HOOK, LINE AND THINKER

The Newsletter of the Fishermen and Scientists Research Society

Issue: 2005 - 2 **Spring 2005**

FSRS ATTENDS YARMOUTH FISHERIES EXPOSITION

By John Lavers, FSRS Member

I arrived at the Eastern Canadian Fisheries Exposition in Yarmouth, NS on Opening Day, April 1st. Yes, the Exposition opened on "April Fool's Day"! But after a brief tour of the Mariners Centre filled with display booths, I quickly realized that this Exposition was no April Fool's Day joke. This was a Class "A" Production, displaying a rather broad cross-section of fisheries related products and the very latest in marine technology.

I arrived at the FSRS booth to find Jennifer LeBlanc and Garnett Heisler hard at work. They were both occupied dispensing information and answering questions about the various FSRS programs. Next to arrive were Carl MacDonald and Jeff Graves and by this time the FSRS area was beginning to look like Grand Central Station. This is a "good thing" because others are taking note of the more popular exhibitor booths at the show.

John Lavers (left) and Carl MacDonald (right) at the Yarmouth Fisheries Expo.

Even though our booth handouts were not as flashy as some of the other exhibitors, we had a constant flow of people showing interest in the FSRS programs. Many of the fishermen who stopped by our booth were FSRS members and involved with FSRS programs. There were many fishermen showing interest in the Lobster Recruitment Study. This is very understandable when you consider that we were in the "heart" of lobster country and the season is open.

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Each year on opening night there is an exhibitors reception held at the Rodd Grand Hotel in Yarmouth. It is sponsored by Nova Scotia Agriculture and Fisheries in conjunction with eight private sector companies. The entire menu consists of seafood and only seafood, no red meat to be found. To us seafood lovers it is as if you have died and gone to seafood heaven.

The cold rainy weather during the three-day Exposition left a great deal to be desired but this did not hamper attendance or enthusiasm. After all, Atlantic fishermen are "no strangers to foul weather".

Thanks to all the FSRS members who helped out at the booth, including: John Lavers, Garnet Heisler, Chris Corkett, Wilford Smith, Ricky Nickerson and Hubert Saulnier.

64 STUDENTS RECEIVE FSRS OCEANS 11 PROGRAM AWARD FOR OUTSTANDING ACHIEVEMENT

64 students from Oceans 11 classes throughout Nova Scotia received the fifth annual Fishermen and Scientists Research Society Award for Outstanding Achievement in the Oceans 11 Program. 14 of these students received their awards at a ceremony held at the Bedford Institute of Oceanography on Oceans Day, June 8th. Each student was presented with their award, an Oceans Day t-shirt donated by the Canadian Wildlife Federation, and given a tour of the facilities by friendly and well trained tour guides. 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 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, marine mapping of fisheries resources and published results have appeared in 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 scientists 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: Katherine MacPherson; Avon View High School: Andrew Reid; Central Kings Rural High School: Garin Schoonhoven; Cobequid Educational Centre: Katie McCarthy, Tara Porter; Cole Harbour District High School: Hanna Barrett, Ellen Rowe, Mariea Schnare, Amanda Smith, Kristin Walsh; Dalbrae Academy: Rory MacDonald; Drumlin Heights Consolidated School: Robert Fredric Archibald; Glace Bay High School: Kathleen Crosby; Glace Bay High School: Bernie Hart, Adam MacLellan, Robert Mazzocco, Amanda McNeil, David McNeil; Halifax West High School: Jillian Eisan, Lindsay MacDougall, Ashley Taylor; Holy Angels High School: Angela Campbell, Brittany Harnum, Athena Paul; Islands Consolidated High School: Corey Crocker; J.L. Ilsley High School: Anthony Griffiths; Liverpool Regional High School: Jennifer Crosby; Lockview High School: James Lavigueur, Richard Lavigueur; Lunenburg Junior Senior High School: Jessica MacIntosh; Middleton Regional High School: Jonathan Ainamo, Jessica Christopherson, Eva Martiny, Martin Pineo, Katalin Torok; North Nova Education Centre: Luke Kaley, Heather MacDonald, Melissa Rice, Leigha Russell, Lauren Selfridge, Derrick Shaw; Pugwash District High School: Natalie Mills; Queen Elizabeth High School: Julia Jackson, Alex Simpson, Matthew Vaughan; River District Hebert High School: George VanSnick; Riverview Rural High School: Joanna Peters, Jonathan Chew, Josh Deveaux, Simon Eavis, Shawn Organ; South Colchester Academy: Alicia Cox; South Colchester Academy: Leah McNeil, Cassandra Sears, Alex Taylor, Kim Workman; Strait Area Education Recreation Center: Travis Lundrigan; Yarmouth Consolidated Memorial High School: Stacy Doucette, Katie Durkee, Whitney Murphy, Kerrilynn Sweeney, Nicholas Trefry.

