

Economic Analysis of Alternative Harvest Strategies for the Eastern Georges Bank Haddock Resource

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Overview

- Resource/Policy Context
- Haddock Market
- Modeling Considerations
- Results
- Conclusions
- Extensions

Multiple Stocks/Multiple Jurisdictions

- Non-Transboundary Stocks
 - U.S. Gulf of Maine - New England Fishery Management Council
 - Canada Northwest Atlantic/non-Georges Bank – DFO Canada
- Transboundary Stock - Georges Bank
 - Shared Eastern Georges Bank
 - Non-Shared Western Georges Bank

Georges Bank Haddock

- Western Component
 - New England Fishery Management Council
 - Constant F-based Harvest Strategy
 - Target TAC
 - Days at Sea Controls
 - Trip limits
 - Mesh Size
 - Minimum Fish Size

Georges Bank Haddock

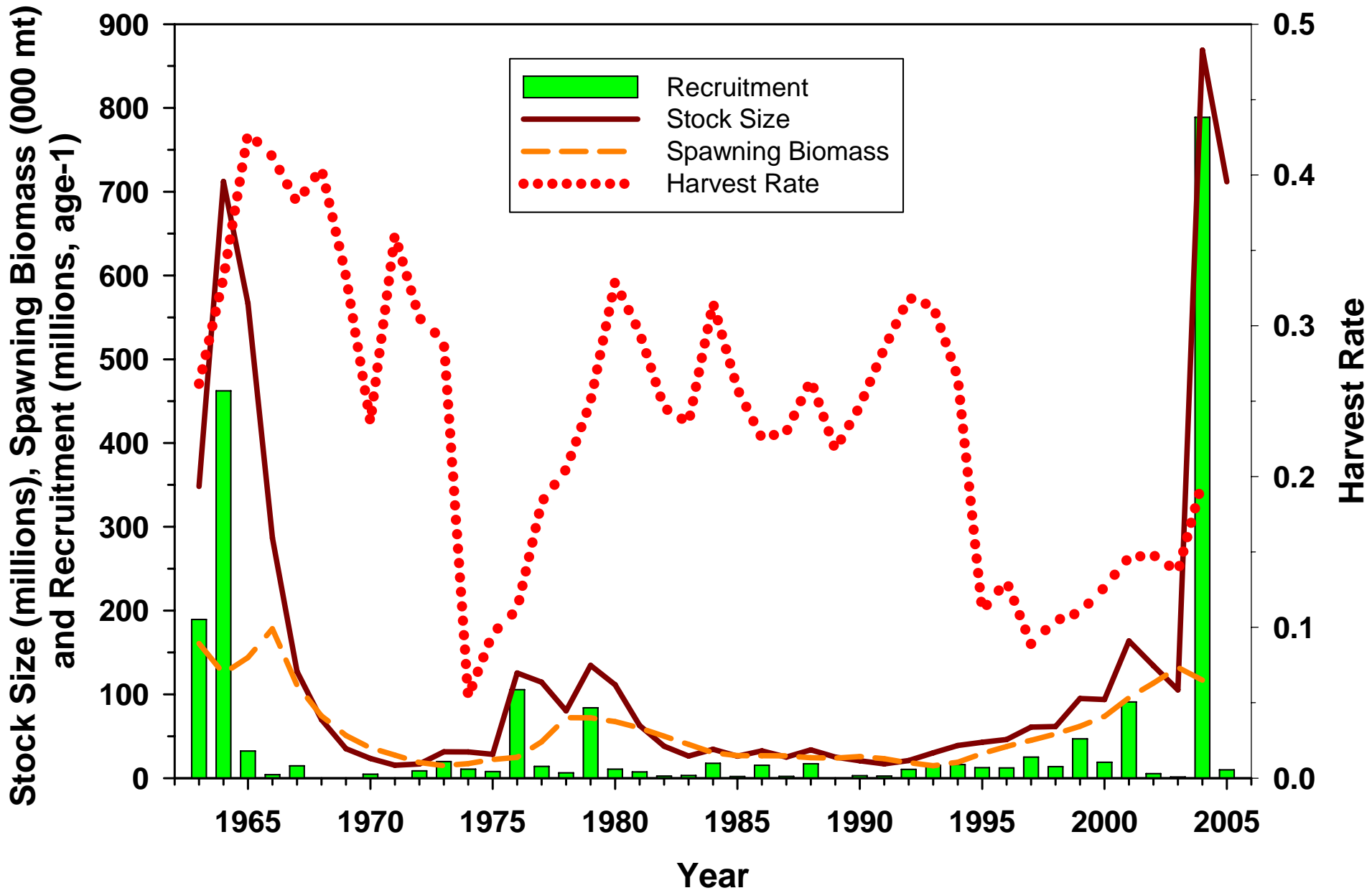
- Eastern Component
 - Transboundary Resource Sharing Agreement
 - Joint Assessment (TRAC)
 - Codified Sharing Formula
 - Joint Management Advice (TMGC)
 - Set Negotiated TAC
 - Harvest Strategy Based on Constant F
 - Joint Decision Making – (TRSC)
 - Approve Recommended TAC
 - Policy Setting Body

