HOOK, LINE AND THINKER

The Newsletter of the Fishermen and Scientists Research Society

Issue: 2002 - 3 **Summer 2002**

40,000+ FISH SAMPLED IN 4VSW SENTINEL PROGRAM

By Carl MacDonald, FSRS Senior Data Analyst

The fall is here and it is time to conduct the eighth 4VsW Sentinel Program off the coast of Nova Scotia. Starting September 1st, the Fishermen and Scientist Research Society will contract eight longline fishing vessels from Sambro to Cape Breton to survey part of the ocean for groundfish. The survey area encompasses from Sambro to Louisburg, out to the edge of the Scotian Shelf, including around Sable Island. Following the 4VsW Survey protocols, the fishermen will be setting 1500 number twelve hooks baited with mackerel at predetermined stratified random stations. A total of 202 stations will be surveyed this fall by the eight hook and line fishing vessels.

The fishermen involved are very well trained in fishery science. All fishermen who are involved in the Survey go through a three-day fisheries training course at the Bedford Institute of Oceanography before setting out to do their work. The fishermen are responsible for getting their boats to pre-selected dots on the ocean and setting their gear. They are responsible for gathering all the scientific fisheries information for the scientists back home, as well as oceanographic information via the use of CTD's and minilogs. Here is a simplified version of the process. For each set, the fishermen record the location where they fished, how long the gear fished, all the species they caught, the number and weight of each species they caught, and the length, sex and stage of sexual maturity of the fish. They remove the fish otoliths (used to age the fish), and the fish stomach if there are contents inside. If this sounds like a lot of work then add in watching for hurricanes, oil rigs, containers ships, and other fishing vessels. Don't forget the largest vessel in the survey is 50 feet in length, with most of the vessels being 40 odd feet.

• Inside this Issue •

40,000+ Fish Sampled in 4VsW Sentinel Program…… 1
Ask The Scientist…… 3
Workshop on Marine Biodiversity in Canada…… 4
Fishermen and Scientists Research Society Code of Ethics…… 8
FSRS Implements Data Sharing Policies…… 9
Blue Crabs Found in Nova Scotia…… 10
Institute Sponsors Lecture by Canadian Lobster Biologist Susan Waddy …… 11
13 Commercial Longline Vessel Participating in Groundfish Sentinel Program…… 12
Creature Feature…… 13
Caution! Subsurface Mooring on Scotian Slope …… 14
Students Receive FSRS Oceans 11 Program Award for Outstanding Achievement…… 15
Clam Resource Enhancement in Chezzetcook Harbour, N.S. …… 16
The Yarmouth Shark Scramble…… 18
FSRS Welcomes New Members …… 19
New to the FSRS Library …… 19

Working on relatively small fishing vessels, the fishermen conduct a high degree of sampling. The main survey results for the last four years are expressed in Table 1. Most years, the fishermen measure over 90 percent of the cod and haddock caught on the survey. All halibut and monkfish are measured as well, along with many other species.

Table 1: Summary of results for selected species from the 4VsW Sentinel Survey for the years 1998 to 2001.
Note – In 2001 there were 50 less stations, causing the catches not to be directly comparable.

Species	Weight in Pounds				Number of Fish Caught				Number of Fish Measured			
	1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001
Cod	21477	13440	10615	4408	7783	4385	4080	1695	7196	4044	3900	1300
Haddock	12936	8617	9098	6330	6339	3858	5120	3234	5902	3743	5035	2960
W. Hake	4359	9097	13564	9515	1616	2717	4603	2560	1272	1987	3878	1751
Pollock	226	222	118	44	61	60	40	7	50	57	30	1
Cusk	2030	1747	1666	2505	506	443	352	600	186	229	192	195
Halibut	3047	793	757	1536	118	48	43	68	118	48	43	68
A. Plaice	498	538	141	512	262	291	82	279	80	256	39	159
Dogfish	533	4483	957	1050	191	1409	370	279	100	893	80	5
T. Skate	3723	3386	4487	3696	1042	936	1144	974	706	707	501	694
Monkfish	1786	1062	3470	758	225	126	425	88	225	126	425	88

When looking at Table 1, please remember that the numbers from year to year are not directly comparable because there were 50 fewer stations in 2001. To compare year 2001 to other years one must pro-rate the catches by stratum from the actual 201 sets in 2001 to 252 sets in the previous 3 years.

In terms of catch, the number of cod captured in 2001 was the lowest in the history of the Sentinel Survey. No good news there. Decreased numbers of cod is certainly a concern. However, last year's survey caught about the same amount of haddock, pollock and white hake as compared to the last couple of years.

The detailed sampling from the 2001 Sentinel Survey resulted in the collection of 1147 pairs of otoliths, 177 fish stomachs, and 1171 individual fish being weighed. This amount of detailed sampling is less then previous year due to the 20% decrease in the number of stations. The participating fishermen should be commended as they continue to be able to sample at about the same efficient rate.

The second part of the Sentinel Program is called the Commercial Index. Fishermen are given ten fishing days to fish anywhere within 4VsW (except the closed haddock box). This commercial fishing activity is designed to show scientists the abundance of fish that the structured survey may have missed. Thus far the Commercial Index has only confirmed the survey portion of the Sentinel Program. Fishermen struggle to find an abundance of fish within 4VsW. Very few fishermen even want to give the Commercial Index a try because the economic feasibility is just not there.

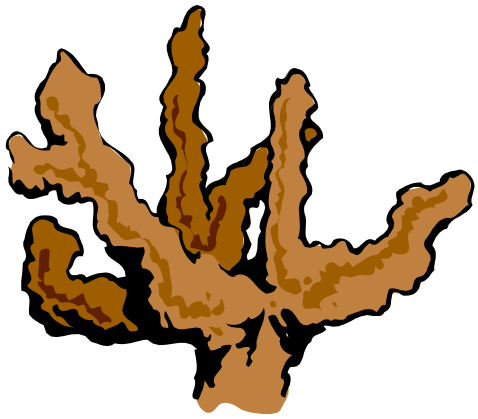
Overall, the 4VsW Sentinel Program has been very successfully executed over the last seven years. The survey works and the fishermen deserve a great deal of credit. However, the survey did not show any great abundance of the main groundfish species. Actually, the survey has shown a decrease in some of the more economically important groundfish species. This result is very comparable to the DFO research survey of the area. Even though the fish abundance results are towards the negative side, the Sentinel Survey is more important now then ever. The greater benefits of the Sentinel Survey are now at a point where scientists place more weight in their results. A greater time series allow scientists to look backward and have better insight into what the current results are saying. So have faith in the survey, and if things turn around for the positive in 4VsW the survey will be there to confirm it.

ASK THE SCIENTIST

What is the difference between a coral & a sponge?

By Julie Davis, Dalhousie University, Marine Biology, Honors Co-op.

