

Canadian Experience of Ecosystem Based Fisheries Management

Dr. Ellen Kenchington

Fisheries & Oceans Canada

Bedford Institute of Oceanography

Dartmouth, Nova Scotia, Canada



You Can't See the Forest for the Trees

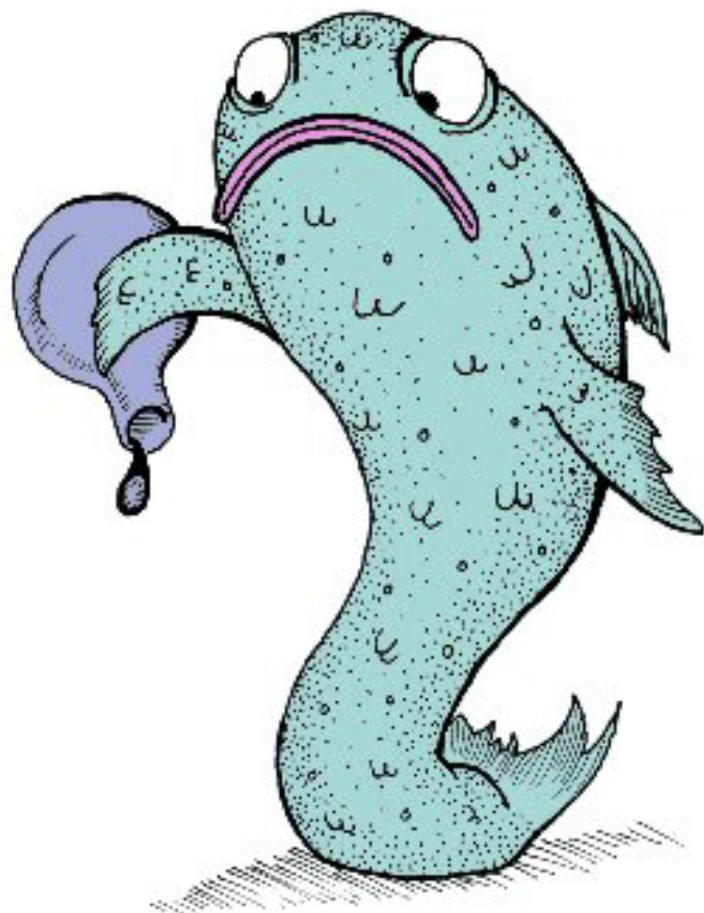


You Can't See the Ocean for the Fish

Researchers and managers have long concentrated on productivity of individual stocks of fish