US-Canada Haddock Markets

- Haddock landings from Northwest Atlantic mainly sold in the US and Canada.
- 2003 US-Canada landings: 22,500 MT
- “Consumption” estimated at 80,100 MT of round haddock.
- Canada and US collectively a net importer of primary haddock products, estimated at 57,600 MT.
- Almost all of Canada's exports go to the US.
- Majority of exports from Canada to US as fresh whole fish
- US/Canada import/export market a raw material for US processors.

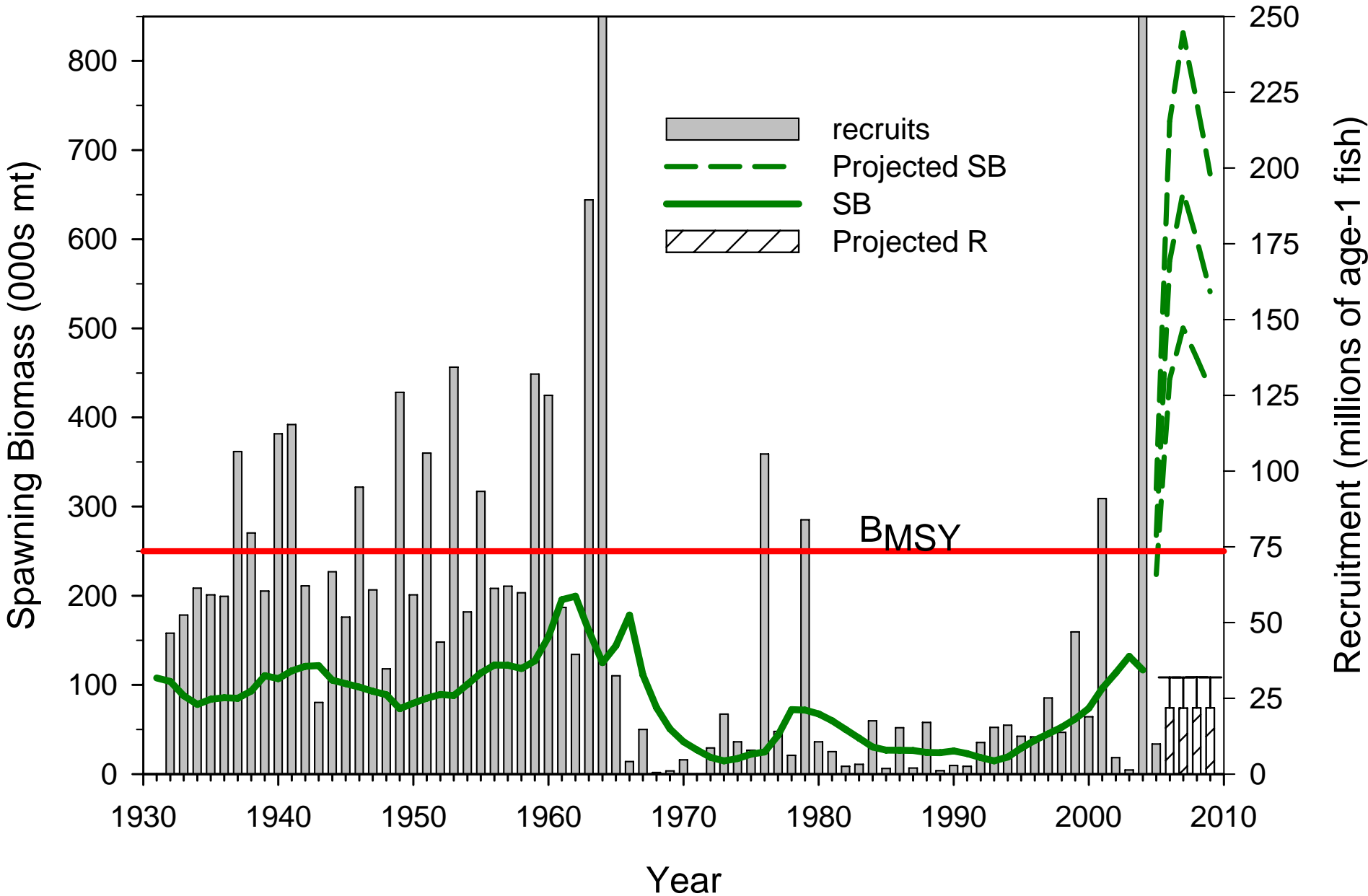
Triggering Event

- Extraordinarily Large 2003 Year Class



1963 YC = 462

2003 YC = 789



Triggering Event

- Extraordinarily Large 2003 Year Class
- Canadian “Industry” concern over potential price effects and processor capacity
- Approach TR Steering Committee to consider alternative harvest strategy
- TRSC Request for Economic Analysis
 - Current $F_{\text{Ref}} = \text{msy}$
 - Constant Harvest

But I Digress...

- Why was Canadian industry concerned and US was not
 - Canada consumer strong preference for cod
 - US primary market
 - Increased US domestic landings would reduce import demand resulting in lower market share
 - Canada ex-vessel price less elastic than US means that Canada ex-vessel price more sensitive to change in supply than US ex-vessel price

