

**Canadian Fisheries  
Research Network**

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**Abstracts**

**Réseau canadien de  
recherche sur la pêche**

**3<sup>e</sup> Assemblée générale  
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**Du 13 au 15 février 2013  
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**Résumés**

Canadian Fisheries  
Research Network



Réseau canadien de  
recherche sur la pêche



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## **Student Abstracts**

(Abstracts presented in the language provided)

## **Résumés des étudiants**

(Les résumés sont présentés dans la langue dans laquelle ils ont été fournis)



# **To fish or not to fish: decision-making in the Skeena River salmon fisheries**

**Author(s):** Eric Angel (eangel@sfu.ca)

**Author Affiliations:** Simon Fraser University

**CFRN Project 1.1:** Enhanced fisheries knowledge for an evolving management regime

**Presented as:** Poster and oral presentation

The highly productive Skeena River salmon fisheries in northern British Columbia have sustained the dominant social-ecological system in the region for over a hundred years. Despite substantial recent declines in economic value, public consultation exercises like the Enbridge pipeline hearings suggest that the social and cultural importance of the fisheries persists. For managers and participants alike this raises important questions, e.g., is the persistence of non-economic value a lag effect or evidence of resilience that could support rebuilding efforts in the fishery? This project is a collaborative venture between academia and the United Fishermen and Allied Workers' Union. The overall objective is to model the risks, benefits and trade-offs in the fisheries as they impact fish stocks, fishermen and fishing communities. A combination of grounded theory techniques and Bayesian network analysis is being used to structure the collection and analysis of evidence from archival, ethnographic, grey literature and quantitative datasets.

# **Spatial and temporal variation in larval production of American lobster (*Homarus americanus*) in Atlantic Canada**

**Author(s):** Marthe Larsen Haarr<sup>1</sup> (marthe.haarr@unb.ca), Rémy Rochette<sup>1</sup>, Michel Comeau<sup>2</sup>, Bernard Sainte-Marie<sup>3</sup> and John Tremblay<sup>4</sup>

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**CFRN Project 1.2:** Metapopulation dynamics, management areas and biological units of lobster in eastern Canada

**Presented as:** Poster and oral presentation

The first component of project 1.2 aims to estimate spatiotemporal variation in larval production based on the abundance and characteristics of egg-bearing females. Fishermen are collecting data on the abundance, size, clutch quality and hatch time of berried females weekly throughout the fishing season with the goal of one fisherman every 50-75 km of coastline throughout Atlantic Canada. Sampling started in 2011 and continued with even better coverage in 2012 with a total of 124 participants. There is considerable spatial variation in estimated egg production with southeastern Cape Breton being particularly productive. These first two years of sampling have been hugely successful thanks to collaboration with industry at an unprecedented spatial scale. Work is planned to validate these estimates of egg production and resulting data will be used as biological input into a biophysical model of larval drift to improve our understanding of connectivity among lobsters in different fishing areas.

# **Modelling potential effects of larval development rates on large-scale drift and spatial connectivity of American lobster**

**Author(s):** Brady K. Quinn<sup>1</sup> (bk.quinn@unb.ca), Rémy Rochette<sup>1</sup> and Joël Chassé<sup>2</sup>

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**CFRN Project 1.2:** Metapopulation dynamics, management areas and biological units of lobster in eastern Canada

**Presented as:** Poster and oral presentation

Because lobster larvae drift with ocean currents, different areas may depend on one another for their supply of lobster larvae, and thus potential fisheries recruits. Time and distance drifted by larvae is influenced by temperature-dependent larval development rates, which we found to vary depending on geographic origin of larvae. We used a new larval drift model, incorporating most of the American lobster's range, to investigate potential large-scale spatial connectivity of lobsters, and tested the sensitivity of model predictions to different temperature-mediated larval development functions. Our model predicted much connectivity within the Gulf of Maine, the Gulf of St. Lawrence, and the Scotian Shelf, and some limited connectivity between these areas. Development functions affected the amount of connectivity within and between areas, showing the importance of correctly assessing these functions for use in the model. This model will support further investigations of lobster fisheries connectivity and metapopulation dynamics.