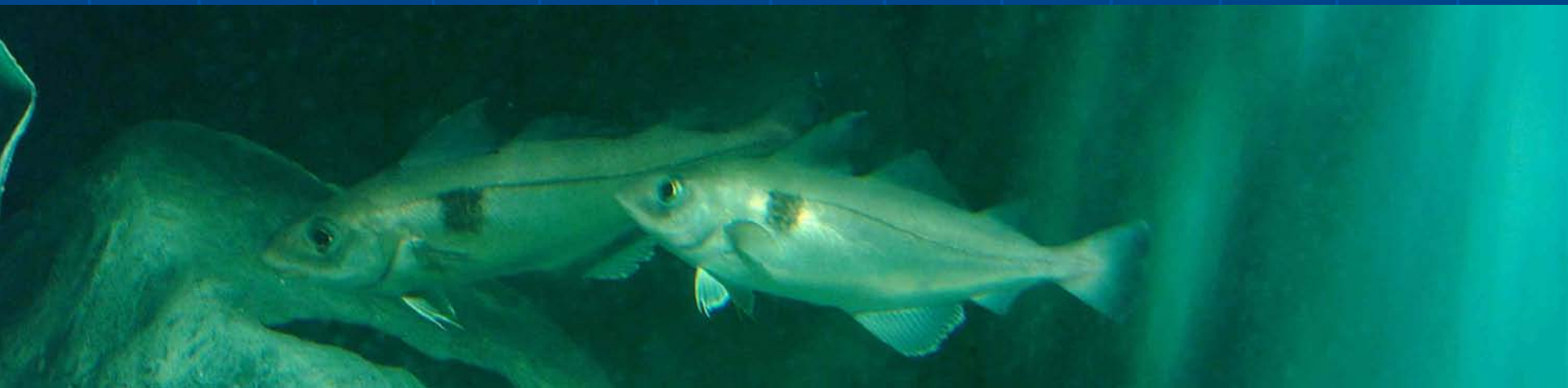


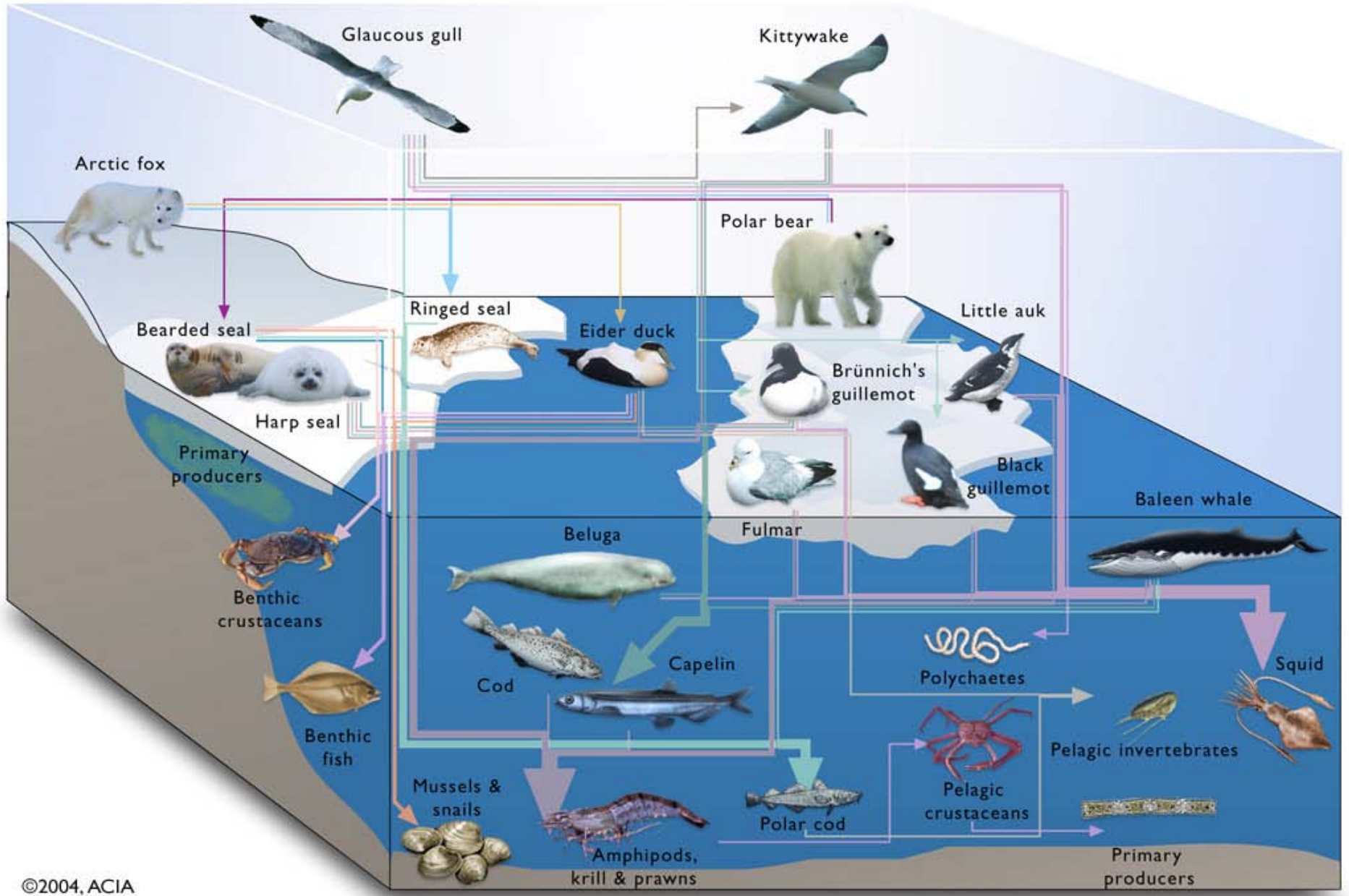
fish
out
of
water



You Can't See the Ocean for the Fish

With Ecosystem-Based Management we need to consider the fish's interactions with other species and the whole range of ocean conditions





