

Rapporteur's Report

Lobster Research Planning Session II: NSERC/FFAW Sustainable Fisheries Project,
Lobsters in Western Newfoundland: Reproductive Relative to Economic Value.

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Territories:

David Schneider: Based on yesterday's discussion we need to look at all area management measures, not just closed areas. Kate has prepared a map that was requested yesterday.

Kate Wilke: Conservation measures in place throughout Newfoundland are depicted on the presented map. The red dots represent closed areas. A single closed area is missing from the map in LFA 11. Most closed areas are very small ranging from 1 to several km in areas; the largest closed area is within Gander Bay an estuary. LFAs 13 and 14 have enforced slot fisheries. Eastport has exclusive fishing areas which are limited to a few people, and is in legislation. Are there any other areas where the exclusive fishing areas are legislated?

Barbara Neis: No

Jennifer Janes: Originally in St. John Bay there were community territories and certain fishing areas were always used by certain fishermen, without legislation. However, a lot of changes in that area over the past years caused there to be overlap between community territories. When the stocks decreased the fishing efforts went up and people travelled further to fish and the territories started to overlap.

Roanne Collins: Licenses which are restricted to certain LFAs is all that exists within legislation.

Barbara Neis: There is not much research on this topic, and we don't know to what degree they are enforced informally.

V-notching:

David Schneider: There were questions yesterday about v-notching and what data are available.

Kate Wilke: Do we know where v-notching is practiced, and is it more common in some areas than other?

Roanne Collins: There are pockets where it is practiced. However, there is no mandatory enforcement in place. As a result the extent of v-notching varies from year to year. Logbooks provide a small amount of data and show that LFA 14B practices v-notching more in comparison to other LFAs within Newfoundland. Logbook data also shows that LFA 4 seems less keen on practicing v-notching.

Rick Wahle: Is there any evidence of fishing activity on egg-bearing lobsters?

Roanne Collins: There have been plenty of cases where people have been charged with possession of v-notched or underage lobsters.

Rick Wahle: Is there any evidence of scrubbing?

Roanne Collins: There is no evidence of scrubbing, but some people have been caught with egg-bearing females

Rick Wahle: Do people support the need to release berried females?

Roanne Collins: yes

Bob Steneck: The percent compliance for v-notching and releasing egg-bearing females is very high in Maine, since people who notch the female know that other fishermen won't be able to keep it either.

Roanne Collins: The main reason the percent compliance for v-notching is low in Newfoundland is that fishermen are not knowledgeable on the subject. Some believe if females grow large, they will eat the smaller ones, as well some believe v-notching will harm the lobster.

Different measures among LFAs:

David Schneider: Another question from yesterday was the effects of different types of management regimes in different LFAs. These can measures can interact which is something we need to consider. I propose we use something from Walter and Martell, which suggests it is sufficient to see if policy A will do better than policy B, to make it a “better bet” than policy B. In our case, policy A versus B can be simplified to v-notched area or not, slot fishery or not, and any particular management scheme or not

Bob Steneck: This approach assumes a consensus on what’s doing better. The challenge is to determine what measurable changes result from natural difference vs. differences in conservation measures.

Newfoundland Lobster Densities:

David Schneider: Another decision from yesterday was that we need to take into account habitat, potential competition, and changes in densities. To do this is problematic. So, first we need to look and see if the densities are low enough to put this aside for the moment?

Rick Wahle: In a short term study it is difficult to follow cohorts through time, but it can be done spatially by looking at relationships of densities of young of the year or juveniles, in relation to adults. I sent you all index work, where we took the approach to look at linkages between settlement densities and older lobsters in Maine on a smaller scale. If you take this data and expand the scale through the entire species range, from Newfoundland to Rhode Island, you could look for linearity or non linearity, to see if density dependence is occurring. I expect that Newfoundland’s densities will fall way down on the spectrum, and it very unlikely that they are subject to density dependent relationships.

David Schneider: I have done this with cod and I am familiar with it, and it is a good way to tackle this.

Bob Steneck: Do you intend to do an intensive scuba survey, or are you mostly confined to traps?

David Schneider: We are hoping to rely on previously obtained data and minimize the field work, with traps comprising our primary method of sampling

Bob Steneck: I like Ricks idea, but I don’t think is it you can do it without an intensive scuba survey. I think with what you are prepared to do and the given time you have to do it, it is not possible to do what Rick said.

David Schneider: Technically we can, but logistically we shouldn’t.

Bob Steneck: Your system is recruitment limited, and I’m guessing if you launched a scuba survey it would be hard to get good numbers. Given this, I think it is important for you to consider what you guys can do, given your methodology, and scale of conservation measures.

Rick Wahle: We have substantial data sets on juvenile lobster from the New England coast and you guys have some data in Newfoundland from diver surveys. I think you guys could create a scatter plot which ranges from Maine to Newfoundland and looks at the relationship juvenile densities and make the argument that Newfoundland is on the low end of the density scale

Sex ratio:

David Schneider: Yesterday the point was made that we need to take into account the sex ratio's, which may change in different LFAs. This is a good point and we will take this into account.