## Patterns and processes of lobster settlement

**Author(s):** Gudjon Sigurdsson<sup>1</sup> (gudjon.mar@unb.ca), M John Tremblay<sup>2</sup> and Rémy Rochette<sup>1</sup>

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**CFRN Project 1.2:** Metapopulation dynamics, management areas and biological units of lobster in eastern Canada

**Presented as:** Poster and oral presentation

The overarching goal of my project is to elucidate patterns and processes of lobster settlement. My objectives are to: (1) quantify the abundance, spatial patterns and patchiness of lobster settlement, (2) elucidate the processes responsible for the patterns observed, and (3) investigate the potential impact of predation and competition on settling and recently settled lobsters in nursery areas. This project has so far discovered important nursery areas for lobster, identified high variability in settlement at the scale of 0.5-10 km<sup>2</sup> and much lower variability at the scale of 0.001-1 km<sup>2</sup> and identified sand shrimp and green crab as potentially important predators on settling lobsters. Future analyses will aim to identify the processes that are most important in explaining the spatial settlement patterns observed, and to design future settlement studies aimed at validating the postlarval dispersal-settlement model of the CFRN's Lobster Node.

# Is muddy seafloor important to settlement and early survival of American lobster?

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**CFRN Project 1.2:** Metapopulation dynamics, management areas and biological units of lobster in eastern Canada

**Presented as:** Poster and oral presentation

Postlarval lobsters are known to prefer settling onto a cobble substrate and prolong swimming (delay settling) over mud or sand. Whether this delayed settlement affects the timing and size of the first benthic moult is unknown but important given the prevalence of mud bottom in Atlantic Canada. Using tanks lined with cobble, mud, or sand, we found that postlarvae molted to stage V faster on cobble than on mud, and faster on mud than on sand. Delayed settlement also came at the cost of reduced body size at moult over sand substrate compare to mud and cobble. These results suggest that in absence of cobble, mud may serve as suitable bottom for settlement and early recruitment of lobster. This hypothesis was supported by a field study in which lobsters as young as 1-2 years old colonized cobble-filled collectors deployed onto mud at least 500m from cobble habitat.

# Activity levels and movements of juvenile american lobsters (*Homarus americanus*) in a nursery area: an ultrasonic telemetry study

**Author(s):** Bryan Morse<sup>1</sup> (bryanlmorse@gmail.com) and Rémy Rochette<sup>1</sup>

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**CFRN Project 1.2:** Metapopulation dynamics, management areas and biological units of lobster in eastern Canada

**Presented as:** Poster and oral presentation

There currently exists no quantitative information on the activity levels and movement patterns of juvenile American lobster (*Homarus americanus*) in nature. This study utilized an ultrasonic tracking system (Vemco's VRAP) to provide estimates of activity levels, activity rhythms, and movements of 10 juvenile lobsters (20-47 mm carapace length) within a shallow ~5000m<sup>2</sup> lobster nursery area in Birch Cove, NB. The study ran from August 6 to 30, 2010. Most lobsters were nocturnally active, and showed a 24 hour cycle of activity. The average daily home range varied between 27 and 112 m<sup>2</sup> per day for the 10 lobsters. Overall lobsters spent a larger percentage of the day outside of their shelters and showed greater movement away from their shelters, then is predicted by the literature. Movements observed were not random; the juvenile lobsters maintained only one shelter at a time and continued to return to it after each foraging trip.