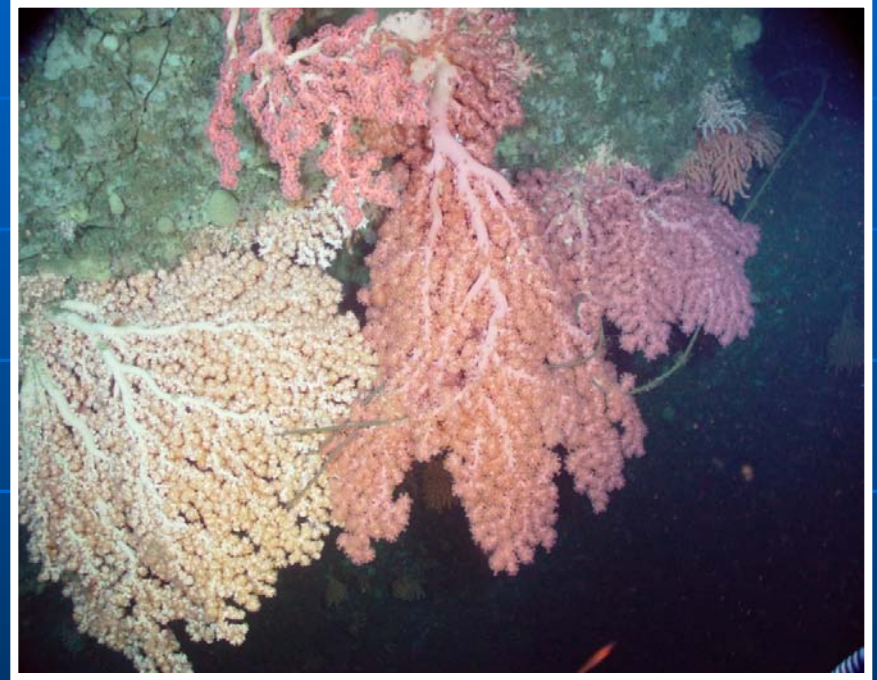
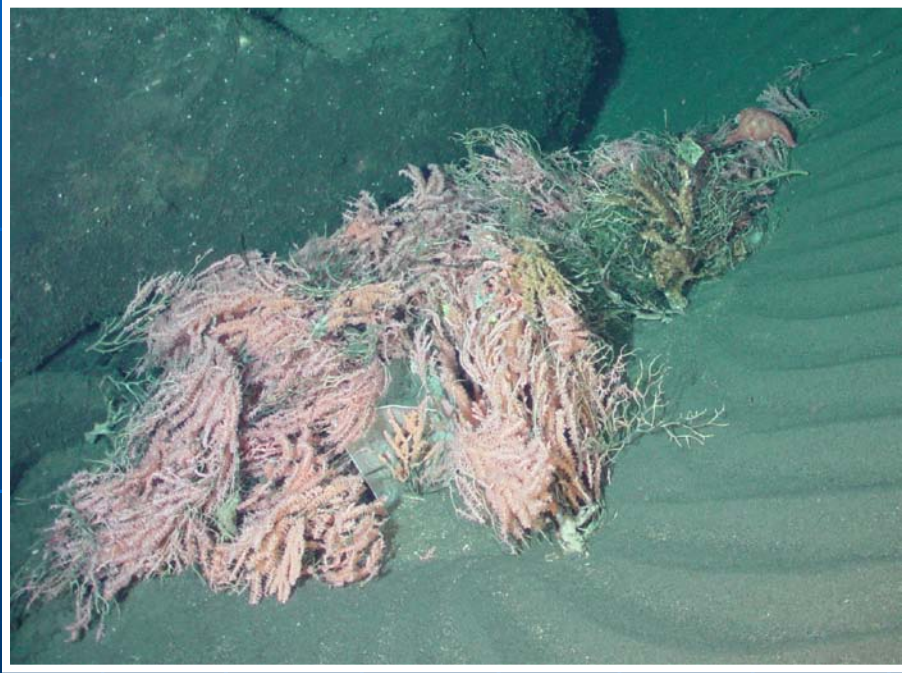
Fisheries Management Plans

- Catch quotas
- Size limits
- Bycatch restrictions
- Seasons
- Vessel and gear restrictions