Model of Raw Material Market

- U.S. import demand for fresh whole haddock
- Import/Export supply of fresh whole haddock from Canada
- U.S. ex-vessel price
- Canada ex-vessel price

- Prices and quantities determined in market clearing process

Import Demand

- Fresh whole import price from Canada [-]
- U.S. ex-vessel price of haddock (t-1) [+]
- Ex-vessel price of cod [+]
- U.S. quantity of landed haddock [-]
- Time trend [?]

Import Supply

- Import price of fresh whole haddock [+]
- Canada landings of haddock (t) [+]
- Canada landings of haddock (t-1) [?]
- Processed product price [-]

Canada Ex-Vessel Haddock Price

- Haddock landings in Canada [-]
- Quantity of fresh whole haddock exports [+]
- Canada ex-vessel price (t-1) [+]
- Price of processed products [+]

U.S. Ex-Vessel Haddock Price

- Quantity of fresh whole imports from Canada [-]
- Quantity of U.S. haddock landings [-]
- Ex-vessel price of cod [+]
- Ex-vessel haddock price (t-1) [+]

Data

- Imports – NMFS via U.S. customs
 - product weights and prices
- U.S. Landings – NMFS
 - Prices and pounds in live weight
- Canada landings – DFO
 - Prices and pounds in live weight
- Monthly time series 1989 to 2003