FSRS WELCOMES NEW FISHERIES TECHNICIAN

Hello, my name is Megan Veinot and I am working on the Soft Shell Lobster Research Project this summer. I will be sampling on the Lobstermen Tours' boat with Barry Levy and his crew out of the Lunenburg. This will be my second year working with Barry and his crew. My job is to take a blood protein sample and a pleopod sample from each lobster sampled, as well as its size and sex. I also help give the tour around Lunenburg and tell the tourists all about lobsters. This is an amazing job that I really enjoy! Starting in September, I will be sampling from different boats around Nova Scotia.

I currently attend Dalhousie University, taking a BSc. with a major in Marine Biology and I will be graduating in October. Besides working for the FSRS this summer I am also doing summer field courses in order to complete my degree. In my spare time I enjoy camping, swimming, water skiing, and hiking.

NEW TO THE FSRS LIBRARY

DFO, 2004. Allowable Harm Assessment for Cusk in Atlantic Canada. DFO Can. Sci. Advis. Sec. Stock Status Rep. 2004/044.

P. King and C. MacKenzie (Eds.) 2005. Gulf of Maine Summit: Committing to Change, Summit Report, Gulf of Maine Council on the Marine Environment and the Global Programme of Action Coalition of the Gulf of Maine.

C. MacKenzie (Ed.) 2005. Joint Fishermen and Scientists Research Society - Gulf of Maine Lobster Foundation Lobster Science Workshop, Fishermen and Scientists Research Society and Gulf of Maine Lobster Foundation.

WINTER FLOUNDER (*PLEURONECTES AMERICANUS*)

By Jennifer LeBlanc, FSRS Fisheries Technician

Did you know that some organisms can withstand the cold by producing antifreeze in their blood? The winter flounder, also known as lemon sole, blackback, or George's Bank flounder, is just one example.

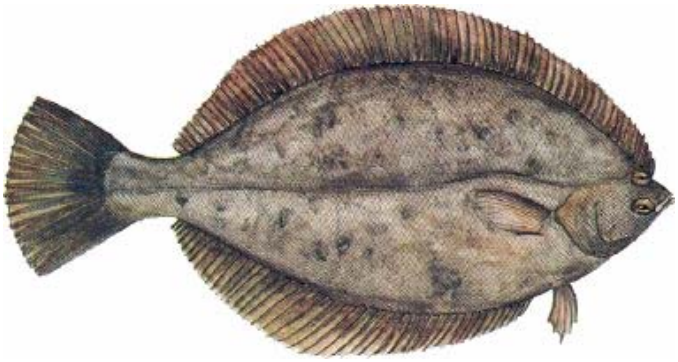

Fig.1. The small mouth, the nearly straight lateral line, and the blotchy back are characteristic of winter flounder. http://collections.ic.gc.ca

This relatively small flatfish is distinguished from other flounders by a number of characteristics. Compared to other flatfish, winter flounder have a small mouth, which barely reaches below the eye, and a nearly straight lateral line (the visible line that runs the length of the body from head to tail). Their backs may vary from reddish brown to black and are often blotchy or spotted, while their bellies are usually white or translucent. These fish can alter their dorsal colours to blend in with the surroundings (Scott and Scott, 1988). On average, winter flounder reach 45 cm in length and 1.4 kg in weight (Scott and Scott, 1988). Males typically mature at approximately 20 cm, and females at 25 cm, when they are roughly 3-4 years old (Scott and Scott, 1988).