Sponges are coelenterates, which means they have a main body cavity upon which they rely for most bodily functions. Water passes into this main body cavity, called the osculum, where food present in the water is captured. Sponges can be found in groups (colonial) or on their own (solitary) and are present in almost all areas of the ocean, from the intertidal to the deep-sea.



Corals can be hard or soft. Hard corals are characterized by many polyps growing over top of a hard calcium carbonate skeleton. Each of these individual polyps functions much like an individual sea anemone, with tentacles to trap food and help create water currents around the animal.

Soft corals do not have a hard skeleton but function in much the same way as hard corals. Shallow water, or tropical corals, depend on a symbiotic relationship with algae for survival, whereas deep-sea corals, like those present off Nova Scotia, rely on the method previously described. Like sponges, corals are also present in almost all areas of the ocean, from very shallow areas to thousands of meters below the surface.

Why do you continue to do a survey when the stocks are not there?

By Paul Fanning, Marine Fish Division, Fisheries and Oceans Canada.

There are several reasons for continuing the survey programs DFO operates in spite of stock fluctuations. The first reason is that the surveys are not direct estimates of the numbers of fish of each species in the area. They are what we call relative indicators. That means that what we are able to measure are changes in abundance from year to year. If we do not maintain the time series of annual estimates we lose the ability to detect changes, either increases or decreases in individual stocks. The second reason is that the DFO RV surveys and many of the industry surveys are directed at a number of species. So, even when we are quite clear about the state of one stock in an area (4VsW cod for example!) there may well be important changes occurring in other stocks (4VW haddock?). The final reason I will discuss here is that the surveys are the means by which we monitor a broad range of other factors in addition to commercial fish stock abundance. This includes various benthic invertebrates (snow crabs, etc.) as well as the conditions in the marine environment, such as temperature and salinity, nutrients, plankton abundance, and forage species abundance and distribution.

The current batch of surveys conducted by DFO and industry provide powerful tools to monitor commercial species trends, marine ecological conditions and the marine environment. The reasons for stopping particular surveys will have more to do with lack of money and staff than it will with the lack of need for the information they produce.

CENTRE FOR MARINE BIODIVERSITY AND CENSUS OF MARINE LIFE: WORKSHOP ON MARINE BIODIVERSITY IN CANADA

By K.C.T. Zwanenburg, Marine Fish Division, Fisheries & Oceans Canada

Introduction and Background

The world demand for food from the oceans is expected to outstrip availability within the next few decades. Increased use of the oceans for extraction of non-renewable resources and the accelerating growth of coastal population centers will put additional pressures on these systems. In Canada this is reflected by increasing pressures on wild fish and invertebrate stocks, some to the point of fishery closure, increases in offshore oil and gas exploration, and increases in non-consumptive and other ocean use activities. At the same time there is increasing demand for conservation of marine habitats and biodiversity. The latter reflects a growing recognition that the welfare of mankind is inextricably linked to the welfare of these marine systems both as sources of food, ecosystem services, and as indicators of overall biosphere health. Rational management of future harvesting and other human marine activities requires a reliable information base and theoretical framework with which to make effective decisions. The workshop was convened to develop a National Plan for Marine Biodiversity in Canada's three ocean territories, to develop recommendations for improved inventories and monitoring of this diversity in future, and to provide guidance on what key factors may control biodiversity thereby allowing for its effective conservation.

By signing the International Convention on Biodiversity Canada has agreed to: make inventories of biodiversity, monitor changes in biodiversity, and make plans to conserve biodiversity. Although Canada ranks among the world leaders in marine research and has been carrying out biophysical monitoring since at least the 1950s, knowledge of its vast ocean territories is still rudimentary for many areas, and especially for many groups of organisms inhabiting them. A pre-requisite to developing effective programs to protect habitats and biodiversity is to determine the extent to which information on biodiversity is available for Canada's Pacific, Arctic and Atlantic Ocean territories. Identifying the shortcomings in this information will allow us to amend existing biophysical monitoring activities to ensure that these information gaps can be filled. In addition the theoretical framework within which these data are interpreted and from which generalities regarding biodiversity can be drawn are not well established for marine systems. Such a framework would allow us to make predictions about what major factors control biodiversity within marine systems and therefore what mitigative procedures would be effective for its maintenance.

The Centre for Marine Biodiversity (CMB) proposed the workshop in recognition of the many projects relating to biodiversity that are being carried out in all of Canada's ocean territories (Pacific, Arctic, and Atlantic) and the need to consolidate and review this knowledge at a national scale. Canada is well positioned for this workshop given the activity and caliber of its marine science community, the long tradition of monitoring of its marine systems, and the implementation of ecosystem level research in many of its marine institutions. The motivations for the Census of Marine Life are that it provides opportunities to make exciting discoveries about our world, that it supports and operationalize the International Convention on Biological Diversity, and that this improved knowledge will lead to an improved ability to manage marine resources. Specifically the objectives of the Census are to describe: 1) What did live in the Oceans, 2) What does live in the Oceans, and 3) What will live in the Oceans. The global objectives of the Census are not only about classifying and counting the number of organisms in the sea; they are about understanding the complexities of biological-physical-chemical coupling in dynamic marine environments.

The census of marine life therefore remains one of the grand challenges of marine science whose execution has the potential to unify all its disciplines (biology, chemistry, and physics). At present a number of pilot projects, exploring various aspects of the Census, are being carried out. The development of a national plan to address marine biodiversity in Canada therefore represents a logical next step in the evolution of the census from pilot projects through national initiatives to the global census. The workshop was attended by invited experts and others from the Pacific, Arctic and Atlantic regions of Canada and by international experts.

Specifically the workshop was convened to achieve the following objectives:

- To identify the present knowledge and knowledge gaps about marine biodiversity in Canada's three Oceans
- To identify the present state of knowledge on major processes affecting biodiversity.
- To develop a 5-10 year plan outlining data collection and research directions to address gaps
- To establish a national committee on marine biodiversity to implement and adapt the plan

The workshop was developed over a period of 14 months under the direction of a National Steering Committee consisting of Canadian experts in the field of marine biodiversity. The members of the steering committee were:

Dr. John Anderson (andersonjt@dfo-mpo.gc.ca)
Dr. Marc Costello (costello@huntsmanmarine.ca)
Dr. Louis Fortier (louis.fortier@bio.ulaval.ca)
Dr. Richard Haedrich (haedrich@morgan.ucs.mun.ca)
Dr. Paul Hebert (phebert@uoguelph.ca)
Dr. Ellen Kenchington(kenchingtone@mar.dfo-mpo.gc.ca)
Dr. Colin Levings (LevingsC@pac.dfo-mpo.gc.ca)
Dr. Ram Myers (Ransom.Myers@dal.ca)
Dr. Ken Minns (MinnsK@dfo-mpo.gc.ca)
Dr. Howard Powles (powlesh@dfo-mpo.gc.ca)
Dr. Mike Sinclair (sinclairm@mar.dfo-mpo.gc.ca)
Dr. Verena Tunnicliffe (tunnshaw@uvvm.uvic.ca)
Mr. Kees Zwanenburg (Zwanenburgk@mar.dfo-mpo.gc.ca) (Project Leader and Workshop Co-convener)

Workshop Results (Summary)

The Center for Marine Biodiversity workshop on Canadian Marine Biodiversity, took place at White Point Beach Lodge, Nova Scotia from Feb 25 – March 1, 2002. The workshop was co-funded by DFO and the Census of Marine Life, Alfred P. Sloan Foundation.