## **Genomics and management of the American lobster (*Homarus americanus*) in eastern Canada**

**Author(s):** Laura Benestan  
(laura.benestan@gmail.com)

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**CFRN Project 1.2:** Metapopulation dynamics, management areas and biological units of lobster in eastern Canada

**Presented as:** Poster and oral presentation

The lobster fishery is the largest commercial fishery in Atlantic Canada. Despite the socio-economic importance of this fishery, there are still significant gaps regarding our knowledge of the population structure of this species. Because of these gaps, the current management of lobsters is based on the geo-administrative area rather than the biological ones, thus limiting the full analysis of management and conservation impact. This project will largely fill these gaps by (1) defining genetically distinct units in a fine scale and testing, with more than 5000 molecular markers, the correspondence between the genetic structure of natural stocks and the 41 managements units currently used, (2) highlighting how these genetics units are interconnected and interdependent, (3) delineating and quantifying the impact of environmental features and local adaptation on population structure. This genomics approach will provide a new tool to Canadian fisheries, in the perspective of a sustainable management of this species.

## **Génomique et gestion du homard américain, *Homarus americanus*, dans l'est du Canada**

**Auteur(s) :** Laura Benestan  
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**Organisme(s) d'appartenance :** Université Laval

**Projet du RCRP 1.2 :** Structure et connectivité des stocks de homard américain, *Homarus americanus*, dans l'Est canadien

**Type de présentation :** Présentation orale et affiche

La pêche au homard est la plus importante pêche commerciale du Canada Atlantique. Malgré l'importance socio-économique de cette pêche l'ensemble de nos connaissances sur cette espèce comportent d'importantes lacunes, notamment en ce qui concerne la structure de ses populations. Ces lacunes, que ce projet de recherche viendrait en grande partie combler, ont fait en sorte que la gestion du homard repose sur des zones géo-administratives plutôt que biologiques limitant ainsi l'analyse de l'impact des mesures de gestion et de conservation. Ce projet vise à combler ces lacunes en (1) identifiant des unités génétiques distinctes à fine échelle et en testant efficacement, avec plus de 5 000 marqueurs moléculaires, la correspondance entre la structure génétique des stocks naturels et des 41 unités de gestion actuelles, (2) en mettant en lumière comment ces unités génétiques sont connectées et l'interdépendantes, (3) en délimitant et en quantifiant l'impact des facteurs environnementaux et de l'adaptation locale sur la structure des populations. Cette approche génomique apportera un nouvel outil aux pêches canadiennes, dans l'optique de gérer de façon durable cette espèce.

# The effect of sedimentation on the settlement behavior of the American lobster (*Homarus americanus*)

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**CFRN Project 1.3:** Factors influencing recruitment and early life survival of lobsters

**Presented as:** Poster and oral presentation

Low recruitment of lobsters in the Northumberland Strait combined with an important commercial fishery contributed to the decline of existing populations. Questions were raised by stakeholders in eastern Canada on the effect of habitat modifications on recruitment processes. Most benthic invertebrates have a complex life cycle involving a pelagic dispersal phase followed by a benthic settlement phase. The transition between these phases is critical to the American lobster (*Homarus americanus*). Stage IV lobster larvae are then vulnerable to various predators and will adopt a cryptic behavior to increase survival. Of the various factors that may affect larval deposition the effect of substratum modifications, due to sedimentation, on larval behavior is investigated. Sedimentary regimes can be severely affected and ultimately impede recruitment in American lobsters. The main objective of this study is to quantify how different thickness of fine sediments over preferred substrate will affect the larval behaviors involved during settlement.