Winter flounder are found in the West Atlantic Ocean, ranging from as far north as Labrador and south to Georgia, USA (Scott and Scott, 1988) but are most abundant from the Gulf of St. Lawrence to Chesapeake Bay, USA. (Nitschke *et al*. 2000). They tend to prefer soft or moderately hard bottoms, usually in depths less than 40 feet (DFO, 2004). In colder northern waters, winter flounder move offshore in winter, and do not seem to migrate as far as those in the southern range, which travel quite a distance offshore in the summer (ASMFC, 2003; Scott and Scott, 1988). They all, however, move inshore to spawn in late winter and early spring (Scott and Scott, 1988), often returning to the same spawning grounds each year (ASMFC, 2003; Nitschke *et al*. 2000).

On average, females deposit 500,000 eggs, which adhere to the bottom once fertilized, and hatch approximately 15-18 days later, depending on temperature (Scott and Scott, 1988). The larvae drift in the water column for 2-3 months and then settle on the bottom to develop into a recognizable flatfish (ASMFC, 2003).

Winter flounder are opportunistic feeders and consume a variety of benthic organisms, including small crustaceans, molluscs, and worms. They are also known to feed on capelin and herring eggs (Scott and Scott, 1988). Alternatively, winter flounder are eaten by birds, marine invertebrates, seals, and larger fish, such as bluefish, dogfish, and striped bass (ASMFC, 2003; Scott and Scott, 1988). In the spring, winter flounder are often hauled up in lobster traps, in which they have been looking for a free meal.

In Canada, winter flounder are sold mainly for lobster bait and to local food markets, while in the USA, they are an important sport and commercial species (DFO, 2004). A decline in stocks has been noted in both Canada and the USA (ASMFC, 2003; DFO 2004; Nitschke *et al*. 2000), although in Canada, the decline appears to have leveled off since 1998 (DFO, 2004). For comparison, from the 1960's to 1997, an average of 1700 tonnes was landed each year in the Southern Gulf of St. Lawrence. In 2003, 458 tonnes were landed (DFO, 2004).

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AVC LOBSTER SCIENCE CENTRE HOSTS 2ND ANNUAL LOBSTER SCIENCE WORKSHOP

The AVC Lobster Science Centre will be hosting its 2nd Annual Lobster Science Workshop at the Delta Prince Edward hotel in Charlottetown, on July 27 & 28, 2005. The theme for the upcoming workshop is ***Lobster Research in an Applied Context***. This will ensure great and positive interactions among fishermen, processors, exporters, biologists, research scientists and others.

The keynote speaker for the 2nd Annual Lobster Science Workshop is Dr. Robert C. Bayer, Executive Director of the Lobster Institute, University of Maine, Orono, Maine, USA. Dr. Bayer will be presenting his views on lobster research that works for the lobster industry. The tentative agenda includes a meet and greet reception on Wednesday evening, and sessions on Applied Aspects of Research at the AVC Lobster Science Centre and on Lobster Fishery Research on Thursday. There will also be an open forum on lobster research, addressing important questions including: What are the priorities for research? How can we fund research? And who should do the research? The event will conclude with a banquet on Thursday evening where, of course, lobster will be king!

Early registration cost for the Workshop is $75, when you register at the door the cost will be $85 and the Banquet cost is $50.

To register or for more information, contact Lori Edwards at (902) 894-2884 (laedwards@upei.ca) or visit their website www.lobsterscience.ca/workshop.

SEA CUCUMBERS: EARTHWORMS OF THE SEA

By Jennifer LeBlanc, FSRS Fisheries Technician

Sea cucumbers are sometimes called the "earthworms of the sea". Not only are they worm-shaped, but they also act like earthworms, churning up the ocean floor as they search for food. (http://www.oceanicresearch.org).