Fisheries Management Plans

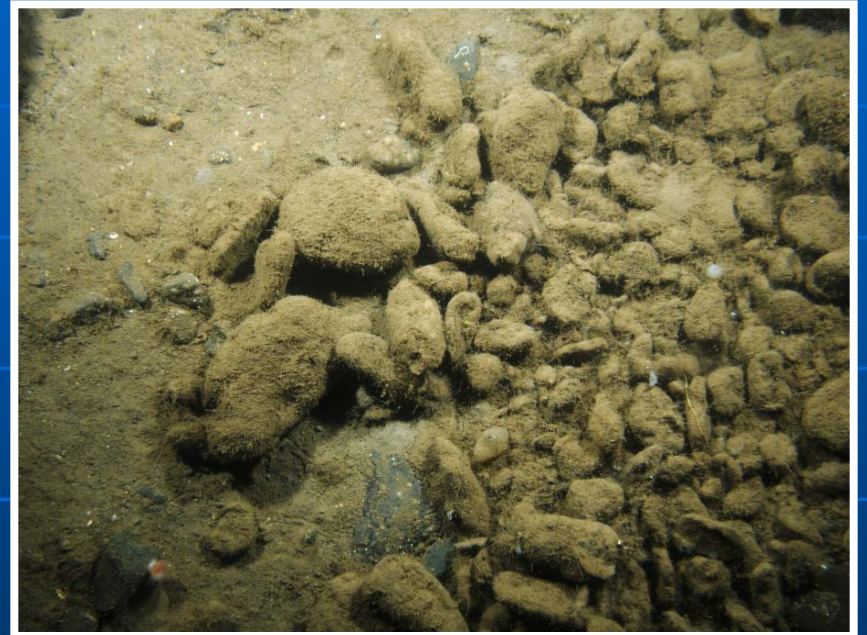
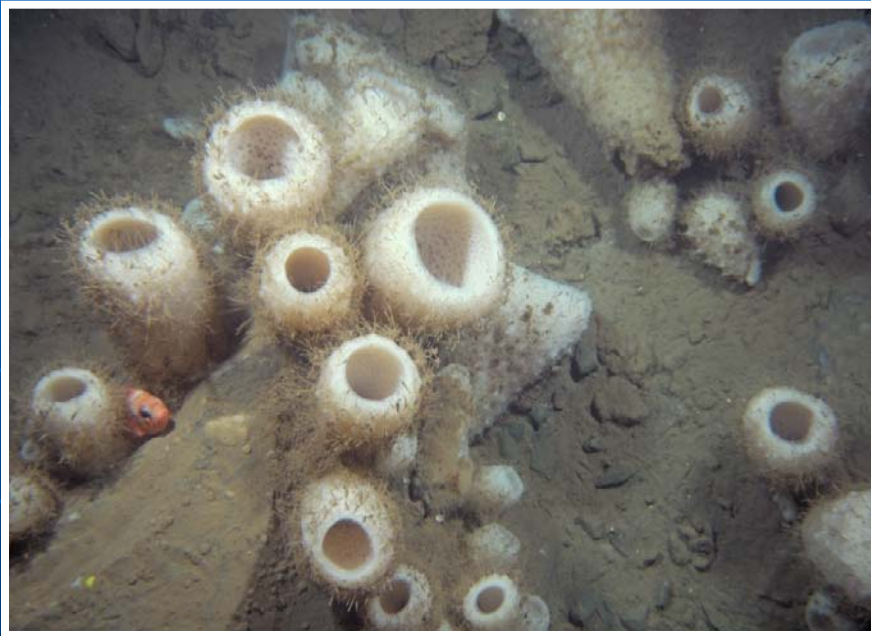
- Catch quotas
- Size limits
- Bycatch restrictions
- Seasons
- Vessel and gear restrictions
- Habitat considerations
- Biodiversity considerations

Impacts of Lost Fishing Gear



Fishing gear entangled with corals off the Scotian Shelf

Habitat Impacts of Gear



Vazella pourtalesi glass sponges on the Scotian Shelf

Cumulative effects

- Direct fishery including bycatch
- Bycatch from other fisheries
- Habitat
- Shipping
- Waste disposal
- Aquaculture
- Undersea cables
- Oil and gas exploration
- Renewable energy schemes

Ecosystem Objectives

- 1) Ensure that the activity does not cause unacceptable reduction in **productivity** of each component (primary, community and population) so that it can play its historical role in the functioning of the ecosystem;



Productivity Objective

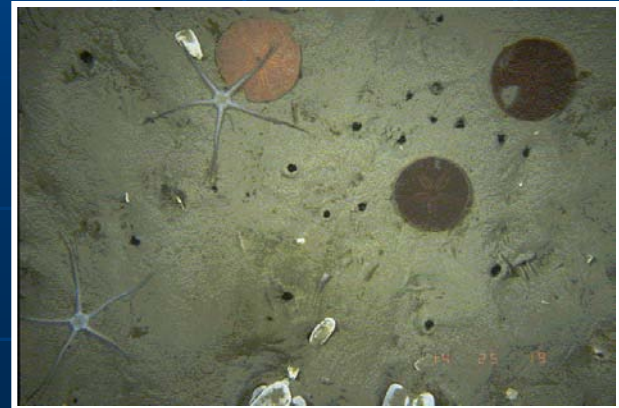
Sub-objective	Strategy	Performance Indicator
Community	Limit removals of any trophic level with respect to trophic demands of higher trophic levels	Trophic level catch biomass
Population	Manage age/size/sex of capture	% age/size/sex in catch

Ecosystem Objectives

- 2) Ensure that the activity does not cause unacceptable reduction in **biodiversity** by maintaining enough components (biotopes/seascapes, species and populations) to preserve the structure and natural resilience of the ecosystem;

