# NSERC / FFAW Project: Sustainable Fisheries

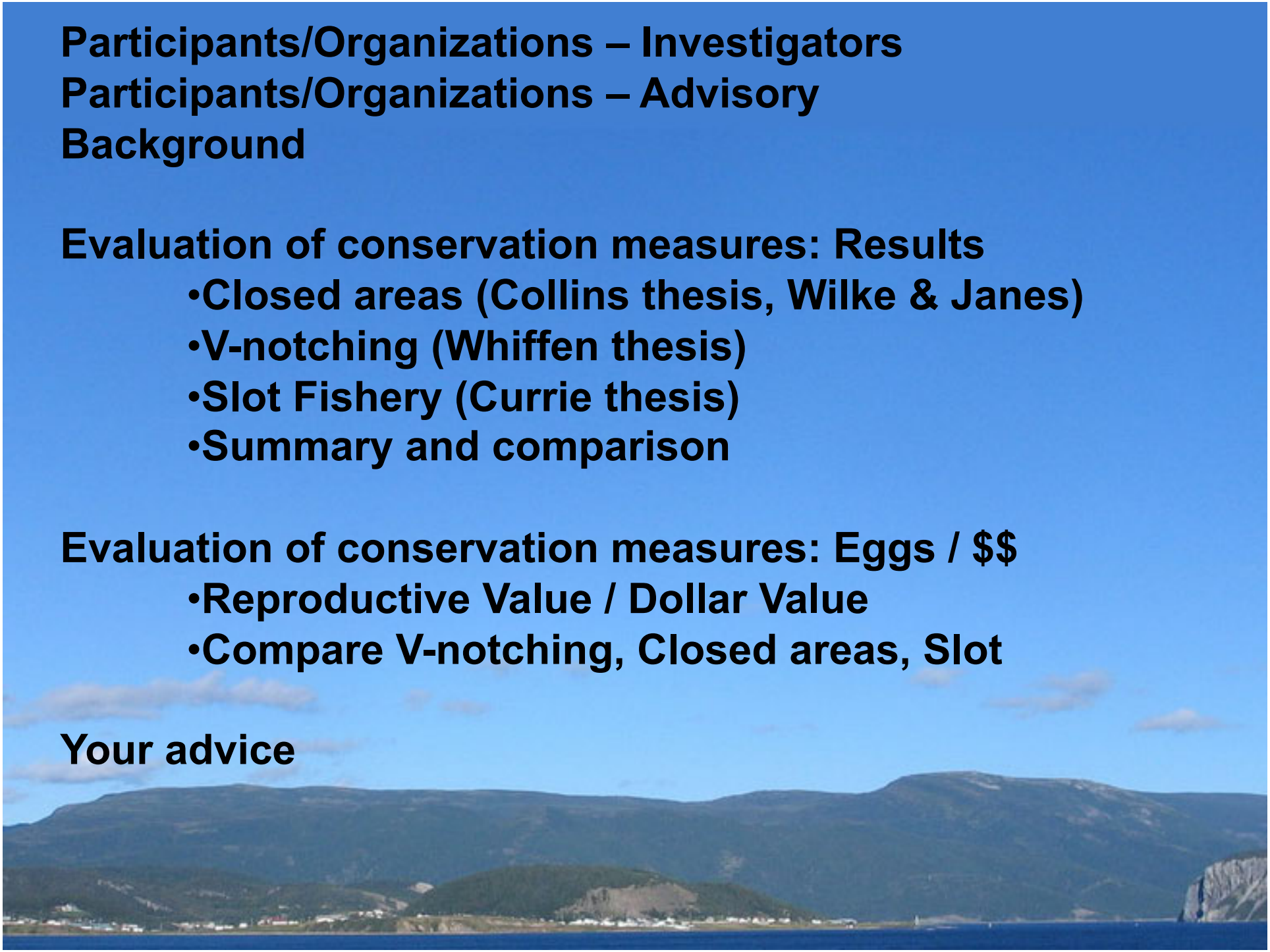
## Lobsters in Western Newfoundland: Reproductive Relative to Economic Value

5 November 2010

Memorial University of Newfoundland

Natural Sciences and Engineering Research Council of Canada | Conseil de recherches en sciences naturelles et en génie du Canada