Fig. 1.1 Orange-footed sea cucumber (*Cucumaria frondosa*).

There are roughly 1250 species of sea cucumbers in the world and they are found in all depths and in all seas (Charles Darwin Foundation, 2001; Meyers, 1995). In some ocean trenches, prime habitat for certain sea cucumbers, they can account for 90% of the benthic biomass (Meyers, 1995; Pechenik, 2000). Off of Nova Scotia, the most common species is the orange-footed sea cucumber (*Cucumaria frondosa*), known to many local fishermen as "pumpkins".

Sea cucumbers have a worm-shaped body with a mouth at one end and an anus at the other, although they have no real head or brain. They have no bones, but do have some spicules of calcium embedded in the highly muscular body wall (Pechenik, 2000). Their body structure is maintained in deep water by fluid in the water vascular system, which are canals running through the body. Sea cucumbers use tube feet, which usually run in five parallel lines down the body (Pechenik, 2000), to attach to solid substrates and to move around or burrow. Modified tube feet form long tentacles around the mouth which are used to capture food. Food particles adhere to a sticky mucus on the tentacles and is then licked off (Pechenik, 2000).

Most species of sea cucumber are deposit feeders. Not unlike earthworms, they sift through the substrate looking for tiny food particles, thereby aerating the organisms living in there (Charles Darwin Foundation, 2001) and fertilizing it with their waste. Some have been estimated to pass more than 130 kg of substrate through their digestive systems in one year (Pechenik, 2000). Sea cucumbers are, therefore, extremely important to the ecosystem. In places where they have been over fished, the ocean floors have become hard and uninhabited (Charles Darwin Foundation, 2001).

Sea cucumbers mostly reproduce sexually (Charles Darwin Foundation, 2001). Eggs and sperm are ejected into the water where the eggs give off a chemical signal to attract sperm, so if there are few sea cucumbers close together the sperm cannot find the eggs (Charles Darwin Foundation, 2001). After fertilization, larvae develop (bearing no resemblance to their parents) and later settle on the bottom and finish developing into an adult sea cucumber (Pechenik, 2000). Adult sea cucumbers live from 5-10 years (Meyers, 1995) and some species can grow to more than 1m in length (Pechenik, 2000). The orange-footed sea cucumber, however, is a slow-growing species that may reach 50cm in length (Gosner, 1999).

Sea cucumber eggs, larvae, and juveniles are preyed upon by some fish, crustaceans, and mollusks (Charles Darwin Foundation, 2000). Adult sea cucumbers do not have many predators, but, if threatened, they are able to expel their internal organs. As if this wasn't impressive enough, the lost organs are then regenerated (Pechenik, 2000). The orange-footed sea cucumber is poisonous to fish, but is preyed upon by some sea stars and urchins (DFO, 1996). Humans are the biggest threat to sea cucumbers. There is a great demand for the muscular body wall, which is considered to be a delicacy in many countries (Meyers, 1995), particularly Asia (Charles Darwin Foundation, 2001; Pechenik, 2000).

(Continued on page 9.)

NEW ENGLAND LOBSTER SETTLEMENT INDEX: UPDATE 2004

By Richard Wahle (Bigelow Laboratory for Ocean Sciences), Mark Gibson (RI DFW), Robert Glenn (MA DMF), Peter Lawton, David Robichaud, (DFO Canada), Robert Steneck (U. Maine), and Carl Wilson (ME DMR)

This is the fourth annual update of the New England lobster settlement index, a monitoring program independently supported by Rhode Island, Massachusetts, Maine, and New Brunswick. Its aim is to evaluate the strength of lobster year classes when they first settle to the sea floor in near-shore nurseries where they spend their first few years of life. The data are being used to better understand the role of environmental factors that determine regional population trends, a potentially valuable tool in lobster stock assessment and forecasting. This year's update briefly summarizes the 2004 settlement index and features a promising development in our effort to use the index in forecasting.