Estimation

- Four equation system
- Two-Stage least squares
- Solution provides predicted values for:
 - Import price
 - Import quantity
 - Canada ex-vessel price
 - U.S. ex-vessel price
- At any specified level of haddock landings in the U.S. and Canada

Biological Projections

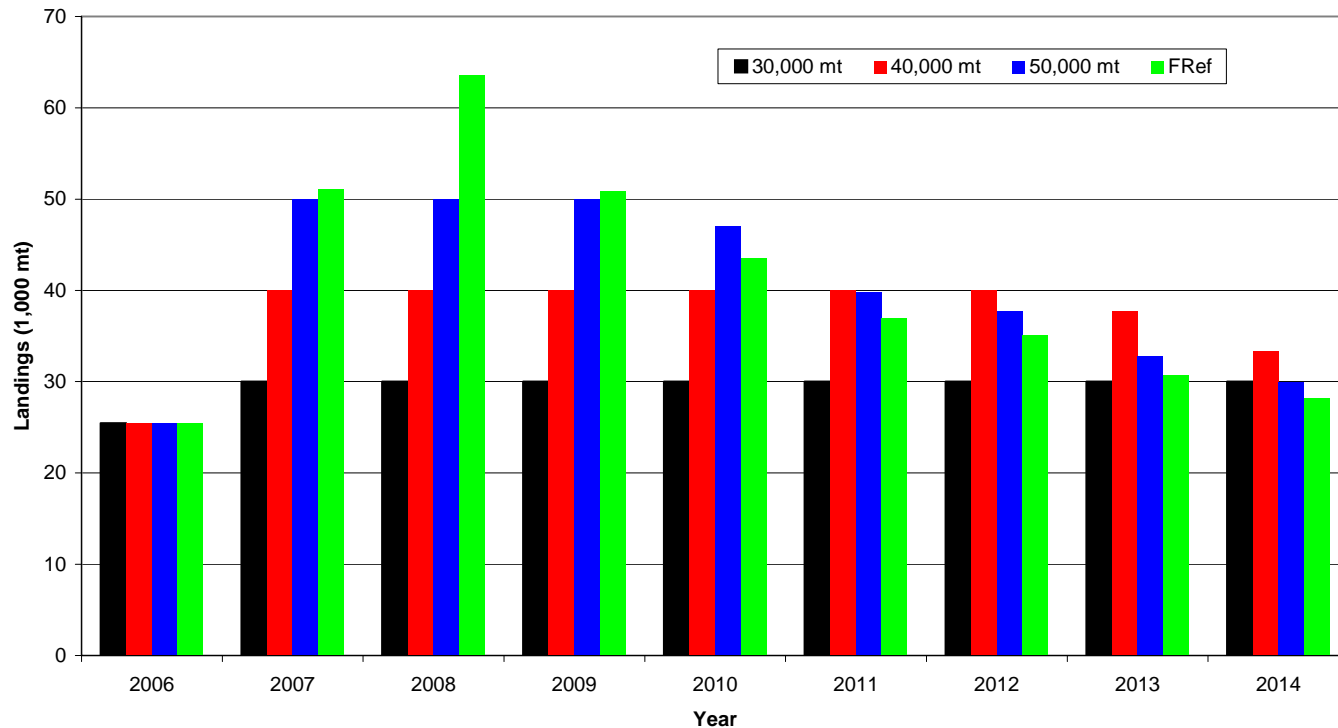
- Stochastic recruitment
- Two-stanza sampling at adult biomass levels above and below 40K mt
- Fishing mortality constrained to be no more than F_{Ref}

Assumptions

- All projected catches will be taken as landings
- Constant monthly distribution of landings
- Landings from non-Georges Bank stocks constant at 2001-2003 average
- Same projected Western Georges Bank landings across all harvest strategies
- Exogenous variables held constant
 - Ex-vessel price of cod in U.S.
 - Average price of alternative import products