## **Comportement des postlarves du homard Américain: effet de la température et de la population d'origine**

**Auteur(s)** : Léo Barret<sup>1</sup> (leo.barret@hotmail.com), Gilles Miron<sup>2</sup>, Patrick Ouellet<sup>3</sup> et Réjean Tremblay<sup>1</sup>

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**Projet du RCRP 1.3** : Facteurs influant sur le recrutement des homards et leur survie aux stades précoces de leur existence

**Type de présentation** : Présentation orale et affiche

Le succès d'établissement des postlarves du Homard américain est un facteur clé dans la dynamique et dans la gestion de ces populations. Le passage d'un mode de vie pélagique à benthique est lié à une transformation du comportement. Cette transition est influencée par plusieurs facteurs environnementaux dont la température de la colonne d'eau et le type de substrat. Les différentes expériences effectuées avec des postlarves de stade IV permettront de caractériser (1) les variations des comportements de nage et d'établissement en fonction de la présence d'une thermocline (2) le comportement d'établissement en fonction de l'incubation des larves, de la population d'origine, du type de substrat et des réserves énergétiques disponibles. Les résultats seront présentés en budget d'activités pour les différents comportements. Les modifications comportementales résultantes auront des implications écologiques sur la dispersion larvaire et la connectivité des populations et fourniront des données pertinentes pour l'industrie et l'ensemencement.

## Effects of age structure of spawning stock on the stock-recruitment relationship of Lake Erie Yellow Perch (*Perca flavescens*)

**Author(s):** Fan Zhang<sup>1</sup> (fzhang02@uoguelph.ca), Kevin Reid<sup>1,2</sup> and Tom Nudds<sup>1</sup>

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**CFRN Project 1.4:** Effects of socio-ecological complexity on dynamics of harvested fish stocks

**Presented as:** Poster and oral presentation

The effect of age structure of the spawning stock on the stock-recruitment relationship is tested for Lake Erie Yellow Perch (*Perca flavescens*). A set of age structure indexes are incorporated into Ricker Model to construct a set of Modified Ricker Models. These models are fitted to three artificial datasets based on no maternal effect, determinate maternal effect and random maternal effect, and three observed datasets of Lake Erie Yellow Perch from 1990 and 2010 based on three different stock classification assumptions. Results indicate that the effect of spawning stock age structure on stock-recruitment relationship is not significant for Lake Erie Yellow Perch as one stock or for stocks in western and eastern basins. However, if the eastern basin stock assumption holds, spawning stock age structure tends to have significant effects on stock-recruitment relationship in eastern basin.

# Temporal variation in rates of phenotypic change in Lake Erie yellow perch (*Perca flavescens*) 1988-2008

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**CFRN Project 1.4:** Effects of socio-ecological complexity on dynamics of harvested fish stocks

**Presented as:** Poster and oral presentation

Lake Erie Yellow Perch is an important commercial and recreational fishery that has been harvested for decades. In marine fish populations, high rates of phenotypic change in response to harvesting have been observed. Harvest induced changes in life history traits, such as size at age, in harvested fish populations can be important because they can affect fecundity, egg and juvenile survival, and population dynamics, and influence the sustainability and management of these resources. We analyzed temporal variation in age and length at maturation for Lake Erie Yellow Perch over two decades. Temporal variation in life history traits revealed change that may be linked to population density, harvest rate, and other environmental factors. Comparing the rate and direction of phenotypic change in response to harvesting in freshwater populations, and comparing these with marine populations, will allow us to test for the generality and significance of harvest-induced phenotypic change in fishes.

# Food-web complexity and the persistence of top-predators in large lake fisheries

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**CFRN Project 1.4:** Effects of socio-ecological complexity on dynamics of harvested fish stocks

**Presented as:** Poster and oral presentation

Collapse of top-predator fisheries has caused social and economic hardships for harvesters and a reduction of biodiversity. Despite changes in fish species composition, Lake Erie fisheries continue to harvest top-predators (walleye, yellow perch, and white perch). Lake Erie fisheries might persist due characteristics of the food-web structure. Harvesters may have interactions with fish similar to those observed by top-predators with prey in stable food-webs. From a food-web approach, at least two complementary hypotheses could explain the enigmatic persistence of top-predator fisheries and have the potential to promote population stability (i.e. lessen changes in population size). I hypothesize that increased stability is promoted by 1) increased prey enrichment and mortality due to harvesting and 2) selective fishing of top-predators. My research may provide a better understanding of why top-predator fisheries exist in Lake Erie.