FFAW CAW



Participants/Organizations – Investigators

Participants/Organizations – Advisory

Background

Evaluation of conservation measures: Results

- Closed areas (Collins thesis, Wilke & Janes)
- V-notching (Whiffen thesis)
- Slot Fishery (Currie thesis)
- Summary and comparison

Evaluation of conservation measures: Eggs / $$

- Reproductive Value / Dollar Value
- Compare V-notching, Closed areas, Slot

Your advice

CURRA

# Community - University Research for Recovery Alliance




- Overview
- Globalization & Recovery
- Rural Youth & Recovery
- Fishplants - Past & Future
- Critical Habitat
- Governing for the Future
- New Initiatives
- Curriculum for Recovery
- Promoting Dialogue


## Collaborative Research — an Overview

Researchers at Sir Wilfred Grenfell College and Memorial University along with multiple community partners have received funding for a Community-University Research for Recovery Alliance focusing on Newfoundland's west coast marine ecosystems and fishing communities. Our activities will include:

- Broadening use and public engagement with the Bonne Bay Marine Station
- Linking research and local knowledge to develop key recovery strategies for the region
- Enhancing the capacity of fish harvesters and fishing communities within the region to engage in recovery strategies
- Integrating existing knowledge and developing new knowledge about fish, fisheries and fishing communities
- Transferring knowledge to the region and between generations through innovative community-based educational programs and initiatives
- Create a multi-disciplinary platform for future research and collaborations

SSHRC

Social Sciences and Humanities Research Council (SSHRC)

MEMORIAL UNIVERSITY

Memorial University

# Participants/Organizations – Investigators

- Jens Currie – Department of Biology, MUN
- Barbara Neis – Department of Sociology, MUN
- Jamie Raper – Department of Biology, MUN
- David Schneider – Ocean Sciences Centre, MUN
- Jason Spingle (FFAW)
- Monty Way (FFAW)
- Cathy Whiffen – Department of Biology, MUN
- Kate Wilke – Ocean Science Centre, MUN
- Cailin Xu – Ocean Science Centre, MUN

- And of course….

## Participants/Organizations - Advisory

### NSERC Advisory Committee

- Lew Incze (University of Southern Maine)
- Bob Steneck (University of Maine)
- Rick Wahle (Bigelow Lab, Boothbay Harbor, Maine)

### Industry

- Harvey Jarvis (FFAW)

### Department of Fisheries and Oceans, St. John's, NL

- Roanne Collins (Science Branch)
- Jennifer Janes (Oceans Branch)

### Informal

- Jerry Ennis (DFO Science, retired)
- Bob Hooper (MUN)

# NSERC / FFAW Project: Sustainable Fisheries

- Lobsters in Western Newfoundland:
  Reproductive Relative to Economic Value

## Background

- $550 million/year in landed value, export market
- Value of regular income to rural communities
- Value of sustainable fishery, export and local


# Evaluation of conservation measures: Results

- **Closed areas**

Egg Production:

Roanne Collins thesis

- **V-notching**

Egg Production:

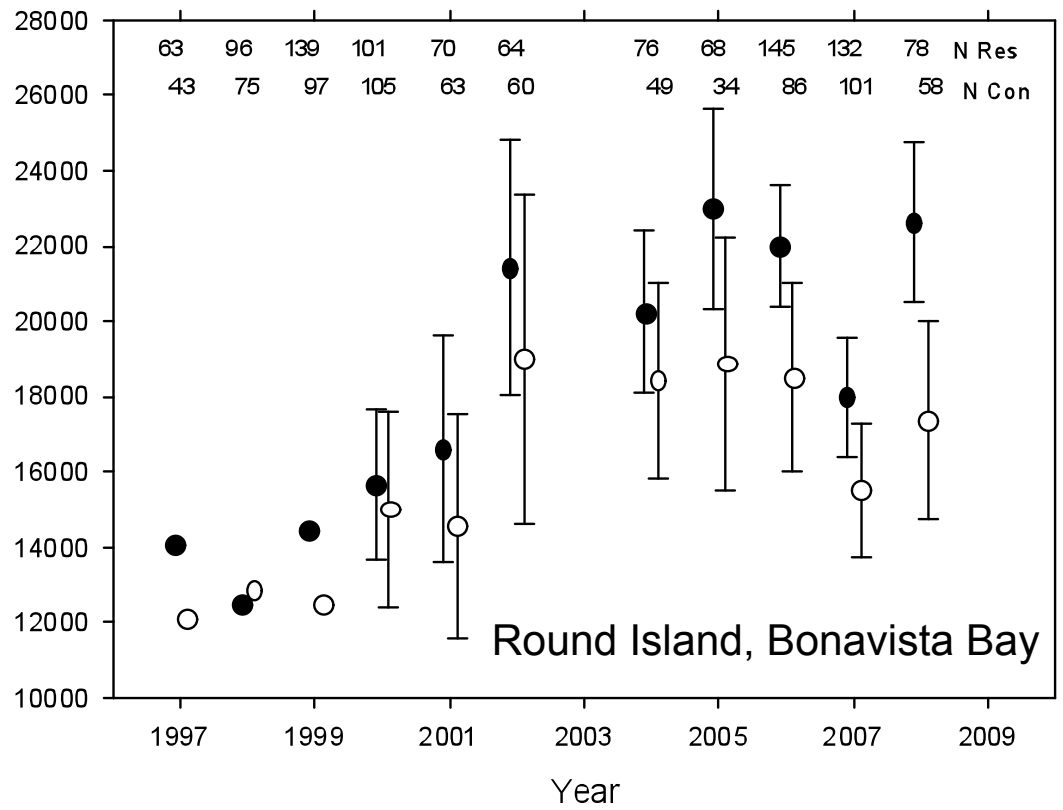
Cathy Whiffen thesis

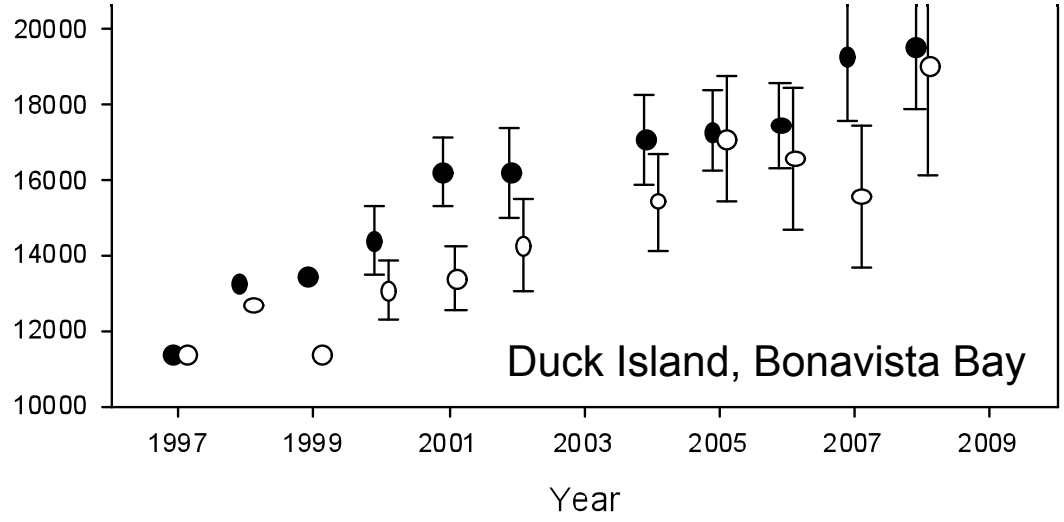
- **Slot Fishery**

Egg Production:

Jens Currie thesis

# Evaluation of conservation measures: Results




## Closed areas

Egg Production/female is consistently higher in closed areas.

Increase due to larger size

Roanne Collins (2010) thesis

Reserve (●) and
Adjacent (○) locations
Sample sizes above estimates.

## Evaluation of conservation measures: Results

## Closed areas

Roanne Collins thesis (2010) More results.

- Mean sizes of males and females were greater inside the reserves, as compared to adjacent control areas.
- Mean size of males and females increased over time inside and outside both Round Island and Duck Islands reserves - (spillover?)
- More pronounced size response to protection occurred for males at both protected areas.
- Higher proportion of females in both protected areas (Duck and Round).
- Density higher inside the protected area at Round Island, but not at Duck Island
- Density in the closed area did not increase over time (1997 to 2008).