The gathered experts from across Canada, the United States and Europe discussed the current state of knowledge of marine biodiversity in Canada's three oceans. Their deliberations were comprehensive and ranged from the manner in which historical patterns set the marine biodiversity stage in Canadian waters, the extent to which we know and do not know the true biological diversity of our three oceans, to modern forces and processes affecting present day diversity. The workshop also discussed the urgent need to develop and implement effective plans for the conservation of Canada's marine biodiversity.

The experts recognized that there exists a significant volume of data and samples, which describe some aspects of the recent patterns of marine biodiversity for each of Canada's oceans. This information exists in two basic forms, samples and information about samples. Data registries based on the Department of Fisheries and Oceans National Science Data Inventory were developed for each of the Pacific, Arctic, and Atlantic oceans and reviewed at the workshop. These registries list the characteristics of all the data sets and samples available for each ocean and are considered the meta-data. The developers of the registries indicated that there are additional data sets and sample collections presently not listed in these registries. These additional sources of information range from data collected by individual scientists to institutional data sets, and from small-scale sample collections from restricted geographic areas and taxa to more comprehensive collections covering broad geographic areas and phylogenetic scope.

The data registries for each of the regions were reviewed at a meeting prior to the workshop by each of four regional co-ordinators. At this meeting standard presentation formats and over-arching issues were identified for presentation at the workshop. It was considered that this was an essential contribution to the success of the workshop in that it prepared an overview of the state of current knowledge and identified issues common to all regions for further discussion during the workshop.

The workshop recommends, as a priority, the completion and integration of the three regional data registries. This should be accomplished through a national working group, consisting of the developers of the meta data sets reviewed at the workshop and other regional experts. The working group should be closely integrated with the on-going development of national and international data management systems (e.g. VDC, OBIS, etc). The workshop developed a set of guiding principles to direct the activities of this group.

The experts recognized that there are existing biological sampling and survey activities that provide invaluable information on marine biodiversity in each of our three oceans. These range from single site observations where information on biological diversity are collected sporadically, to large-scale and long-term surveys that provide comprehensive views of the diversity and abundance of organisms over a wide geographic area. None of these surveys presently provide a comprehensive view of marine biological diversity in Canada. The Arctic Ocean was identified as an area for which we have very little baseline information relative to the other oceans.

The workshop recommends that existing sampling and survey activities in the Pacific, Arctic, and Atlantic oceans be analyzed to determine to what extent these existing activities can be augmented or enhanced to broaden the taxonomic or geographic scope of the information they collect. The workshop developed a set of guiding principles for this group and distinguished between the requirement for establishment of biodiversity inventories and the need to monitor marine biodiversity.

The workshop recognized that a significant institutional structure at government, NGO, universities, and other levels is involved in the inventory, monitoring and conservation of marine biodiversity. The workshop also recognized the need for a continued development and coordination of this infrastructure to support the implementation of the workshop recommendations. This need for this development and coordination must be recognized and must be conveyed to the relevant organizations to ensure that the requisite infrastructure is developed in lock-step with information, research, and monitoring requirements.

The workshop recommends that consideration be given to the design and implementation of pilot studies which are intermediate between the network of observatories (as outlined below) and the existing sampling and survey activities. Such pilots would broaden the taxonomic scope of surveys and make use of best practices, including technologies, to develop protocols and requisite institutional evolution.

The experts reviewed evidence that indicates the applicability of some terrestrial based approaches to conservation in marine systems. It was shown that the fundamental characters of pelagic marine ecosystems are determined by a relatively small number of physical factors (irradiance and wind mixing of the upper water column) much as terrestrial biomes are determined by soil types. For benthic marine habitats the workshop was presented a review which defined habitat heterogeneity, using principles of landscape ecology, as the basis for community diversity. This concept of ecodiversity integrates single species and meta-population distributions by basing these patterns on the distribution of habitat varieties. It was also shown that species areas relationships apply to marine fishes and that the insular biogeographic theory is an appropriate construct for evaluating and interpreting patterns of marine fishes.

The workshop recognized that Canada requires a long-term vision with regard to understanding and conserving marine biodiversity. This vision could be encapsulated in the development and implementation of a network of *Marine Biodiversity Reference Areas* located in each of the Pacific, Arctic, and Atlantic oceans. The nature and location of these reference will be based on the analysis and exploration of available marine biodiversity information as described in the completed regional registries. Their establishment will also be based on the analysis of existing sampling and survey data and the extent to which these allow for the *a priori* classification of marine habitats. Such classification will greatly increase the efficacy of future sampling and survey activities by directing efforts to areas that are either representative of larger areas or are in some manner unique. It will also allow for extrapolation to adjacent waters. The *Marine Biodiversity Reference Areas* would be designed to provide detailed estimates of biodiversity across all taxa and to allow for studies of the processes affecting or maintaining biodiversity. As such, they will provide focal points for taxonomic research and provide the materials for training in taxonomic identification and the development of new identification techniques.

The workshop is recommending that national working groups be established. The mandates of these working groups would be to: 1) further develop the regional registries of marine biodiversity information, 2) determine the extent to which existing monitoring and sampling activities can be augmented to broaden the taxonomic or geographic scope of the information they collect, and 3) to analyze existing data on the distribution and abundance of marine biota in relation to physical and environmental characteristics to determine processes underlying new or established patterns in species diversity. The long-term aim of the working group deliberations being to provide the information necessary for the design and implementation of a network of *Marine Biodiversity Observatories* as outlined above.

PATTY'S PICKS - WEB SITES OF INTEREST

Pacific Fisheries Resource Conservation Council - **www.fish.bc.ca**
The Council acts as an agent for public participation and accountablity by collecting, analyzing and reporting information about fish populations and fish habitats.

FISHERMEN AND SCIENTISTS RESEARCH SOCIETY CODE OF ETHICS

Ethics in the Fishing Industry. Some think that is not possible. The members of the Fishermen and Scientists Research Society (FSRS), however, believe that it is possible to maintain ethics in the fishing industry, and set an example by abiding by a Code of Ethics developed in July 1994 at a FSRS General Meeting. The FSRS Code of Ethics, which forms part of our by-laws, outlines the FSRS Mission Statement and Code of Conduct for members. The FSRS encourages not only its members but also all those involved in FSRS projects and guests at FSRS conferences and workshop to abide by the code of ethics.