Buy-in:

David Schneider: Yesterday two points were raised about buy-in by lobster fishermen. The first was that buy-in to a particular measure differs among LFAs. The second was that buy-in can change over time. My thinking here is that because buy-in depends on the community of fishers, we can present them with the data. But they will ultimately make their own decisions on what methods they will adapt, which we cannot control.

Barbara Neis: We need to know what the conservation effort translates into.

David Schneider: We can create a model, but can't deal with interactive effects easily. The standard approach is to compare units (LFAs) that differ in conservation measures and see what difference that makes. This approach will be limited by different types of units, small number of units, and background variability. Even comparing just slot fishery vs. a non-slot fishery units may not give a clear answer. So rather than comparing units that differ in conservation measures we use the modeling approach to compute effects. For example we compute reproductive value with and without slot fishery.

Barbara Neis: Could we use some modeling from Jennifer's thesis?

Jennifer Janes: I looked at the behaviors of the fishermen in 14B. I interviewed 1/5th of fishermen on their fishing strategies, and developed a geographic computer model which ran on a series of rules based on the interviews. The model tested closed areas, trap limits, and community territory. The model was run over a series of years.

David Schneider: Can this model be generalized beyond where you did it, can you apply rules to other LFAs?

Jennifer Janes: I don't know, the strategies I observed were the result of the intense increase in fishing pressure in that area.

Data on v-notching:

David Schneider: We can we use fecundity and reproductive value to get the efficacy index for v-notching. What data is available on v-notching in Newfoundland?

Roanne Collins: We have at sea data and local data, but it is very limited.

Jennifer Janes: What if you did some over the phone surveys?

Barbara Neis: There is data available for Eastport, some rough data in and Bonne Bay, and some scuba diving data.

David Schneider: We have a model for one LFA so we can do more interviews and see if this is similar to our 4 areas on the west coast.

Bob Steneck: Is the at sea sampling extensive, with large sample sizes?

Roanne Collins: We have an independent observer that goes out with a fisherman throughout the entire season and records data. The problem with the data on v-notching is that the same lobsters can be caught twice. However there is at sea data on v-notching available for several years.

Bob Steneck: At sea sampling is a much better method of evaluating v-notching as a conservation measure than scuba diving.

Fecundity:

David Schneider: For this project we need fecundity at size and growth rates. So I have some logistic questions, first about fecundity. At what stage of egg development should we measure fecundity? It has been suggested to use eyed eggs.

Lew Incze: Since you don't have data on the rate of egg loss over the incubation period, which is hard to come by, I would suggest you develop a method where you sample all your gravid females.

Kate Wilke: We are going to use existing data sets for fecundity, and build on them due to the sensitivity of scrapping eggs from the females. We plan to use fecundity data researched by Jerry Ennis (used eyed eggs), which has a good curve for legal size range. From this we would fill out the data for the small and larger lobsters, the focus of our field work.

Bob Steneck: You could look at non invasive methods of calculating fecundity, since this is a sensitive issue. You could expose the ventral surface of the female and get the area of the footprint and measure the depth of the egg mass with a probing ruler. It is also important to get egg diameter and stage of development. You would require a sufficient camera to do this and this may allow you to increase your sample size.

Rick Wahle: You could use the females you scrape as a standard and do a scaling of egg bearing to non egg bearing females using displacement.

Bob Steneck: Yes, use the scraped lobsters as a standard and then the variance would be reduced if you can expand on this photo metrically.

Rick Wahle: You may find local variations.

Tagging:

David Schneider: The next topic is growth rates which we need to get size at age based on the growth transition matrix. I have no experience with measuring growth rates or tagging lobsters to get a growth curve, any thoughts?

Kate Wilke: There has been tagging in LFAs 14a and 14b for one year, using streamer tags, however, none have been recaptured from these locations. Eastport has a couple of years of data,

approximately from 1997 to present, with some years missing. We measured the size at capture and recapture

Rick Wahle: We used streamer tags with great success and were retained at high rates. A lot of work is currently being done using streamer tags. One short coming is that they can get degraded if there are a lot of lobsters in a single trap, this may not be an issue in Newfoundland.

David Schneider: Is post molt in fall a good time for tagging?

Jennifer Janes: Yes, we usually tag the week after Labor Day.

Rick Wahle: Avoid tagging when they possess a soft shell.

Recap:

David Schneider: I would like to return to the email discussion between me and Bob about the different management measures, and how we disentangle the affects. We can simplify our problem based on the quote from Walters and Martel and take a case such as v-notching vs. not v-notching and look at the difference and see if this changes egg number or reproductive value, this is an extreme simplification based on a demographic model.

Bob Steneck: I'm not convinced that the models will show efficacy of the conservation measure in place. We face the problem of having areas where the slot fishery is in place and areas that they are not this creates a confounding problem to disentangle these affects. If your study domain creates so much variance that it swamps conservation measures, you can't answer that question. You need to know what they are initially and how they changed throughout time. A BACI (before after control impact) design does this. The second problem is that you have a very small closed area, and your annual migration is larger then the closed area. This means you may not see the effect of a closed area.