# Comparing Closed Areas - lobster size inside vs. outside

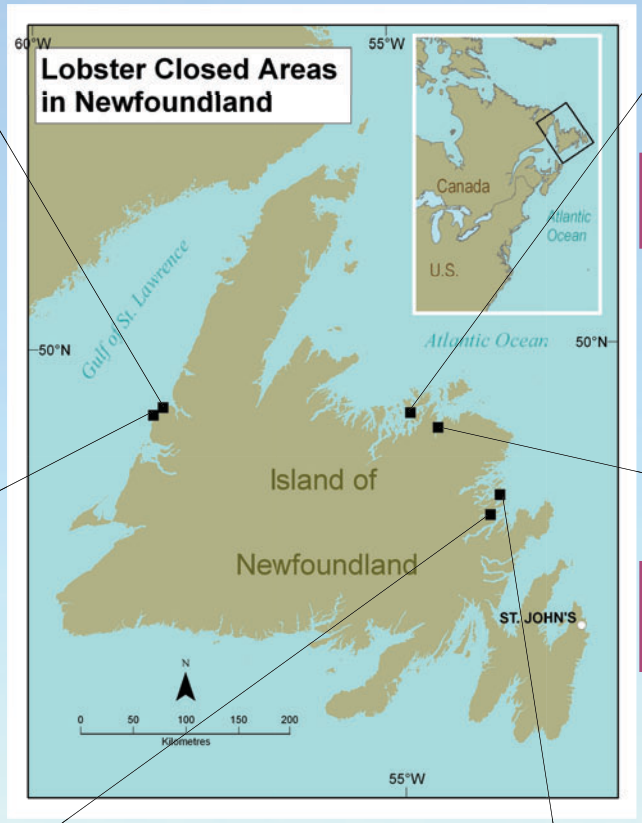
Results (Kate Wilke and Jennifer Janes) :

- Establishment of a closed area results in larger lobsters inside the closed area at some locations, but not at others.
- Longer time since closure does not result in larger lobsters.