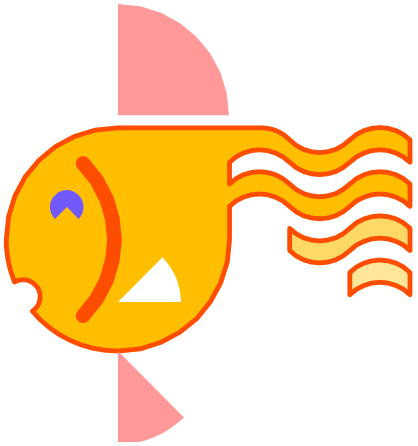
MISSION STATEMENT

The following are the goals of the Fishermen and Scientists Research Society:

- further cooperation between fishermen and scientists
- collection and interpretation of accurate information
- protection of fish stocks and the marine ecosystem
- contribute to the establishment of a more sustainable fishery
- contribute to the viability of coastal communities
- become a financially self-sustaining, non-profit organization over the long-term
- further educate all involved in the Society
- continuation of our livelihoods as fishermen

CONDUCT

1. Members must collect and report as much relevant and accurate information as possible, according to instructions and requirements.
2. All information and data collected under the auspices of the Society remain the property of the Society, not withstanding any access granted to individuals for interpretation and analysis.
3. Conclusions presented in any products other than Society products must include a disclaimer to the effect that the interpretation and conclusions reached by the person preparing the product, be he/she a member, non-member scientist, or other group or individual, when analyzing the Society's data are not necessarily those of the Society.
4. Members, non-member scientists, or other groups or individuals given permission to analyze the Society's data must first present their conclusions to the Society.
5. Members, non-member scientists, or other groups or individuals analyzing the Society's data must acknowledge the Society as the source of the data.
6. Members shall communicate, educate and promote, wherever and whenever possible, the nature and importance of the responsible commercial fishing industry in Atlantic Canada.
7. Members shall not compete with the Society for contracts.
8. Members shall address grievances internally where such matters involve the Society or its membership.
9. Members shall constantly act with fairness and integrity in dealing with clients and employees.
10. Members shall conduct themselves in a professional and dignified manner and relate to others with courtesy and respect.
11. Members must declare any potential conflict of interest, whether real or perceived.



FSRS IMPLEMENTS DATA SHARING POLICIES

Now in its ninth year of operation, the Fishermen and Scientists Research Society (FSRS) has gathered a wealth of information on groundfish and lobster. This information is proving useful not only to our members, but also to scientists who are studying these marine resources. Through its research, the FSRS is proving to be a valuable source of data that would not otherwise be available.

Allowing non-FSRS personnel to analyse our data is of benefit to our members and the fishery as a whole. By allowing others to work with our data, we are able to have more analysis done than we ourselves could do, and have more opportunities for the information collected by fishermen to be utilized in the process of fisheries science. Some exciting developments are occurring because we are sharing our data. For example, Ross Claytor, a lobster biologist with Fisheries and Oceans Canada, is using the FSRS Short Term Lobster Recruitment Index Project data to develop a new model for estimating lobster exploitation rates.

Sharing FSRS data did raise some issues. For example, protecting the confidentiality of fishermen's data has always been a priority for the FSRS. One way we have done this is by using vessel codes instead of names in our data sets. Guidelines for the use of FSRS data are included in the FSRS Code of Ethics. The Executive Committee used these guidelines to develop a set of Data Sharing Policies. Anyone wishing to use FSRS data must submit a proposal to the Executive Committee and agree to abide by the FSRS Data Sharing Policies.

DATA SHARING POLICIES

Any person or organization or group granted permission to use the FSRS's data must agree to the following conditions:

1. All information and data collected under the auspices of the FSRS remain the property of the FSRS, notwithstanding any access granted to individuals or other groups or organizations for interpretation and analysis.

2. Use of the data is limited to the analyses and purposes set forth in his/her/their proposal. All original data media will be returned when the analysis is complete and he/she/they undertake to delete all copies of the data and intermediate results. Any analytical products to be retained for possible future use will be provided to the FSRS Data Analyst and retained only by him. All published results will be grouped at the level of port or port cluster to ensure anonymity of the data provider and no spatial data will be presented revealing fishing locations (minimum of three data points must be used, five points in each grouping is preferred).

3. Conclusions presented in any products other than FSRS products must include a disclaimer to the effect that the interpretation and conclusions reached by the person preparing the product when analyzing the FSRS's data are not necessarily those of the FSRS.

4. Conclusions must first be presented to the FSRS.

5. The FSRS must be acknowledged as the source of the data.

6. The Executive Committee can approve exceptions to these policies if deemed necessary. Each case will be reviewed on an individual basis.

7. The FSRS and its Executive assume no liability in connection with any use and/or interpretation of its data.

BLUE CRABS FOUND IN NOVA SCOTIA

By Carl MacDonald, FSRS Senior Data Analyst

That's right! An eel fisherman caught not green crabs but blue crabs (*Callinectes sapidus*) in Nova Scotia. Howard Hawkins and his son Jacob of West Jeddore, Nova Scotia were tending their eel traps (better known as fyke nets) on July 16th, 2002 when they found a surprise. When Howard and his son hauled aboard their net in West Lawrencetown Lake, they were greeted by a dozen blue crabs. Howard knew exactly what these crabs were because he caught one last year in Cole Harbour, just east of Halifax. Howard and his son wanted to show biologists their finding and called the Fishermen and Scientists Research Society based out of Halifax. Howard collected 7 of the 12 blue crabs and took them to the Bedford Institute of Oceanography. Working with the Society and the BIO, aquarium manager, Fred Rahey, the 7 crabs were placed in a heated saltwater aquarium tank. Since finding a new home at BIO one blue crab has died. This male crab is now preserved and on file at the Nova Scotia Museum of Natural History.

So where did these blue crabs come from? Firstly, the blue crab's original range is from Nova Scotia and throughout the Gulf of Mexico to northern Argentina, including Bermuda and the Antilles. However, blue crabs are seldom found north of Cape Cod. (Guillory, 2001). In fact, Leslie Pezzack from the Nova Scotia Museum of Natural History has only 12 records of Blue Crab (*Callinectes sapidus*) collected in Nova Scotia over the last 100 years. The locations of the blue crab occurrences were in St. Margarets Bay in 1970, Lawrencetown in 1954, Cow Bay in 1902 and 1903, and Cole Harbour in 1902. Blue crabs are not usually found in Nova Scotia since they like warm water greater than 15 C to a maximum of 33 C. The optimum salinity for blue crabs is between 3 - 15 parts per thousand (Zinski, 2001), as they normally live in estuarine environments. Ocean seawater is around 32 parts per thousand.

What do we know about blue crabs? Blue crabs are popularly known as swimming crabs. Their posterior legs are wide and flat, somewhat like paddles. The blue crabs can actually swim forward and backwards quite well but they swim faster sideways. The Latin scientific name, *Callinectes sapidus,* means "beautiful swimmer that is savory" (Davis, 2001). In the United States there are big commercial and recreational fisheries for the tasty crabs. The minimum legal size in the States is 5 inches from carapace spike to spike. Blue crabs grow fast and are known to reach sexual maturity at 1 to 1 1/2 years of age in the Chesapeake Bay (Zinski, 2001). The maximum age for most blue crabs is 3 years. The largest crab caught by traditional fishing methods in the state of Maryland was a 9 inch male (Davis, 2001). The male crabs Howard Hawkins caught in Lawrencetown Lake were large 7.8, 7.4, 6.8, 7.8 and 7.6 inches. Male crabs are larger than females. Female blue crabs can be easily identified by the red colour on the tips of their claws.