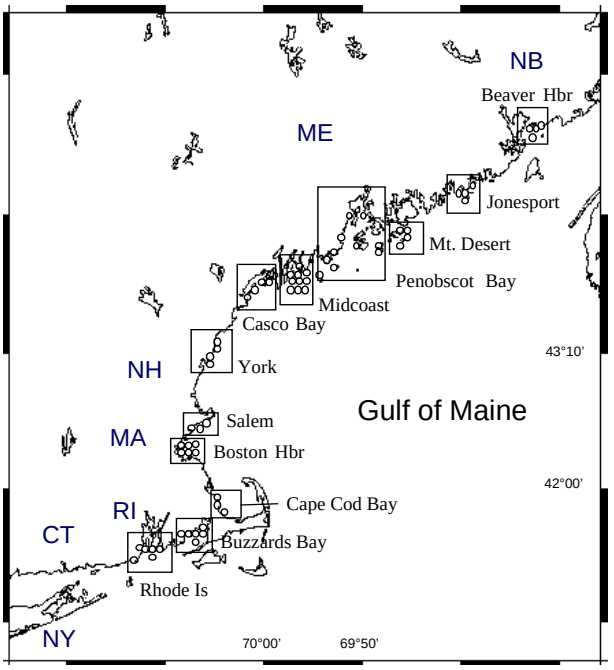

Fig. 1. Sampling sites of the New England lobster settlement index. Initiated at a few sites in Maine and Rhode Island in 1989-90, the survey now spans some 65 sites from RI to New Brunswick. Boxes surround sites used for regional averages shown in Fig. 2. Surveys are conducted by divers using suction samplers in shallow cobble-boulder.

Settlement in 2004 continued a string of generally strong settlement years across New England since 2001. The spatial pattern of high densities in New Brunswick and from mid-coast Maine to Salem, Massachusetts, and low densities in eastern Maine and Buzzards Bay are now familiar patterns (Fig. 2).

As with previous updates, we present an ongoing analysis with the time series to illustrate how the data are used. In this update we show how the settlement survey can be used together with nearshore trawl survey data collected at nearby stations to evaluate the predictive power of the settlement index, as well as to measure the impact of natural mortality, such as disease.

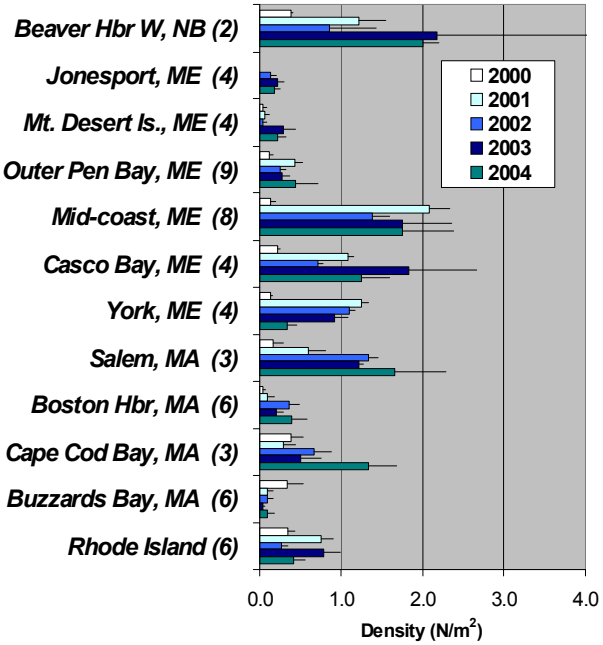

Fig. 2. Regional average lobster settlement throughout New England from 2000 to 2004. Number of sites averaged for a region in parentheses. Some sampling sites in Jonesport, Mt Desert and Penobscot Bay have changed in the past 3 years, so time trends may not be reliable.

Earlier studies have demonstrated that annual differences in the abundance of newly settled young-of-year lobsters reliably foretell the number of 1-year-olds in the nurseries a year later (Wahle and Incze 1997, Wahle et al. 2003). Until now we have been uncertain whether it would be possible to forecast the number of lobsters entering the fishery anywhere from 5 to 9 years later depending on the region. It comes as no surprise that our first evidence of that link comes from southern New England where lobsters grow relatively quickly.