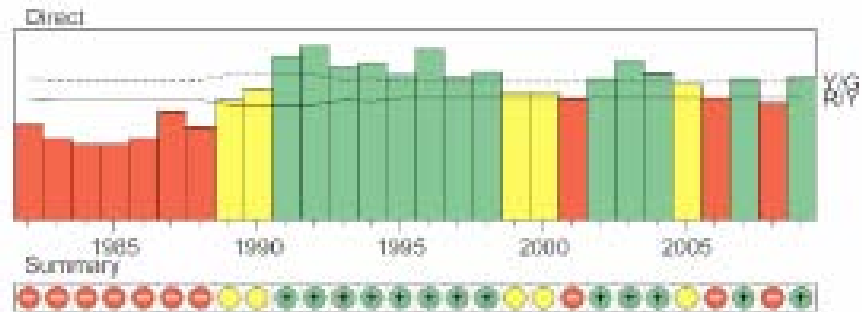
Ecosystem Objectives

- 3) Ensure that the activity does not cause unacceptable modification to **habitat** that is difficult or impossible to reverse in order to safeguard the 'container' (both physical and chemical properties) of the ecosystem.

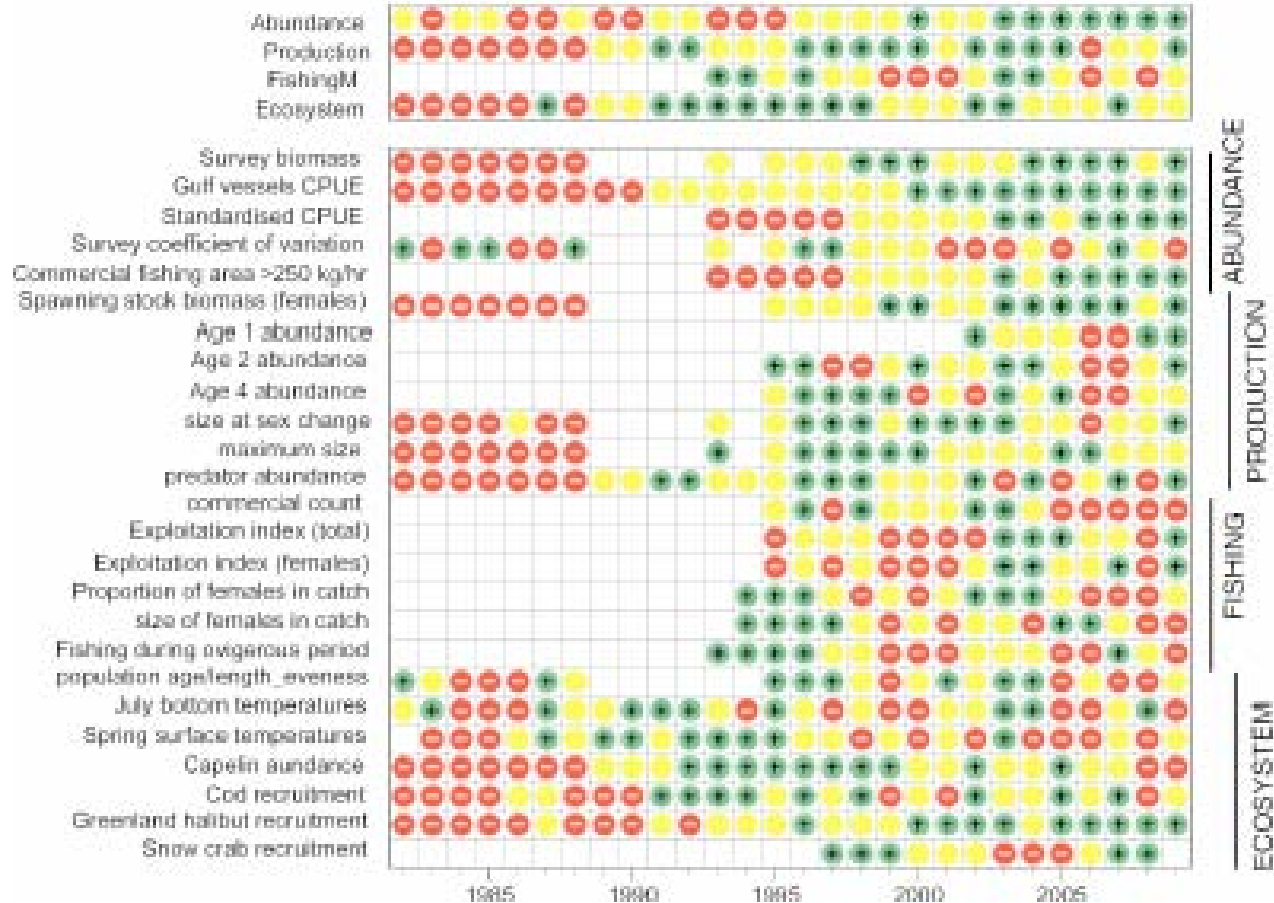


TRAFFIC LIGHT SUMMARY

RÉSUMÉ DES FEUX DE CIRCULATION



Characteristics





Fisheries and Oceans Canada / Pêches et Océans Canada

Science / Sciences

Maritimes Region

Ecosystem Status Report 2003/004

State of the Eastern Scotian Shelf Ecosystem

Background

The Eastern Scotian Shelf, comprising NAFO Div. 4VW, is a large geographic area (~108,000 km²) supporting a wide range of ocean uses such as fisheries, oil and gas exploration and development, and shipping. It is currently the focus for the development of an integrated management plan intended to harmonize the conduct of the various ocean use activities within it (referred to as Eastern Scotian Shelf Integrated Management or ESSIM). The area is unique for having a year-round closure for directed fishing of groundfish since 1987, associated with Emerald and Western Banks. In addition, The Gully has been declared a pilot marine protected area.