*based on 2004 data

**Trout River**
(closed 2002)
Area = nd
Males: no sig diff
Females: no sig diff

**Shoal Point**
(closed 2002)
Area = .57 km$^2$
Males: no sig diff
Females: no sig diff




**Summerford**
(closed 2003)
Area = .41 km$^2$
Males: larger inside
Females: larger inside

**Gander Bay**
(closed 2003)
Area = 77.57 km$^2$
Males: larger inside
Females: larger inside

**Round Island**
(closed 1997)
Area = .47 km$^2$
Males: larger inside
Females: no sig diff

**Duck Island**
(closed 1997)
Area = 1.96 km$^2$
Males: larger inside
Females: no sig diff

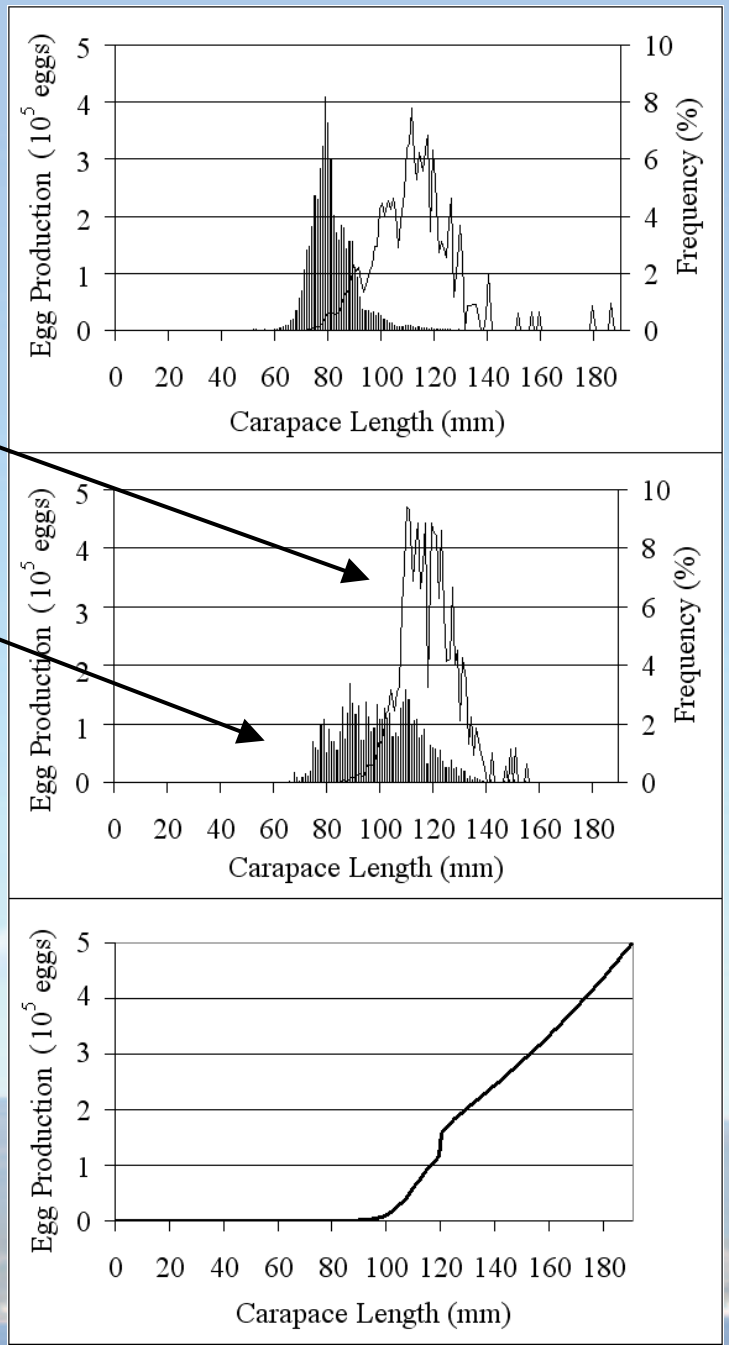
# Evaluation of conservation measures: Results

## V-notching

Non V-notched

Egg Production by Size Class

Number of Females by Size Class




V-notched

Eggs/female

Egg Production/female:

Cathy Whiffen thesis (2010)

Locations:
Eastport,
Leading Tickles,
Gander Bay,
Summerford,
Random Island,
Shoal Point, and
Trout River

V-notched lobsters accounted for 6.8% of the catch, and 42% of the estimated egg production

# Evaluation of conservation measures: Results
## Slot fishery

Egg Production/female:

Jens Currie thesis (2010)

Currie, J.C. D.C.Schneider, K.M. Wilke (in press). Validation of a non-invasive technique for estimating fecundity in the American lobster *Homarus americanus*. *Journal of Shellfish Research*

Results.

- Fecundity estimates to date based on removal of 7000 egg masses and 140 million eggs, or 1.4 million lobsters, assuming 1% survival
- A non-invasive technique was developed, based on field estimate of egg mass volume and sample of 10 eggs/female. Lobsters are released with egg mass left intact.
- Estimates were within 4% of those based on complete removal of egg mass.

# Evaluation of conservation measures: Results

## Slot fishery

Egg Production/female: Jens Currie thesis (2010)

Currie, J.C., D.C. Schneider (submitted mss). A General Model of Fecundity in a Commercially Important Species.

Results.

- All available data on lobster fecundity in relation to size was assembled (Newfoundland to Massachusetts).
- Fecundity decreases in a regular way with increasing latitude
- Lobster fecundity can now be estimated at any location in the species range.

Slot Fishery Effects

- Increase in egg production ? (Cailin Xu)
- Increase in number of large lobsters in catch?
- If increase in number or large lobsters, does this affect density or egg production of smaller lobsters?