Mark Gibson, one of Rhode Island's senior fishery scientists, assessed the predictive power of the settlement index by testing its ability to forecast the abundance of pre-recruit lobsters caught in Rhode Island's nearshore trawl survey; a survey that has been conducted every fall and spring since the late 1970's.

Pre-recruits in this analysis comprised lobsters with a carapace length between 55-72 mm which were deemed likely to be 3-years-old, and about a molt or two away from legal size (83 mm). Figure 3 illustrates that during the early 1990's the number of pre-recruits reached a peak in 1993 after which their numbers began to falter somewhat. But after 1997 the lobster count in the trawl survey dropped precipitously, a trend coincident with the onset and spread of shell disease. Importantly though, the settlement data suggest that not all of the decline in pre-recruits during the late 1990's can be attributed to shell disease. An initial correlation analysis indicated that fully 88% of the variation in pre-recruit numbers prior to 1997 can be explained by settlement alone. But once shell disease became prevalent, an additional "disease severity" term needed to be included in the model to fully explain the decline in pre-recruits. When the joint effects of settlement and disease were included in a modified form of a standard stock-recruitment equation called a Ricker model, Gibson was able to reproduce the time course of pre-recruit catch with reasonable accuracy (Figure 4). It is noteworthy that as the disease took its toll on the adult population from 1997 onward, settlement continued to be strong, suggesting a larval subsidy to coastal Rhode Island from outside the affected area that continues to repopulate Rhode Island nurseries.

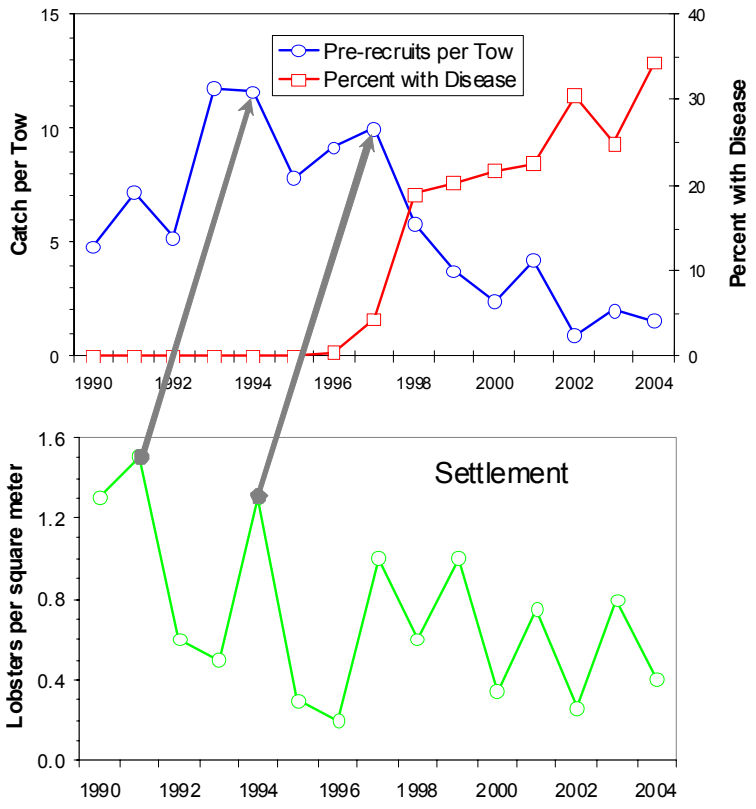

Fig. 3. Time series of the abundance of pre-recruit lobsters and the prevalence of shell disease among them (top panel) and the settlement index (bottom panel). Until the onset of shell disease, peaks in settlement were strongly reflected in the pre-recruit catch 3 years later (arrows); afterward disease increasingly masked the continuing settlement.