The blue crabs are scavengers and will eat worms, clams, oysters, mussels, snails, other blue crabs, other crabs, dead fish, aquatic plants like eel grass, or just about whatever is available. In return, eels, striped bass, trout, herons, ducks, raccoons and people eat blue crabs (Zinski, 2001).

If you have ever seen or caught a blue crab in Nova Scotia please give us a call at our toll free number 1-800-226 -3777. Or if you have found a marine species and you don't really know what it is, give us a call. We may be able to help you identify it.

References (from the internet)

Blue Crab Archives
2001, Steve Zinski.
Description: Information concerning identification, catching and cooking.
www.blue-crab.org/

Blue Crab Facts
2001, Brenda Davis
Blue Crab Fun **Facts**: Callinectes sapidus means "Beautiful swimmer that is savory". **...**
www.dnr.state.md.us/fisheries/education/ crab/bluecrabfacts.html -

BLUE CRAB LIFE HISTORY AND **ECOLOGY**
2001, Vince Guillory
The scientific name given to the **blue crab** was derived from Latin **...**
www.blue-crab.net/bchist.htm

INSTITUTE SPONSORS LECTURE BY CANADIAN LOBSTER BIOLOGIST SUSAN WADDY

Reprinted with permission from The Lobster Institute, Orono, Maine, USA. Originally published in the Winter 2002 issue of *The Lobster Bulletin* .

The Lobster Institute sponsored a lecture by Susan Waddy, a scientist with Canada's federal Department of Fisheries and Oceans, on January 26 as part of the Massachusetts Lobstermen's Association Annual Weekend. Waddy shared findings from her research on lobster reproduction conducted over a period of more than twenty-five years at her laboratory in St. Andrew's, New Brunswick.

Highlights of Biologist Susan Waddy's Findings on Lobster Reproduction – Starting in the early 70s, Waddy held and observed lobsters in her laboratory over a long period of time (some as long as 27 years). Studies focused on those 4.7 - 6 inches. Here are highlights:

- Contrary to assumptions, bigger/older female lobsters are very productive. 4.7 inch females spawn more often than smaller lobsters and produce more eggs. According to Waddy, "unlike humans, female lobsters don't stop reproducing in the middle of their life."
- With every mating, larger female lobsters accept enough sperm for 2 batches of eggs and can store viable sperm up to 3 years.
- Females do not mate only immediately after molting. Further the amount of time between molts for a larger lobster is typically only 2 years (the longest time between molts observed was 5 years, in a male). If a large female is ready to lay eggs, even in a non-molt year, and she does not have stored sperm, she will actively search out a male to mate. She doesn't have to be in a soft-shell condition to mate.
- During reproduction, one 3-pound lobster will produce an amount of eggs equivalent to the amount produced by seven 1-pound lobsters. And over a period of four years, the 3-pound lobster will produce a quantity of eggs equivalent to that of twelve 1-pound lobsters.
- There is little difference in the survival rate of larvae from large versus small lobsters.

Waddy stated that on the whole reproduction in lobsters is "incredibly predictable." She noted that her findings do not preclude exceptions and variations due to water temperature, geographic area and other environmental factors. She also stressed that similar observations would be hard to replicate in the field due to the difficulty of tracking the same lobster for years in the wild. However, she characterizes larger female lobsters as prime egg bearers and definitely not "reproductively senile" as she has heard some call them.

13 COMMERCIAL LONGLINE VESSELS PARTICIPATING IN GROUNDFISH SENTINEL PROGRAM

Thirteen commercial longline vessels have been selected to participate in the 2002 4VsW Sentinel Program, a joint project of the Fishermen and Scientists Research Society (FSRS) and the Department of Fisheries and Oceans (DFO). The Program is a continuation of the Sentinel Program begun in 1995. The FSRS is a non-profit partnership between fishermen and scientists, whose objective is to learn more about the health of fish stocks in the Maritimes Region.

The 2002 4VsW Sentinel Program consists of two components. One is a Sentinel (Stratified Random) Survey in which fishing locations are preselected randomly by computer. The second is a Commercial Index which will permit a limited amount of commercial fishing effort following fishermen's customary fishing patterns. Scientists would like to establish a series of catch rate and abundance indices which will be valuable in the assessment and management of primary groundfish resources. In addition to providing valuable data, Sentinel Programs foster a closer working relationship between fishermen and fisheries scientists and managers.

Applications to participate in the Program were reviewed on May 24, 2002 in Dartmouth by a Selection Committee representing a cross-section of interested parties, including three representatives from the FSRS, and one representative from the Halifax West Commercial Fishermen's Association. Mr. Clarrie MacKinnon served as independent chair of the Committee.

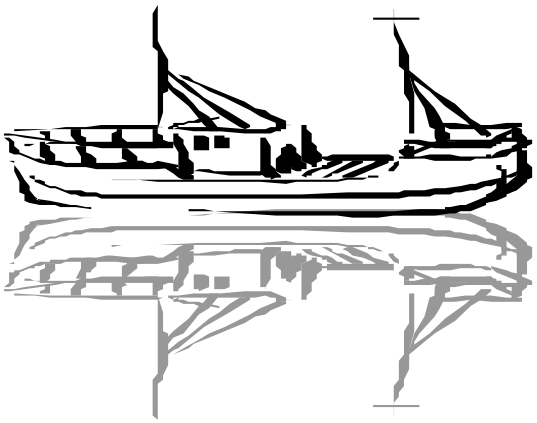
The Selection Committee reviewed all applications for agreed upon criteria, including personnel and personal suitability, violations/sanctions history, references, past participation, general experience, and vessel safety and suitability. "The Selection Committee is pleased that all applicants for the 4VsW Sentinel Program in 2002 have been accommodated, although some did not get their first choice in area to be fished," stated Clarrie MacKinnon, Committee Chairman. There were one or two more applicants this year than last, " MacKinnon said, "but nothing like the numbers in the first years of the program." He attributed the slow recovery of groundfish and redirected fishing efforts for the reduced level of interest.

Participating in the 2002 4VsW Sentinel Program are: Nick Henneberry - Sambro, Paul Drew - Sambro, Rick Jewers - Ecum Secum, James Baker - East Jeddore, Randy Boutilier - Mushaboom, James Gray - Sambro, Dale Garrison - Sambro, Patrick Gray - Sambro, Victor Gray - Sambro, Mark DeBaie - Little Harbour, Roger George - White Head, Jerry Creamer - Phillips Harbour, and Arnold Eddy - Glace Bay.