## Lags between fish abundance and harvest in commercial fisheries

**Author(s):** Katrine Turgeon<sup>1</sup> (kturgeon@uoguelph.ca), Ray Hilborn<sup>2</sup> and John M. Fryxell<sup>1</sup>

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**CFRN Project 1.4:** Effects of socio-ecological complexity on dynamics of harvested fish stocks

**Presented as:** Poster and oral presentation

Collapses in many commercial fisheries have led to sophisticated harvest models characterized by a constant harvest mortality rate and where harvest is coupled dynamically to variation in resource abundance. However, managers usually have limited control on effort and they rarely know true resource abundance. Model simulations demonstrated that weak compensatory response by harvesters/managers, *i.e.* delayed adjustment of quota, effort and harvest to changing resource abundance, in presence of environmental uncertainty can accentuate population cycles and can increase the risk of fisheries collapse. In presence of delayed adjustment, the model predicts cycles with decadal periodicity, with effort and quotas lagging far behind resource abundance and harvest lagging at intermediate distance. Time series data on 26 marine and 2 freshwater fish species were consistent with these model predictions suggesting that weak compensatory response to changing resource abundance may create instability in the system and may affect the sustainability of fish populations.

# Bayesian Decision Networks: a framework for the scientific management of fisheries assessment and research resources

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**CFRN Project 1.4:** Effects of socio-ecological complexity on dynamics of harvested fish stocks

**Presented as:** Poster and oral presentation

Assessment and management capacities of fisheries management agencies are increasingly challenged by “austerity” budgets imposed by various levels of government, and by sophisticated and demanding stakeholders with often conflicting objectives. Attribution and recovery of the costs of fisheries assessment, research and management is an on-going issue in many of the world’s commercial fisheries; consequently, sound decisions about stock assessment programs and related research are needed to ensure the sustainability of fish stocks and fishing industries. A framework for decision analysis of fisheries assessment programs and research proposals is needed to help decision makers to optimize the allocation of scarce assessment and research resources in a defensible, transparent way. Such a framework will also facilitate understanding and ranking of the assessment and research priorities. This decision making framework will be increasingly useful as governments seek to recover the costs of assessment directly from industry and industry seeks to ensure that stock assessment and research are efficient. This research will provide a rare “worked example” of the use of Bayesian Decision Networks (BDN) and Value of Information (Vol) analysis to aid decision making about allocation of funding for stock assessment and research.

## Characterising benthic communities and quantifying fishing impacts in the Gulf of St. Lawrence

**Author(s):** Charlotte Moritz<sup>1</sup> (charlotte.moritz@gmail.com), Philippe Archambault<sup>1</sup>, Dominique Gravel<sup>2</sup>, Mélanie Lévesque<sup>1</sup>, Sandrine Vaz<sup>3</sup>, Diane Archambault<sup>4</sup> and Jean-Claude Brathes<sup>1</sup>

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**CFRN Project 2.2:** Reducing seabed impacts of mobile fishing gears

**Presented as:** Poster and oral presentation

In the CFRN, Project 2.2 is dedicated to conduct research aiming at reducing seabed impacts of mobile fishing gears. Within this Project, we aim at characterizing benthic communities in the Estuary and Northern Gulf of St. Lawrence, and assess the effects of fisheries on these communities. Epibenthic macro fauna was monitored at 755 stations each summer between 2006 and 2009. Average environmental conditions and fishery data from 2008 and 2009 were also gathered. Six different communities clustered in habitats characterized by particular depths, temperatures, bottom current velocities, and sediment types. Specific environmental and fishery variables influenced the overall community structure, species richness, and biomass at different spatial scales ranging from 10 to >100km. A predictive community distribution model was designed to build a benthic habitat suitability map, which can contribute to managing the impacts of fisheries on the seabed, for conservation of both fishing stocks and vulnerable non-fished species.