There are several important messages in this analysis. First, it is a promising sign that the settlement index may be a useful forecasting tool in other parts of New England. Second, it is clear that a new agent of natural mortality affecting post-settlement lobsters has entered the picture, and must be accounted for in the settler-to-pre-recruit relationship. Third, the parallel settlement and trawl surveys help us distinguish disease effects from larval supply effects on changes in lobster populations. This is a prime example of how the two surveys can be used hand-in-hand to assess the health of the resource. Following year classes through time in this way enables us to evaluate changes in natural mortality before lobsters enter the harvest. Moreover, we can take from this the lesson that it is not safe to assume that

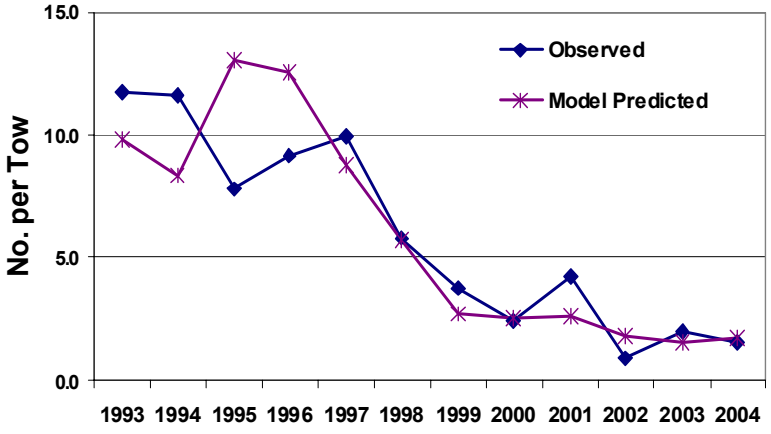

Fig. 4. Observed time series of pre-recruits from 1993 onward compared to the time series predicted by the model using terms for settlement and disease.

natural mortality is constant, either in time or space, as has been practiced in previous stock assessments (ASMFC 2000). Finally, the relative stability of the settlement signal to date - despite declining catches - implies that a substantial portion of coastal Rhode Island's lobster fishery is dependent on egg and larval production occurring elsewhere, suggesting an effective breeding population in offshore waters. The appropriate management response to this recent crisis will benefit from a better understanding of the source-sink linkages among regions.

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Sea Cucumbers *(Continued from page 6.)*

The sea cucumber fishery in Atlantic Canada is still in the early stages. In 1996, the first experimental license was issued and today there are three exploratory licenses in Nova Scotia and two in New Brunswick (Lundy, 2005). These licenses allow the distribution, abundance, and any negative impacts of harvesting the orange-footed sea cucumber to be assessed (Lundy, 2005). An important consideration is the potential for overexploitation because they are so slow-growing. Also, the muscular body wall of the orange-footed sea cucumber is thin and small compared to other species harvested for this market (DFO, 1996) so the economic feasibility must also be considered.

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BEACHCOMBING – What's New in The News

DFO RELEASES STOCK STATUS REPORT ON THE "ALLOWABLE HARM ASSESSMENT FOR CUSK IN ATLANTIC CANADA".

Fisheries and Oceans Canada (DFO), Maritimes Region released a Stock Status Report in February 2005 on the "Allowable Harm Assessment for Cusk in Atlantic Canada".

Cusk is considered "threatened" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Cusk is also listed by the Canadian Government under the Species At Risk Act (SARA).

This report discusses the historical population sizes of cusk, its distribution, human-induced mortality, and exploitation rate. It also mentions the change in fishing behaviors by the industry as a result of recent caps placed on allowable by-catch.

If you would like to review this report, it is available from the FSRS library or by contacting DFO.

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DFO, 2004. Allowable Harm Assessment for Cusk in Atlantic Canada. DFO Can. Sci. Advis. Sec. Stock Status Rep. 2004/044.

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UPCOMING EVENTS

AVC Lobster Science Centre
2nd Annual Lobster Science Workshop

July 27-28, 2005
Delta Prince Edward Hotel
Charlottetown, PEI
For more information see page 5 of this issue.

Canadian Centre for Marine Communications (CCMC)
Oceans Innovation 2005

October 23-26, 2005
Rimouski, Quebec
For more information check out their website:
www.oceaninnovation.ca