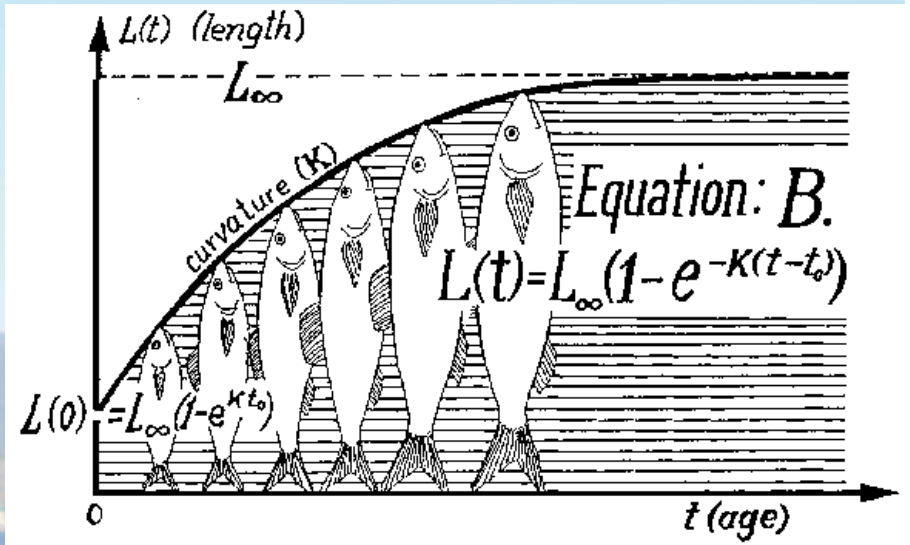
# Evaluation of conservation measures: Results
## Slot fishery

Growth rate:

Jamie Raper thesis (2011)

Results.

- All available data on lobster growth in relation to size was assembled (Newfoundland to Massachusetts).
- Growth decreases in a regular way with increasing latitude
- Lobster growth can now be estimated at any location in the species range.



## Evaluation of conservation measures: Result summary

- Closed areas. Some increase in egg production. Window for survival of large, highly fecund lobsters.

- V-notching. Substantial effect (42% of eggs from 7% of catch)
- Slot Fishery. Effect cannot be evaluated from catch data – lack of catch data for lobsters above 127 mm

Next steps:

Evaluation of conservation measures: Eggs / $$

Reproductive value/$$

# Evaluation of conservation measures: Eggs / $$
## •Reproductive / Economic Value

SEARCH GO

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We keep these massive live lobsters in darkened seawater tanks. The water is kept chilled at a constant 38 degrees so as to simulate their natural environment. This process keeps the lobsters strong and healthy. These are hard shelled lobsters and full of meat.

Four Pound Jumbo Lobster
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**$134.68**

Nine Pound Jumbo Lobster
**$151.52**

What is a lobster worth to the population, relative to what it is worth to the person who catches it?

## Evaluation of conservation measures:

## Reproductive Value / $$

- **Closed areas**

$\frac{v_x}{v_0}$ With and without a closed area at several spatial scales

- **V-notching**

$\frac{v_x}{v_0}$ With and without v-notching, depending on % notched

- **Slot Fishery**

$\frac{v_x}{v_0}$ As it depends on the upper limit of the slot

**And now,**

**your advice and your queries**

Topics

- Aquaculture
- Aquatic Species
- Fisheries
- Fish Habitat Management
- Marine Navigation

Oceans

- About Canada's Oceans
- Oceans Management Approach
- Marine Areas
- Ocean Industries
- Events and Awareness
- Reports and Publications
- Information by Region

# Marine Protected Area

## Eastport

The Eastport Peninsula, one of the most picturesque areas of Bonavista Bay, is located approximately three hours drive from St.John's, Newfoundland. The rugged coastline is interrupted by a number of headlands, coves, and beaches. Numerous islands found in the area provide habitat for a variety of marine wildlife. The rich, productive waters surrounding the Eastport Peninsula are host to a wide range of groundfish, pelagic fish, shellfish, marine mammals, and aquatic plants. Since early settlement the people of the Eastport Peninsula have relied on the fishery for their economic subsistence.

In 1995, to address declining catches, the Eastport Peninsula lobster fish harvesters formed the Eastport Peninsula Lobster Protection Committee (EPLPC). The aim of the Committee was to implement an overall lobster conservation strategy for the Eastport Peninsula. Committee members provided information and data required for the management of the resource and implemented various measures to address conservation and sustainability. Based on the initial success of various initiatives, the EPLPC developed an agreement with Fisheries and Oceans Canada in 1997 to limit local fisheries and close two areas of prime lobster habitat to lobster harvesting. One benefit of these initiatives has been the ability of fish harvesters, government, community youth, academics, and scientists to work together and share information and knowledge for better management of the lobster fishery.