# Computer simulation and flume tank testing of scale engineering models: how well do these techniques predict full-scale at-sea performance of bottom trawls?

**Author(s):** Truong Nguyen<sup>1</sup> (truong.nguyen@mi.mun.ca), Paul D. Winger<sup>1</sup>, Dave Orr<sup>2</sup>, Harold DeLouche<sup>1</sup> and Tara Perry<sup>1</sup>

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**CFRN Project 2.2:** Reducing seabed impacts of mobile fishing gears

**Presented as:** Poster

The purpose of this study is to evaluate the engineering performance of the Campelen 1800 shrimp/survey trawl using three techniques, including numerical simulation, physical modeling, and evaluation of the full-scale prototype. The objective of this study is to assess the accuracy of numerical and physical modeling in predicting the full-scale at-sea performance of the Campelen 1800 shrimp trawl. A dynamic simulation of the trawl was evaluated using DynamiT software developed by IFREMER. A 1:10 scale model is currently under construction and will be tested in a flume tank at Memorial University of Newfoundland in spring 2013. Full-scale observations of the Campelen 1800 shrimp trawl were collected during the fall multi-species survey aboard the *CCGS Teleost*. As the study is still ongoing and in progress, we just discuss here some preliminary data on the comparison between dynamic simulation and full-scale prototype.

## **This area is closed. But what about the fish?**

**Author(s):** Kate Barley (kate.barley@mun.ca)

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**CFRN Project 3.1:** Closed areas in ecosystem based fishery management

**Presented as:** Poster and oral presentation

So what about the fish? Are closed areas about the fish, are they about the fishers and their livelihoods, or are they about the habitat? Or should they in fact be about all of these things together?

Fishers, fisheries, and conservation are often different pillars. There is a need to include all of these pillars to achieve sustainable fisheries, but this may involve compromise. Closed areas may be a key part in this compromise. The question is how effective are they, what are the best type to use when? And can an area have both fisheries and conservation benefits at the same time

Finding the medium between biodiversity protection and the productivity of fisheries is key to the future sustainability and the health of the whole system both within Canada and worldwide.

## How much food do seals and sea lions require?

**Author(s):** Sarah Fortune<sup>1</sup> (s.fortune@fisheries.ubc.ca), Brian Battaile<sup>1</sup> and Andrew Trites<sup>1</sup>

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**CFRN Project 3.2:** Assessing the impact of marine mammals on the recovery of salmon, rockfish, herring and cod

**Presented as:** Oral presentation

Marine mammal predation has been a leading hypothesis for declines of commercially valuable fish stocks in Canada. They have been blamed for the low abundance of Atlantic cod and Pacific salmon. However, the direct impact of marine mammals on these fish stocks is poorly understood. We are determining the energetic requirements of Steller sea lions, California sea lions, harbour seals and grey seals using a generalized energetics model. The energetics model predicts daily energy requirements (MJ) that vary by season by accounting for the costs of growth, metabolism, activity, digestive efficiency and reproduction. Uncertainty is incorporated into the model predictions through numerical randomization of the model parameters. Preliminary results for Steller sea lions show seasonal differences in daily energy needs between different demographic groups. These results are being incorporated into pinniped consumption models to evaluate the impact of seals and sea lions on fish stocks in Canada.

## Enhancement options for Atlantic cod in the southern Gulf of St. Lawrence

**Author(s):** Rachel Neuenhoff<sup>1</sup> (r.neuenhoff@fisheries.ubc.ca), Murdoch McAllister<sup>1</sup>, Andrew Trites<sup>1</sup>, Mike Hammill<sup>2</sup> and Doug Swain<sup>2</sup>

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**CFRN Project 3.2:** Assessing the impact of marine mammals on the recovery of salmon, rockfish, herring, and cod.

