles are loss of nesting habitat due to shoreline development, pollution and erosion (Pritchard 1982) as well as becoming entangled in fishing nets as bycatch. Turtles have been found dead after being caught in shrimp trawls, and longlines and gillnets of various fisheries throughout the world (Lewison et al. 2004; James et al., 2005) and in particular, the pelagic longline fisheries for Canadian swordfish and tuna (Javitech 2002).

Leatherback turtles have been sighted in the waters off the Atlantic coast of Canada (Goff and Lien, 1988; James 2004). Although not a common sight to see in our local Canadian waters, their presence generates a lot of excitement for rural communities. Research to determine the abundance and fate of sea turtles which venture into our waters is of importance in order to assess the risk that the Canadian fisheries have on the viability of this species. Once becoming entangled in fishing line or nets, turtles have a difficult time swimming, feeding and returning to the surface to breathe. The estimated mortality rate for turtles caught in fishing gear is above 50% (Goff and Lien, 1988). Fisheries and Oceans Canada (DFO) and the Species at Risk Act state that it is forbidden to kill, harm, harass, or take a live turtle from the wild. It is also illegal for anyone to possess a turtle, dead or alive, or a part of a turtle. If you do happen to see a leatherback sea turtle in the wild, DFO requests that you take a picture or a video of it and record the date and time of the sighting. If possible, you should record the position or location of the sighting and report this information to DFO.

Conant, R. and Collins, J. T. (1998). A Field Guide to Reptiles and Amphibians of Eastern and Central North America, Houghton Mifflin Co, Boston, Mass, USA, 3rd edition, 1998.

Eckert, S. A. (2002). Distribution of juvenile leatherback sea turtle *Dermochelys coriacea* sightings. *Marine Ecology Progress Series* **230**: 289-293.

Goff, G. P. and Lien, J. (1988). Atlantic leatherback turtles, *Dermochelys coriacea*, in cold waters off Newfoundland and Labrador. *Can. Field-Nat.* **102**(1):1-5.

James, M.C. (2004). *Dermochelys coriacea* (leatherback sea turtle) migration and dispersal. *Herpetological Review* **35**: 264.

James, M. C., Ottensmeyer, A. and Myers, R. A. 2005. Identification of high-use habitat and threats to leatherback sea turtles in Northern waters; New directions for conservation. *Ecology Letters* **8**: 195-201.

Javitech Limited (2002). Report on seaturtle interactions in the 2001 pelagic fishery. Report submitted to the Nova Scotia Swordfish Association and Habitat Stewardship Program, Canada Wildlife Service, Environment Canada, Javitech, Dartmouth NS.

Lewison, R. L., Freeman, S. A., and Crowder, L. B. (2004). Quantifying the effects of fisheries on threatened species: the impact of pelagic longlines on loggerhead and leatherback sea turtles. *Ecology Letters* **7** (3): 221-231.

CATCHING UP ON SEA TURTLES IN TRINIDAD

By Josh Fricker, Fisherman and Director, Fishermen and Scientists Research Society

Since 1999 the Canadian Sea Turtle Network (CSTN) (Dr. Mike James and collaborators) has been working together with fishermen to help conserve the leatherback sea turtle population by collecting sightings and even helping with fishing gear entanglements. Every year the CSTN has a field research season. In July they work with fishermen in Prospect and in August/September in Neil's Harbour (northern Cape Breton). I have been helping out since 2003 with my uncles, who have been working with Dr. James for the last 12 years. The turtles we catch come north every year to forage for Lion's Mane jellyfish. When we work with leatherbacks, we do many things, such as attaching satellite tags, cameras, flipper tags, and pit tags, and collecting DNA samples, weights and measurements. Some of the female turtles we catch were also tagged in other places such as Trinidad, French Guiana and Costa Rica when they come ashore on the beaches to lay eggs.

Back in March, a leatherback working group from Trinidad, the Nature Seekers, invited five of us to go down to help volunteer on Matura Beach. It was a great experience; we got to witness the females swim from the surf and climb up the soft sand in the moonlight and dig a metre deep hole with their flippers to lay their eggs, just like they have for millions of years. Even though the Trinidad people have found many of our tagged turtles in the past they did not find any while we were there. But it still was a never-to-be-forgotten sight. The leatherback nesting season is from March till August, we came at the start of the nesting season so we only saw a few turtles. The Nature Seekers have an ecotourism business set up, where people from around the world that care about sea turtles come to Matura to help. Just the experience alone is very rewarding.

The leatherbacks in Trinidad have many challenges to face, especially accidental fishing gear entanglement with gillnets. While there, Dr Scott Eckert of the Nature Seekers took us around to many fishing ports and we got to talk to many local fishermen. The fishing industry there is very different from ours in Canada. They only use small outboard boats and mainly use gillnets. There is a very high mortality rate of turtles that get entangled in gillnets during the mating season. Nature Seekers is trying to get the locals to try other methods of fishing that will reduce leatherback bycatch.

It truly was a trip of a lifetime, we got a chance to meet and work with wonderful people and also learned a lot more about leatherbacks and other fishing cultures far from home.

This summer we invited seven people from the Nature Seekers to come to Cape Breton to experience what we do to help leatherback turtles. Although we have similar methods of working with the turtles it is on very different terms; we work with them at sea. They really enjoyed being out on our boats and experiencing fishing different species like handlining mackerel and cod. One guy even took back home a miniature lobster trap to give him ideas to construct a trap for catching the type of lobster that they have in Trinidad. Many of the Nature Seekers talked about coming back to Canada to visit again someday.

With jellyfish becoming more and more abundant around the world and feeding on fish larvae and zooplankton, the leatherback turtle, as one of only a few species that eats jellyfish, is an important marine predator. It is nice to see that efforts to recover leatherbacks in the Atlantic are helping the situation.

BEACHCOMBING - What's New in The News

New Video and Publication on Oil Spill Mitigation Science

Fisheries and Oceans Canada (DFO) recently released a new video online which provides a brief overview of oil spill countermeasure research conducted by DFO's COOGER – the Centre for Offshore Oil, Gas and Energy Research, a Centre of Expertise within the Ecosystems and Oceans Science Sector.

The video demonstrates how DFO contributes to protecting the health of our aquatic ecosystem through the work of COOGER's Executive Director Dr. Ken Lee and his team. Highlighted are recent oil spill mitigation efforts in the Gulf of Mexico, on-going research on the clean-up of oil spills in cold and ice-prone waters, including the Arctic, and an experimental study conducted in partnership with the Canadian Coast Guard onboard the CCGS *Martha L. Black*.

The video can be viewed at:
<http://www.science.gc.ca/default.asp?lang=En&n=D5B19585-1>.

For more information on oil spill mitigation, you can also check out 'Oil Spills and Microbes', originally produced by the American Society of Microbiology and is now available on the DFO website at:
<http://www.dfo-mpo.gc.ca/science/publications/microbes/index-eng.html>.

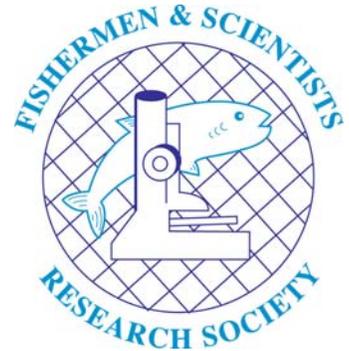
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UPCOMING EVENTS

Mark Your Calendars! FSRS 19th Annual Conference

**February 24-25, 2012
Best Western Glengarry Hotel
Truro, NS**