For more information:

Patricia King
Fishermen and Scientists Research Society
(902) 876-1160

Bill MacEachern
Marine Fish Div., Dept. of Fisheries & Oceans
(902) 426-3517



Creature Feature

Northern Stone Crab

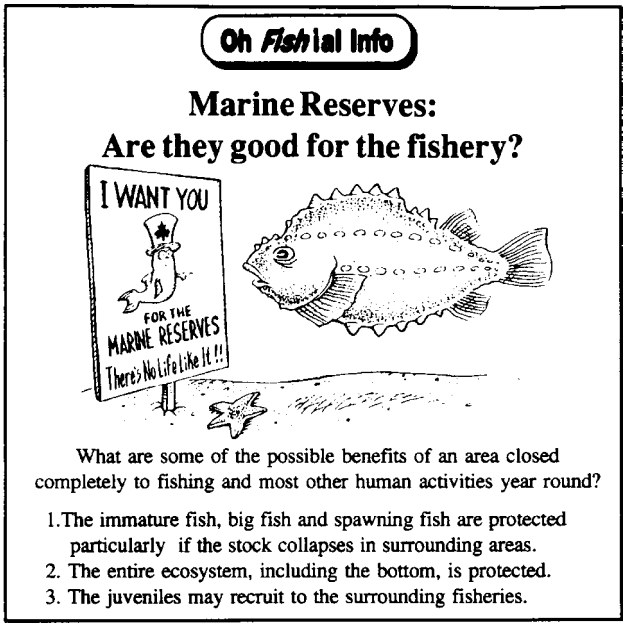
The Northern Stone Crab (*Lithodes maja*) is one of two species of the King Crab family that is found in Atlantic Canadian waters. This crab inhabits the North West Atlantic from New Jersey to Newfoundland and Western Europe. It can be found at depths from 65 to 800 meters. The Northern Stone crab can be easily identified by its many spines found on its carapace and legs, as well as its orange/red colour. Their carapace is slightly longer than it is wide and 3 pairs of walking legs are apparent. Sexual maturity occurs in males with a carapace width of approximately 98mm and with females with a carapace width of approximately 65mm. To learn more about the Northern Stone Crab you can visit the Marine Invertebrate Diversity Initiative web site at: WWW. Fundyforum.com/MIDI

Resources:

Minister of Supply and Services
Canada 1989
Catalogue Number Fs 41-33/43-1989E
ISBN 0-662-17296-5.

Underwater World, Crabs of the Atlantic Coast of Canada.
Communications Directorate,
Department of Fisheries and Oceans,
Ottawa, Ontario,
K1A 0E6.

DFO Stock Status Report (4-04) (1998)
Decapod Crustacea of the Atlantic Coast of Canada
Hubert J. Squires



Oh Fi*sh*ial Info has been provided by the Communications Branch of the Department of Fisheries and Oceans.

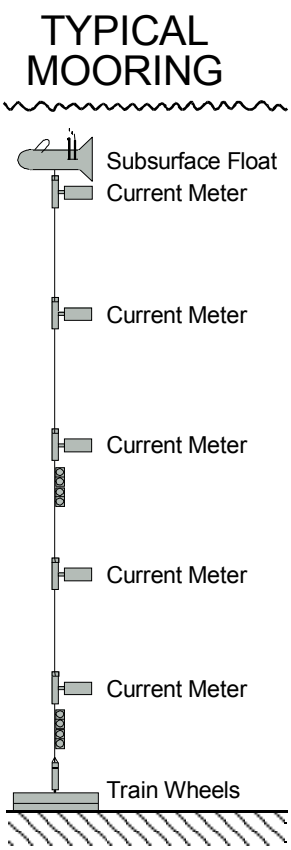
Caution! Subsurface Moorings on Scotian Slope

- The Bedford Institute of Oceanography has re-deployed subsurface moorings at 3 sites on the Scotian Slope, southeast of Emerald Bank. The moorings have current meters extending from the seafloor to about 80 m below the sea surface.
- The mooring sites, water depths, positions and types are:

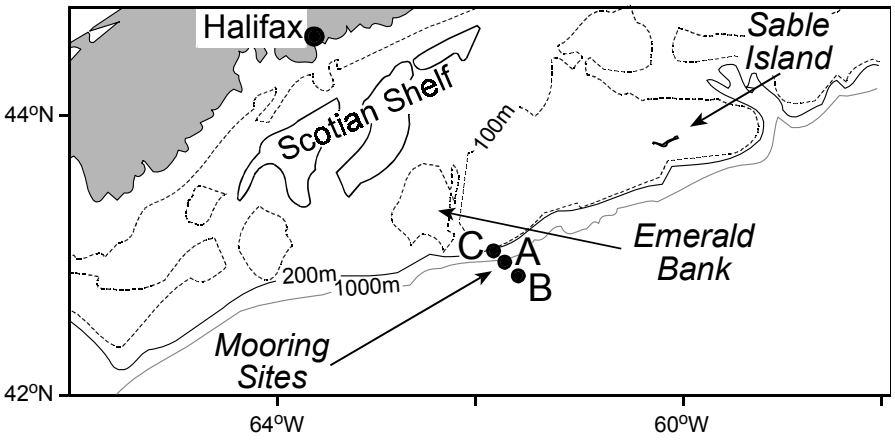
  Site A, Depth 1110 m: **42°50.7'N, 61°37.5'W**
  - 2 subsurface moorings

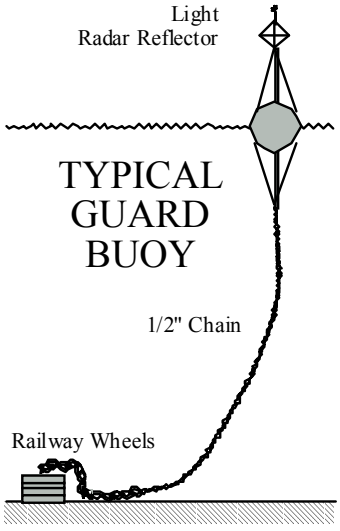
  Site B, Depth 2000 m: **42°41.6'N, 61°31.3'W**
  - 1 subsurface mooring

  Site C, Depth 300 m: **42°59'N, 61°45'W**
  - 3 surface guard buoys
  - 2 subsurface moorings between guard buoys



Map of Scotian Shelf with Mooring Sites





Fishermen and other mariners are advised to avoid the mooring sites to prevent fouling their gear and/or damaging the moorings.

For further information, please contact:

Mr. Bert Hartling - Collect (902) 426-3495; Fax (902) 426-7827
Dr. John Loder - Collect (902) 426-3146; Fax (902) 426-3711

STUDENTS RECEIVE FSRS OCEANS 11 PROGRAM AWARD FOR OUTSTANDING ACHIEVEMENT

46 students from Oceans 11 classes throughout Nova Scotia received the Fishermen and Scientists Research Society Award for Outstanding Achievement in the Oceans 11 Program. This annual award recognizes students, nominated by their teachers, who have demonstrated outstanding accomplishments in their Oceans 11 class, including level of interest, participation and contribution to the class, along with scholastic achievement. The Oceans 11 Program is a science program for grade 11 students, offering them the opportunity to learn about a wide range of marine science topics, including biology, oceanography, fisheries science and fisheries management.