**Presented as:** Oral Presentation

Two decades of a commercial fishing moratorium on Atlantic cod in the southern Gulf of St. Lawrence has not stopped the population decline. Some hypothesize that high predation rates by grey seals have hampered recovery by increasing natural mortality to unprecedented levels. However, there is uncertainty about when, where and how much cod are being consumed. We are testing the seal predation hypothesis using existing 4T cod stock assessment estimates of natural mortality in a modified catch-at-age model. Natural mortality is decomposed into seal predation mortality and residual natural mortality; and predicted seal predation mortality is used to estimate per capita consumption of cod by grey seals. Functional responses will be fit to predicted consumption rates and cod biomass to determine the potential of grey seals to limit cod in the southern Gulf of St. Lawrence. Results will be placed within a decision network for the southern Gulf ecosystem.

## **Evaluating impacts of policy on the financial viability of the BC small boat groundfish fleet**

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**CFRN Project 3.3a:** Applying management strategy evaluation to identify economically viable harvesting options for the B.C. small boats groundfish fleet

**Presented as:** Poster and oral presentation

An integrated management regime was introduced in the BC groundfish fisheries in 2006, which included 100% monitoring and expansion of the individual transferable quota system. The integration of the groundfish fisheries opened new opportunities for the BC small boat groundfish fleet, but has also led to a number of challenges. Existing issues also continue to persist, including concerns about the stock status of a number of rockfish species. Management actions to address these concerns could have wide-reaching and severe impacts on the small boat fleet. The management strategy evaluation (MSE) approach enables candid evaluations of the performance of current and alternative fisheries policies and management plans. This research will develop and apply aspects of the MSE approach to address questions about the long-term viability of the small boat fleet, contribute to an improved understanding of the BC groundfish fisheries, and demonstrate new approaches for fisheries management and evaluation.

# Harvest control rules for coping with autocorrelated recruitment variation, conservation of biodiversity, and economic wellbeing

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**CFRN Project 3.3b:** Evaluating the impacts of current and alternative harvesting strategies on Skeena River salmon populations and fishing fleets

**Presented as:** Poster and oral presentation

Dynamic programming is used to construct harvest control rules that account for persistent changes in productivity, exploitation rate constraints that prevent extinction of non-target weak stocks, and an economic objective that recognizes moderate income to be more important to fishermen than maximization of total profit. Persistent productivity changes imply downward adjustment in spawning abundance targets during periods of low productivity, while conservation constraints simply imply upper limits on exploitation rate at high stock sizes. When the economic objective is to maximize the logarithm of net income, the optimum control rule shifts from fixed escapement form to a curve where exploitation rate increases smoothly from zero at the minimum stock size that can be fished profitably to the upper limit set by conservation constraints; this policy results in total profits close to those obtainable with fixed escapement policies but without the frequent low catches or closures implied by fixed escapement policies.

# **In search of effective management: lessons from domestic and international experience**

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**CFRN Project 3.3.c:** Developing tools and experiments to evaluate impacts of current and alternative fisheries management plans and spatial zoning on Hecate Strait Crab Fisheries

**Presented as:** Oral presentation

The British Columbia Dungeness crab fishery is facing serious challenges including questions of management's effectiveness for maintaining stocks biological sustainability, the need to cement supportive and productive industry-government relationships, and to finance management with dwindling resources. The "Larocque Decision", a federal court case which changed the way that Fisheries and Oceans Canada can finance collaborative management has further complicated matters. This thesis, utilizing a comparison of domestic and international experience based on case studies of the British Columbia Dungeness crab fishery, Western Australia rock lobster fishery and Cape Breton snow crab fishery searches for best practices to create effective management within fisheries. The investigation concludes by providing criteria for the creation of effective management. It finds that collaborative management creating long-term industry-government partnerships enhances the success of such approaches.