The Eastern Scotian Shelf consists of a series of outer shallow banks and inner basins separated by gullies and channels. The mean surface circulation is dominated by southwestward flow, much of which originates from the Gulf of St. Lawrence with anticyclonic circulation tending to occur over the banks and cyclonic circulation around the basins. The northeastern region of the Shelf is the southern-most limit of winter sea ice in the Atlantic Ocean.

This document provides an assessment of the current state of the Eastern Scotian Shelf ecosystem. The analysis focuses on time trends in all available data



Summary

Many features of the Eastern Scotian Shelf ecosystem have changed dramatically during the past thirty years:

- A major cooling event of the bottom waters occurred in the mid-1980s that persisted for a decade and recent intensive stratification in the surface layer has been apparent; both phenomena are associated with flow from upstream areas.
- The index of zooplankton abundance was low in the decade of the 1990s when phytoplankton levels were high and the opposite pattern was evident in

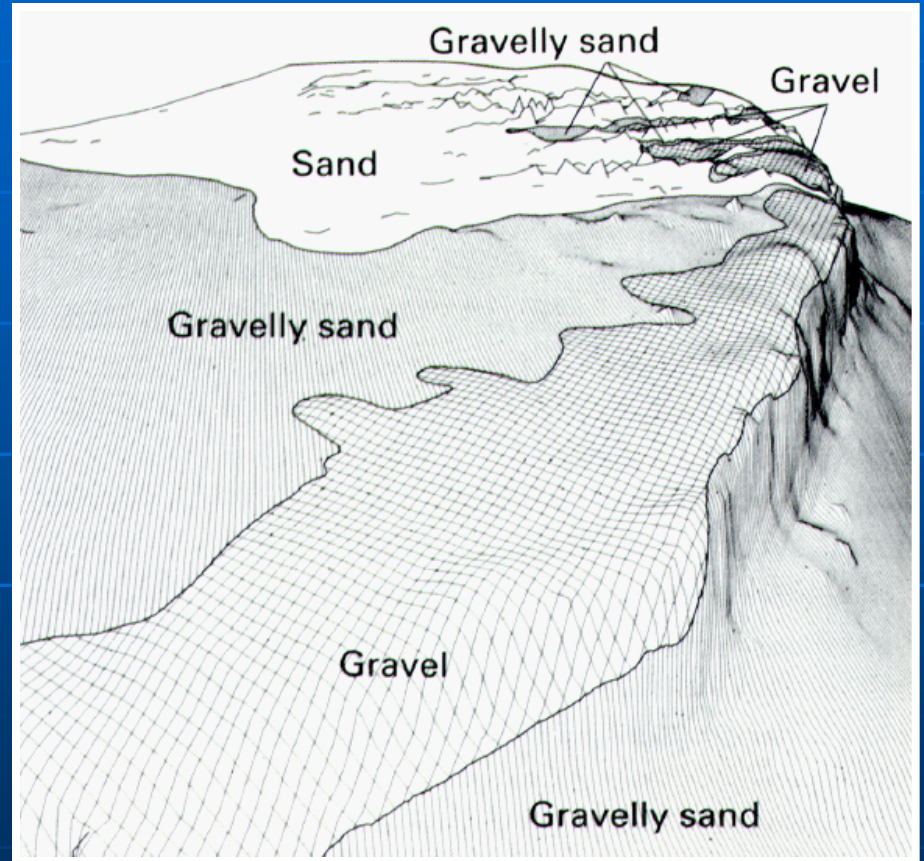
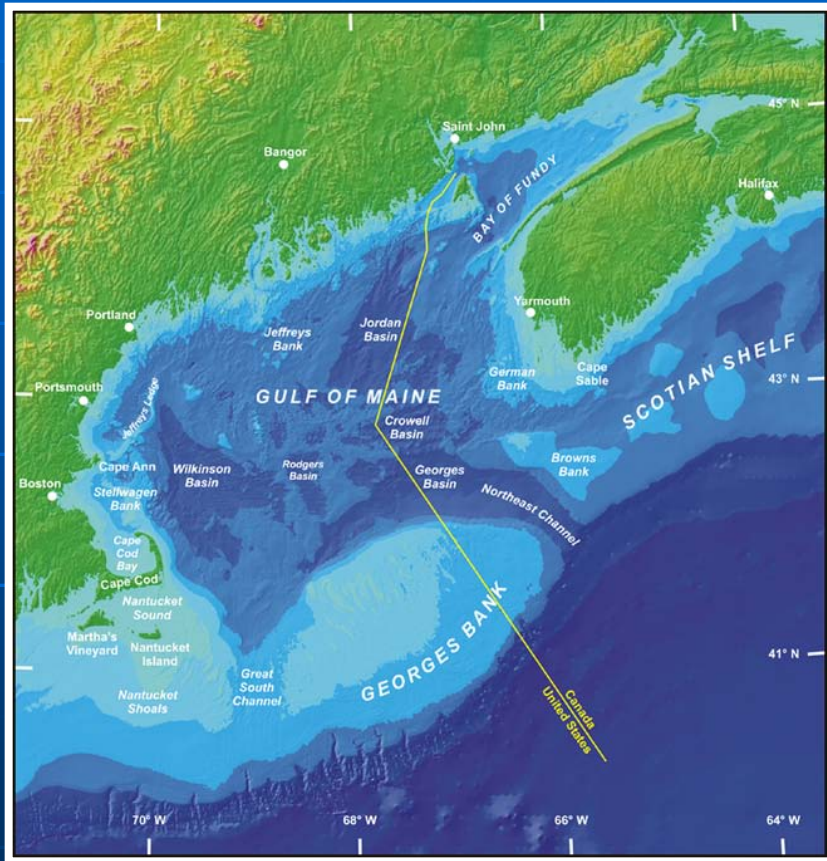
Georges Bank Example