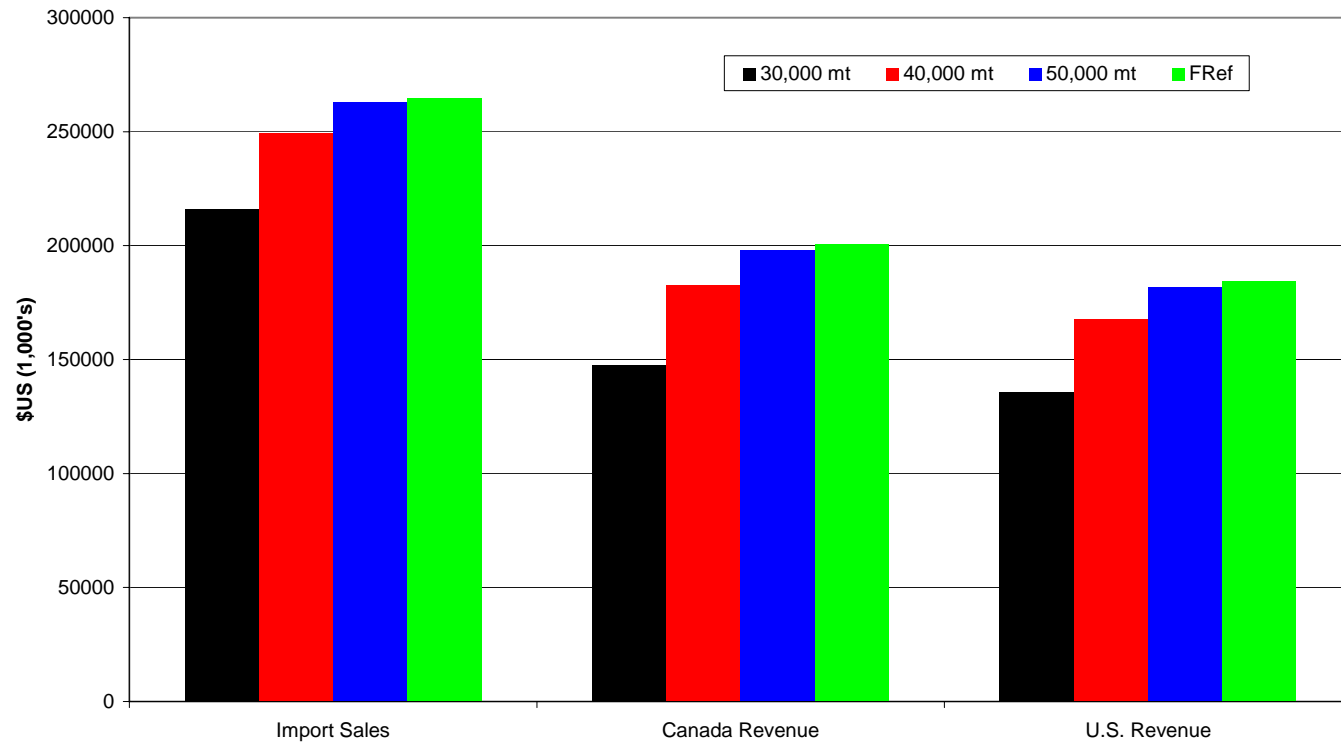
Projected Landings for Eastern Georges Bank

Annual Projected Median Catches for Haddock from the Eastern Georges Bank
Area by Harvest Strategy