## **Pacific Hake And Pacific Herring: developing management procedures robust to stock productivity variability**

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**CFRN Project 3.3d:** Developing management procedures robust to variability in stock productivity arising through trophic interactions and persistent environmental changes

**Presented as:** Oral presentation

There is increasing interest on the effects of persistent changes in productivity over stock assessment and management of commercially valuable species. Pacific hake *Merluccius productus* stock is characterized by high recruitment variability leading to increased uncertainty in assessment results and high volatility of quota estimates. There's also evidence that pacific hake has faced a considerable decline since the 1980's which might be attributed to a failure in establishing a management evaluation system robust to such uncertainties. Pacific herring stocks *Clupea pallasii* also declined in all major herring spawning areas despite closures and major reductions in fishing mortality. To account stock assessment uncertainties, changes in the stock assessment protocol were introduced but the performance of various harvest control rules considering these modifications and productivity changes remain untested. This project aims at developing a management evaluation system to provide management advice robust to the uncertainties currently identified for pacific hake and herring.



## **Other Abstracts**

(Abstracts presented in the language provided)

## **Autres résumés**

(Les résumés sont présentés dans la langue dans laquelle ils ont été fournis)



## **New technology for assessing mobility of longline trap gear**

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**CFRN Project 2.2:** Reducing seabed impacts of mobile fishing gears

**Presented as:** Oral presentation

Fisheries for demersal fish stocks are increasingly scrutinized for the potential impacts of fish gear on sensitive seabed habitats. Historically, most of the attention has been on mobile gears such as bottom trawls; bottom longline hook and longline trap gear is generally treated as stationary, at least during the majority of the soak time. Fisheries sustainability certification for these “non-mobile” gears is nonetheless conditional upon demonstrating acceptably low impacts on sensitive benthic habitat. In 2012, we developed and field-tested a new camera/motion-sensor system for providing benthic habitat images as well as quantitative data on mobility of longline trap gear. The project results from a successful collaboration between academia, government, the fishing industry, and a deep-sea technology manufacturer. This talk presents this technology and preliminary analyses of longline trap gear mobility.

# **Fisheries policy and regional development: insights from the Newfoundland and Labrador shrimp fishery**

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**CFRN Project 1.1:** Enhanced fisheries knowledge for an evolving management regime

**Presented as:** Poster

The sustainability of many coastal regions in Canada has long been tied to changes in fisheries policies. Yet little research has examined how specific fisheries policies impact regional development opportunities and outcomes. This project examines the impacts of the northern shrimp fishery on regional development in three areas: Southeast Labrador, the Northern Peninsula of Newfoundland, and Fogo Island. Drawing on a literature review and 54 interviews, we found that shrimp allocation policy guided by the principles of adjacency and regional economic development goals resulted in the establishment of two innovative regionally based fishing organizations in Southeast Labrador and the Northern Peninsula, and the consolidation of a third existing fishing organization on Fogo Island. Each organization used relatively small shrimp quotas productively for regional development purposes. Outcomes in these cases measure up relatively well against objectives of social sustainability contained in various fisheries management frameworks in Canada and elsewhere.

## **A collaborative approach to understanding the ecological role of seals in the Northeast US**

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**Presented as:** Poster

Increasing seal abundance in Northeast U.S. waters has led to concerns about fisheries and other interactions between human and seal populations. The urgency of documenting, understanding, and mitigating these interactions has become more apparent, as has the need to improve our knowledge of the ecological role of seals. The Northwest Atlantic Seal Research Consortium (NASRC) was created following a series of workshops that gathered scientists, resource managers and the fishing community to address issues, concerns, and data gaps related to increasing seal populations along the New England coast. These issues include interactions between seals and fisheries (ecological and operational) and those associated with coastal overlap of seals and humans and the implications for human and seal health. NASRC will improve the understanding of the ecological role of seals through coordinated research, data sharing, stakeholder collaboration, and public outreach. The Consortium will include continued participation of the scientific and fishing communities.