The Fishermen and Scientists Research Society (FSRS) is a non-profit organization which strives to improve the state and sustainablity of our fisheries resources. The FSRS members, as the name suggests, are predominantly either fishermen, or scientists who study the fisheries resources, and the marine systems on which they depend. Other members include social scientists, educators and interested citizens. The prime requirements to be a member are an interest in the goals of the FSRS and a willingness to contribute towards them.

The FSRS works towards its goals in two related ways. First, members conduct science projects. These involve field collection of data, samples and specimens, and laboratory processing and analysis by FSRS technicians, interns and members. The data produced by FSRS projects have been used in stock assessments and marine mapping of fisheries resources, and published results have appeared itn the primary scientific literature. The second way the FSRS seeks to improve the long-term prospects of our fisheries is through education, or more properly, co-education. Both the fishermen and scientist members have a wealth of knowledge about fisheries resources and the ocean. They certainly do not express it the same way but, more importantly, it is not the same knowledge. When these two groups have put their heads together, learned each other's way of describing what they know, and pooled their knowledge, strong new insights have emerged.The FSRS implemented the Oceans 11 Achievement Award to recognize the efforts of others that work towards the goals they share with the FSRS. The development of the Oceans 11 program in our schools is clearly such an effort, and the achievements of students in the program are worthy of recognition.

The FSRS congratulates the following students who received the award: Amherst Regional High School - Laura Smith; Annapolis West Education Centre - Lauren Wyman; Auburn Drive High - Meghan Lawlor; Auburn Drive High - Matt Manning; Auburn Drive High - Edward Turner; Central Kings Rural High School - Laura Ueffing; Cobequid Educational Centre - Samuel Searle; Cobequid Educational Centre - Candace Weatherby; Cobequid Educational Centre - Jessica Wier; Cole Harbour District High School - Jaret Darrell; Cole Harbour District High School - Ronnie Lunn; Digby Regional High School - Justin Daley; Drumlin Heights Consolidated School - Jody Melissa Malone; Glace Bay High School - Jenna Gillis; Glace Bay High School - Georgina MacNeil; Glace Bay High School - Shawn Matheson; Glace Bay High School - Merika Poirier; Guysborough Academy - Clarence Kelly; Hants West Rural High School - Katie Church; Holy Angels High School - Kathlene O'Handley; Islands Consolidated - Ashley Leeman; Liverpool Regional High School - Laurel Conrad; Lockeport Regional High School - Jillian Roache; Lockview High School - Jonathan James Fulton; Lockview High School - Liberty MacDougall; Lockview High School- Caitlin Rutherford; MacDonald Complex - Derek Poirier; Memorial Composite High School - Daniel Devoe; NDA School - Celine Larade; New Glasgow High School - Katie Aikens; North Queens Rural High - Nick Whynot; Park View Education Center - Gustin Herman; Pugwash District High School - Dawn LeBlanc-Wilson; Queen Elizabeth High - Matthew Mercer; Queens Adult High School - John Hanson; River Hebert District High - Bethany Noeg; Riverview Rural High School - Mark Keating; Sackville High School - Sean Briggs; Sir John A. MacDonald High - Shawna Eason; South Colchester High School - Amelia Cox; South Colchester High School - Adam Connors; St. Mary's Academy - Patricia Hudson; St. Patrick's High School - Lyle Douglas Howe; Stellarton Middle High School - Mike Snell; West Kings District High School - Lucas Thorne-Humphrey; Yarmouth Consolidated Memorial High School - Ashley Bishara.

CLAM RESOURCE ENHANCEMENT IN CHEZZETCOOK HARBOUR, N.S.

By Jill Moore

For the past year I have enjoyed the opportunity to work with DFO and the Eastern Shore Clam Fishers' Association (ESCFA) on a project with soft-shell clams (*Mya arenaria*). The goal was to verify the feasibility of enhancing the clam fishery in Chezzetcook Harbour.

The clam fishermen of Chezzetcook were fully involved in the conception and implementation of the project. Its main objective was an experimental transplant of undersized clams from an overcrowded area to one where faster growth was expected.

After the first meeting between DFO and the local clam diggers, it was concluded that Chezzetcook Harbour appeared to offer a good opportunity for Industry and DFO to work together for the best utilisation of the available resources for wealth creation and stable employment for local residents. The joint endeavour was perceived as a step toward Integrated Coastal Zone Management and Community-Based Management.

The follow-up meeting was to discuss project ideas. Three areas of interest were summarized into the main objectives for the project:

1. A limited experimental transplant of undersized clams to test the feasibility of enhancing production and growth through relocation of clams from an area where growth is poor to one selected location with better growth potential.
2. A predator survey to develop an index of abundance of potential clam predators at different locations in the Harbour following the estuarial gradient and tidal exposure.
3. Preliminary work towards a study of the impact of harvesting practices on clam survival from the juvenile stages to market size.

George and Donald Renouf during random sampling on the clam plot.

The results of this study provided valuable information on clam growth and local crab species for future project planning. The experimental transplant indicated that a modest increase in growth can be achieved by transplanting clams. A first analysis on growth based on sample means and modes showed an increase in clam shell length of approximately 3 mm in the "receiving" area from August 1 to October 26. A second analysis indicated growth in width and length. A width to length conversion found that generally, a 2" clam would grow to 2.5"-2.7" if relocated to the receiving area for a full growing season, compared with 2.2" if left in the original area.

The predator study showed the presence of two species of crab, the green crab (*Carcinus maenas*) and the rock crab (*Cancer irroratus*) as potential predators of transplanted clams. Green crabs came on to the flats from the channel in high numbers both day and night, with the majority being males. The majority of rock crabs came on to the flats at night only, with the females being more prominent.

Observations on harvesting impacts were based solely on clams broken by clam hacks during the experiment at the receiving area. Breakage rates varied between 8% and 22%.

Overall, all participants worked together to the best of their ability in a harmonious fashion. Should there be the interest and resources to continue, this collaborative approach, with the support of DFO and the community, could help the Chezzetcook Harbour fishermen enhance their soft-shell clam fishery.

Many thanks to Rob Mannette and all dedicated participants of the ESCFA; and to Maureen Butler, Dave Duggan, Rene Lavoie, Ted Potter, and Ginette Robert for their indispensable contributions.

For more information about this project, reports can be obtained from Jill Moore, 426-4164, or Rene Lavoie, 426-2147.

Clams were individually marked, glued with epoxy, then measured with calipers for each sample.

THE YARMOUTH SHARK SCRAMBLE

By Melanie Hurlburt, FSRS Research Intern

August 17th and 18th, 2002 marked the 5th annual Yarmouth Shark Scramble. I was invited by Department of Fisheries and Oceans scientists Steve Campana and Warren Joyce to help gather and record biological data from the sharks landed at the tournament.