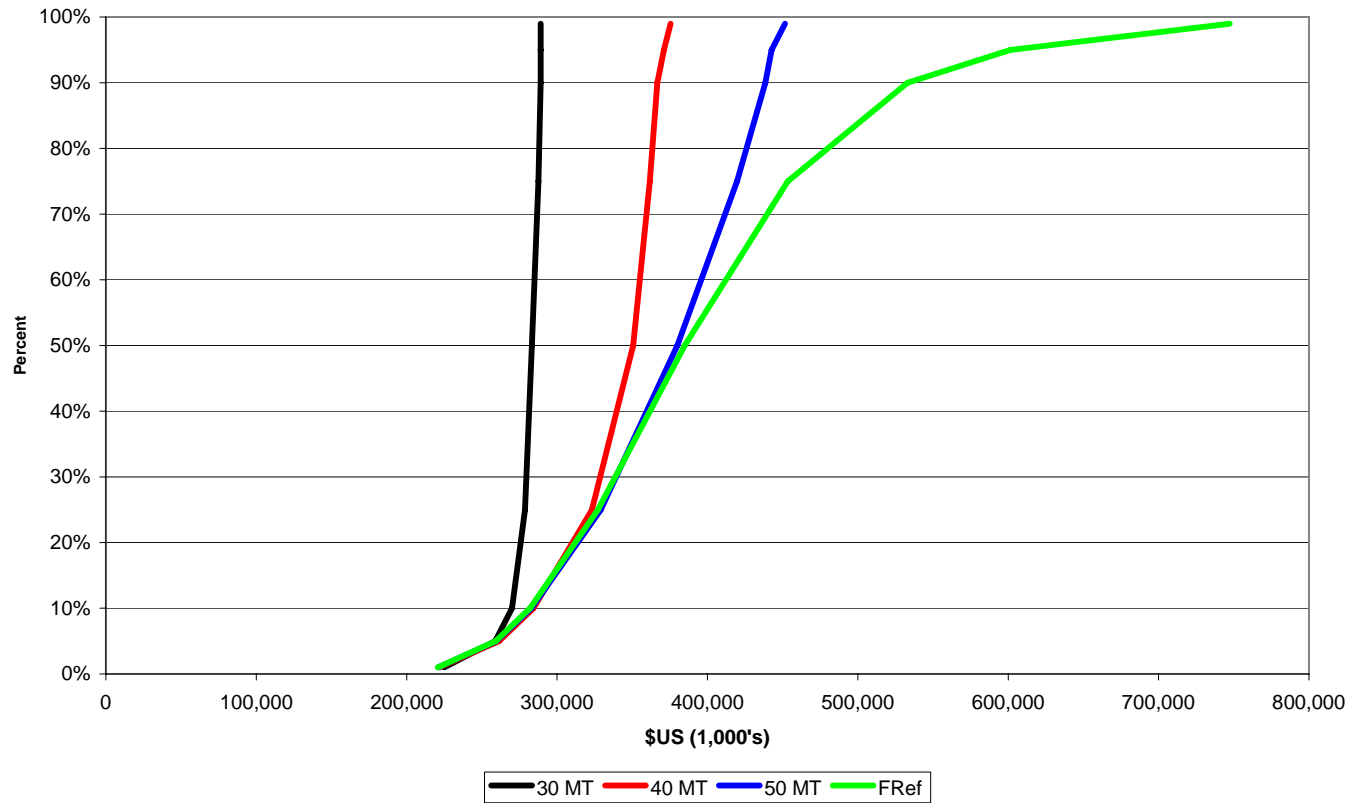
Import and Harvest Revenue

Present Value of Import and Harvest Sales from Catches of Eastern Georges Bank Haddock by Harvest Strategy



Probability

Cumulative Probability Distributions of Present Value of Combined U.S. and Canada Ex-Vessel Revenue by Harvest Strategy (7% Discount Rate)



Conclusions

- Current F_{Ref} harvest strategy has highest present value
- Ordinal ranking of strategies robust to discount rate and assumed weights-at-age
- Constant harvest strategies ignore possibility of future recruitment events

Extensions

- Price premiums for large haddock
 - Delayed harvest increases size composition of landed catch
- Implications of pursuing different harvest strategies for non-shared stocks
 - Market effects of unilateral action

<http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0515/>