ICES CM 2005/BB:05

**Review of Management Plan Conservation Strategies
for Canadian Fisheries on Georges Bank:
A Test of a Practical Ecosystem-Based Framework**

S. Gavaris, J.M. Porter, R.L. Stephenson, G. Robert, and D.S. Pezzack

Georges Bank Example



Georges Bank Example

- **Herring fishery**, uses purse seines to encircle fish near the surface with minimal bycatch
- **Lobster and Jonah crab** traps affect the bottom only minimally, but can take significant bycatch
- **Groundfish and scallop drags** also take bycatch, and can affect bottom topography and organisms

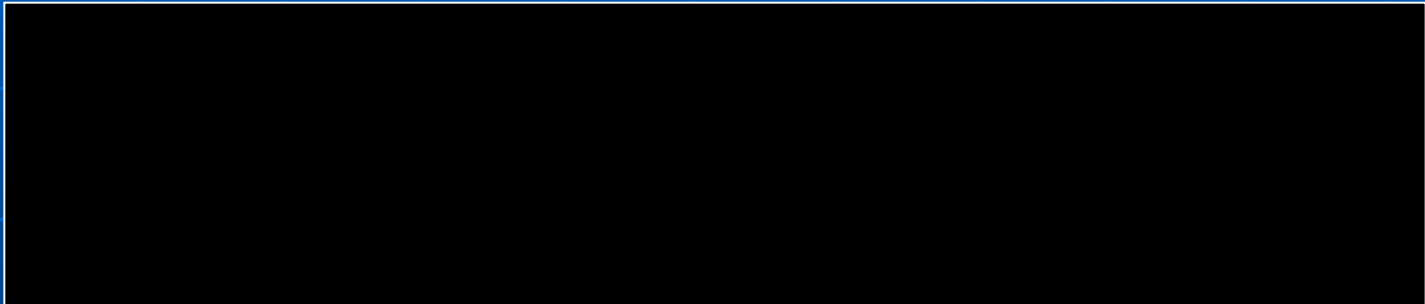
Assessment Results

- Controlling the cumulative impact of bycatch and determining the survival rates of discarded fish require attention;
- Scallop drags can catch important quantities of quota-managed groundfish;
- Lobster traps can catch unexpected amounts of cusk, a threatened species;

Georges Bank Example

- More consideration of the impact of groundfish and scallop drags on bottom habitat, with regard to both intensity and extent is needed;
- Accurate information on location of fishing and composition of the catch, not just landings, is required.