The local Shark derbies offer a great opportunity for scientists to gain information to assess the status of the shark populations. in particular about the blue shark, as this species is rarely landed in the commercial fishery. The first thing to be recorded once the sharks were landed was the weight. During this year's tournament the sharks were required to be dressed upon arrival at the wharf, therefore all weights recorded were dressed weights. Then a number of measurements were recorded. We recorded the fork length (from the tip of the nose to the fork in the tail), inter dorsal length (the distance from the end of the first dorsal fin to the beginning of the second dorsal fin) and jaw gape (width of the jaw). We also recorded the sex of the sharks and maturity in the case of the males (female maturity is determined by examining the ovaries and uterus which had been removed). Sex is determined by the presence of claspers in males and the absence of claspers in females. Claspers are rolls of cartilage located after the pelvic fin. As males mature the claspers become stiff and rigid as they fill with calcium. The claspers of immature males are rubbery and very flexible. We also determined maturity by cutting the epididymis, part of the male reproductive tract, and looking for the presence of sperm packets.

A total of 102 sharks were landed during the two day tournament, 65 on Saturday and 37 on Sunday. Of those 102 sharks, 99 were blue sharks and 3 were makos. This is the most mako sharks that have ever been landed at the Yarmouth derby. We were fortunate enough to have one of the makos be brought in round so we were able to look at the stomach contents and the internal organs of the shark. This particular shark was an immature female. When examining its stomach contents, two lumpfish were identified along with other unidentified fish. Dr. Campana also determined the shark's stomach capacity by filling the empty stomach with water.

The atmosphere on the waterfront was full of excitement and curiosity, and a great time was had by all. The largest shark landed during the tournament was a blue shark weighing 285 lbs. I would like to thank Dr. Campana and Warren Joyce for allowing me to take part in this year's shark derby. I thoroughly enjoyed myself and learned a great deal.

Know an interesting **Fast Fact?**

Send it to Patty King

e-mail: pattyfsrs@auracom.com

fax: 902-876-1320

or mail to

PO Box 25125

Halifax, NS B3M 4H4

Fast Fact

Lobsters carry their eggs on their abdomen or tail from late summer until the following June or July. A one-kilogram lobster may carry more than 16,000 eggs, with a 2.25-kilogram female carrying as many as 50,000 eggs. Very few eggs will live to reach legal size. It's estimated that 97.5 to 99.5 percent of the larvae that hatch will die or be eaten within their first year of life.

From The Chronicle-Herald, Saturday Dec. 29, 2001, pg A4,
By Brain Medel

FSRS WELCOMES NEW MEMBERS

The Fishermen and Scientists Research Society would like to welcome the following members, whose applications were approved at the June 26th Executive Committee meeting. We trust that this expansion of the FSRS's membership will prove to be beneficial to all involved.

Douglas Bertram
Caroline Butler
Charles Comeau
Gilbert Donaldson
Art Gaetan
Judith Hitchens
MD. Serajul Islam
Mohammad Mazloomi Arjagh
Carter Young

NEW TO THE FSRS LIBRARY

Conley, Marshall and , Graham Daborn. (1983) Energy Options for Atlantic Canada,- The potential—and the problems—of oil, coal, tidal, nuclear and hydro power. Formac Publishing Company Limited.

2002 Conservation Requirements for Georges Bank Groundfish Stocks, Report to the Minister of Fisheries and Oceans. May 2002. Fisheries Resource Conservation Council, 18 pp.

Moore, J.A., G. Robert, M.A.E. Butler, and R.E. Lavoie. 2002. Clam Resource Enhancement in Chezzetcook Harbour, Nova Scotia. Can. Ind. Rep. Fish. Aquat. Sci. 266: vii +42p.

Percy, J.A., P.G. Wells and A.J. Evans (eds) (1997) Bay of Fundy Issues: a scientific overview. Workshop Proceedings, Wolfville, N.S., January 29 to February 1, 1996. Environment Canada - Atlantic Region occasional Report no. 8, Environment Canada, Sackville, New Brunswick, 191 pp.

Chopin, T. and P.G. Wells (eds.) (2001). Opportunities and Challenges for Protecting, Restoring and Enhancing Coastal Habitats in the Bay of Fundy. Proceedings of the 4th Bay of Fundy Science Workshop, Saint John, New Brunswick, September 19-21, 2000. Environment Canada, Atlantic Region Occasional Report No. 17, Environment Canada, Dartmouth, Nova Scotia, 237 pp.

Wells, P.G. (work in progress) Assessing Health of the Bay of Fundy—Developing a Conceptual Framework and Questions. Proceedings of the BOFEP 5th Bay of Fundy Science Workshop, May 2002. An work in progress—an assemblage of facts, quotes and thoughts to stimulate discussion in the workshop. Environment Canada—Environmental Conservation Branch, Dartmouth, Nova Scotia, 43pp.

BEACHCOMBING – What's New in The News

The 4X Cod Tagging Study is progressing, with almost 400 tags having been returned to date. Any person who returns a tag will have their name entered into a series of draws for different prizes. There have been three draws so far, and there will be a grand prize draw of $1,000.00 cash to be held over the Labor Day weekend 2002.

Local businesses in New Brunswick and Nova Scotia have donated many different merchandize items to be distributed as prizes in the draws. The first draw was held in December 2001; 15 prizes were distributed to those who had returned tags. The second draw was held in February 2002 with 12 prizes being sent out. The third draw was held in August 2002, with 17 prizes won.

For more information contact Jennifer Hinze at 506-529-8854

We're on the Web! www.fsrs.ns.ca

EXECUTIVE COMMITTEE

OFFICERS

John Levy	President
Junior (Winfred) Risser	Vice President
James Gray	Secretary
Nick Henneberry	Treasurer

DIRECTORS AT LARGE

Randy Boutilier
Jerry Creamer
Garnet Heisler
Peter Hurley
Bill Hutt
Barry Levy
Rick Nicherson
Lawrence Rudolph
Victor Wolfe

Paul Fanning - Communications Committee Chairman
John Batt - Scientific Program Committee Chairman

FISHERMEN AND SCIENTISTS RESEARCH SOCIETY
P.O. Box 25125
Halifax, NS B3M 4H4

Phone: (902) 876-1160 Fax: (902) 876-1320
E-Mail: pattyfsrs@auracom.com
Web Site: www.fsrs.ns.ca

Editor: PMD Services

UPCOMING EVENTS

GEOMATICS ATLANTIC 2002—Technology and Beyond: Geomatics in the Information Age.
September 25- 27, 2002
Delta St. John's Hotel and Convention Centre , St. John's, Newfoundland.

FSRS 10th ANNUAL CONFERENCE
February 21- 22, 2003
Howard Johnson Halifax Hotel.
For more information contact Patty King at (902)876-1160 or pattyfsrs@auracom.com