David Schneider: I started out as a benthic ecologist doing experiments, and then I went to sea and did oceanography where we can't control anything. So we construct a computational model.

Rick Wahle: Given your tools at hand, you may make better use of a tagging effort by getting a handle on the local population dynamics inside and outside of closed areas. You could do a number of mark recapture approaches (See paper I sent) to characterize gains and losses to a very small population, and possibly have this ground truthed by diver surveys. This kind of approach could allow you to get a start on the population dynamics within various closed areas and evaluate if these closed areas are too small to effectively help reproductive value fecundity.

David Schneider: These areas are control impact areas and so not a BACI design.

Lew Incze: Why did you decide to close these areas?

Roanne Collins: It has less to do with the biology and more to do with the willingness of the fishermen to forfeit a certain area.

Jennifer Janes: This was usually a combination of low fishing efforts and low lobster densities.

David Schneider: we do know that the lobsters inside are bigger.

Lew Incze: Do you know how much lobster move around?

Roanne Collins: Tagging data suggests little emigration and immigration of closed areas.

Bob Steneck: What is the average size in the closed areas?

Jennifer Janes: The average size is approximately 100mm (CL) inside and 90mm (CL) outside. Sizes are much lower in the greater area than in adjacent area.

Bob Steneck: Has anyone done growth rates within Newfoundland?

Roanne Collins: Jerry Ennis looked at it and suggested a lower than average growth rate.

Bob Steneck: Are there lobsters over 127mm (CL)?

Roanne Collins: No not really

David Schneider: We talked to Jerry Ennis about where we could find larger lobsters and he said we need to look in areas that aren't fished, such as exposed headlands.

Barbara Neis: Are there no large lobsters within the slot fishery? How long has it been in place?

Roanne Collins: Since 2003

Bob Steneck: On the closed areas, is there data available pre-closure?

Jennifer Janes: No

David Schneider: At Eastport there was not much difference in the sizes inside and outside the closed area the first year. But then there was more difference in the next two years, this is currently still the case.

Bob Steneck: There are three conservation measures in place; each should affect local stocks slightly differently. How differently would be a measure of the efficacy of the conservation measure. No effect would suggest these have relatively little demographic impact. So I think you should set up hypothesis for the different areas where conservation measures are in place. For example:

<u>Measure</u>	<u>Hypothesized effect</u>
1. Closed Areas -----	Population density and body size increase
2. V-notching -----	Sex ratio will become increasingly dominated by females at and above size of female sexual maturity.
3. Slot fishery -----	Since all areas have a minimum legal size, the only change is the maximum size. Thus the hypothesized effect will be a gradual build up of large size classes in this area.

Lew Incze: What are the scales of recruitment dynamics in Newfoundland?

David Schneider: There is some physical oceanography and some knowledge of the spatial dynamics of ichthyoplankton around Newfoundland. However, lobsters live in the coastal zone where we have a highly convoluted coast line that makes computation difficult. So we don't have the scale of coherence of recruitment dynamics.

Lew Incze: To get info on recruitment scale, between relative abundance and lobsters, you could possibly go to different decapods. From this you may be able to set up what the patterns of recruitment may look like. Ultimately a rough understanding of these patterns is useful. It is hard to understand the conservation methods without looking at this.

David Schneider: In Leading Ticks we looked at drifter dynamics and got confusing results. Powerful winds and strong coastal upwelling systems all make this difficult to do. There have

been studies of capelin and cod eggs and larvae in some areas. We have almost no information on the south coast and little on the west coast. Leading Ticks presented difficulties doing this so we tried to avoid this in the proposal.

Lew Incze: I would like at least an idea of the physical conditions and how this effects lobster recruitment.

Barbara Neis: Scott Canes pulled together all the oceanography data for the west coast, maybe you could talk to him.

Ryan Stanley: There has been work done for cod in various locations. This data maybe compatible.

David Schneider: In cod we found pulse like recruitment and it was not same from year to year at any one place. We were unable to completely predict or even get a strong relationship between one year and the next at any one location. It was somewhat of a lottery just like fish settlement on coral reefs and this may apply to lobsters.

Lew Incze: Do you have any figures on distribution of lobster and the physics of lobster?

David Schneider: (Note added latter) We did start to investigate this at Leading Ticks. One of Paul Snelgrove's students, Victoria Burdett-coutts looked at larval lobster behavior and vertical migration in relation to light in the lab.

Rick Wahle: Trap catches maybe useful in this respect. If you see differences in size structure from region to region some areas may have a high number of pre-recruits (50mm CL 4-5 years old). In Maine there are region to region variations in size structure and this may be true for Newfoundland.

Correction of notes from 13 May:

Bob Steneck: Are their quotas in different areas?

Barbara Neis: ~~It depends on the turfs~~

No, there are no quotas in Newfoundland and Labrador for the lobster fisheries.