Where Does This Information Go?



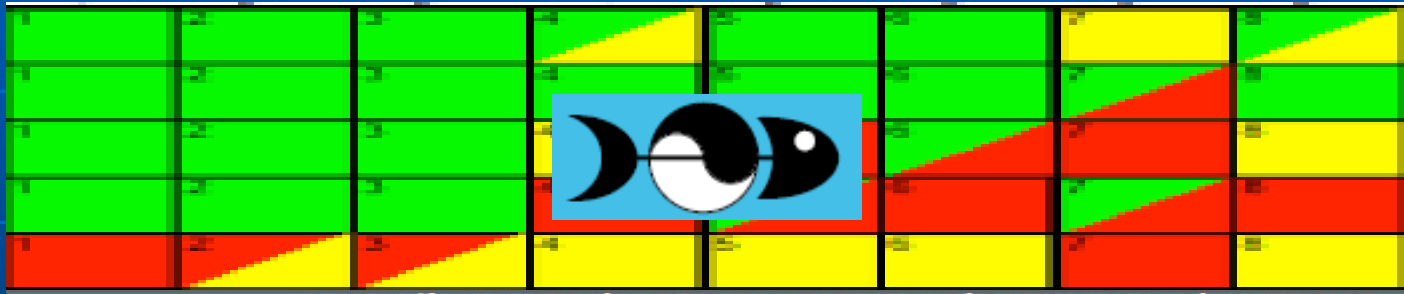
Where Does This Information Go?



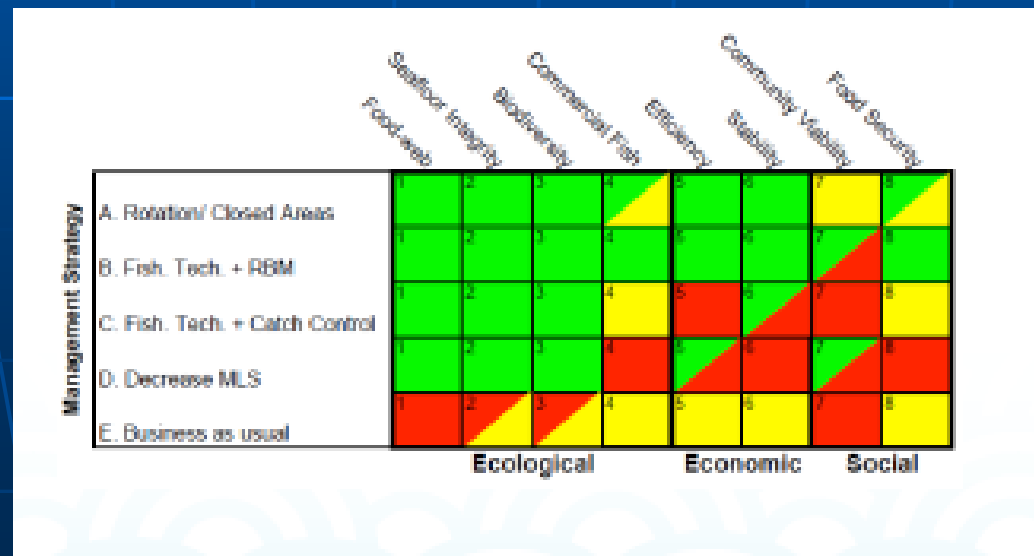


MEFEPO

Making the European Fisheries Ecosystem Plan Operational



“THE NEW FRAMEWORK CAN ALSO INCORPORATE **SOCIAL AND ECONOMIC FACTORS** AFFECTING THE FISHERY. THAT REQUIRES TEAMWORK WITH ECONOMISTS AND OTHERS, AND ESPECIALLY THE FISHING INDUSTRY ITSELF. THE FULLER AND MORE EXPLICIT THE OBJECTIVES, THE LESS THE DANGER OF SHORT-TERM PRESSURES DISRUPTING THE INDUSTRY'S LONG-TERM INTERESTS.”



Oceans Act

In 1997, Canada became the first country in the world to adopt comprehensive legislation for integrated ocean management.



1997 Oceans Act

The *Oceans Act* provides a framework for modern ocean management. The Act calls for the Minister of Fisheries and Oceans to lead and facilitate the development of a national ocean management strategy.



Oceans Act

Part 2 of the Oceans Act calls for the **Minister of Fisheries and Oceans** to *“...lead and facilitate the development and implementation of plans for the **integrated management of all activities or measures in or affecting estuaries, coastal waters and marine waters....”***

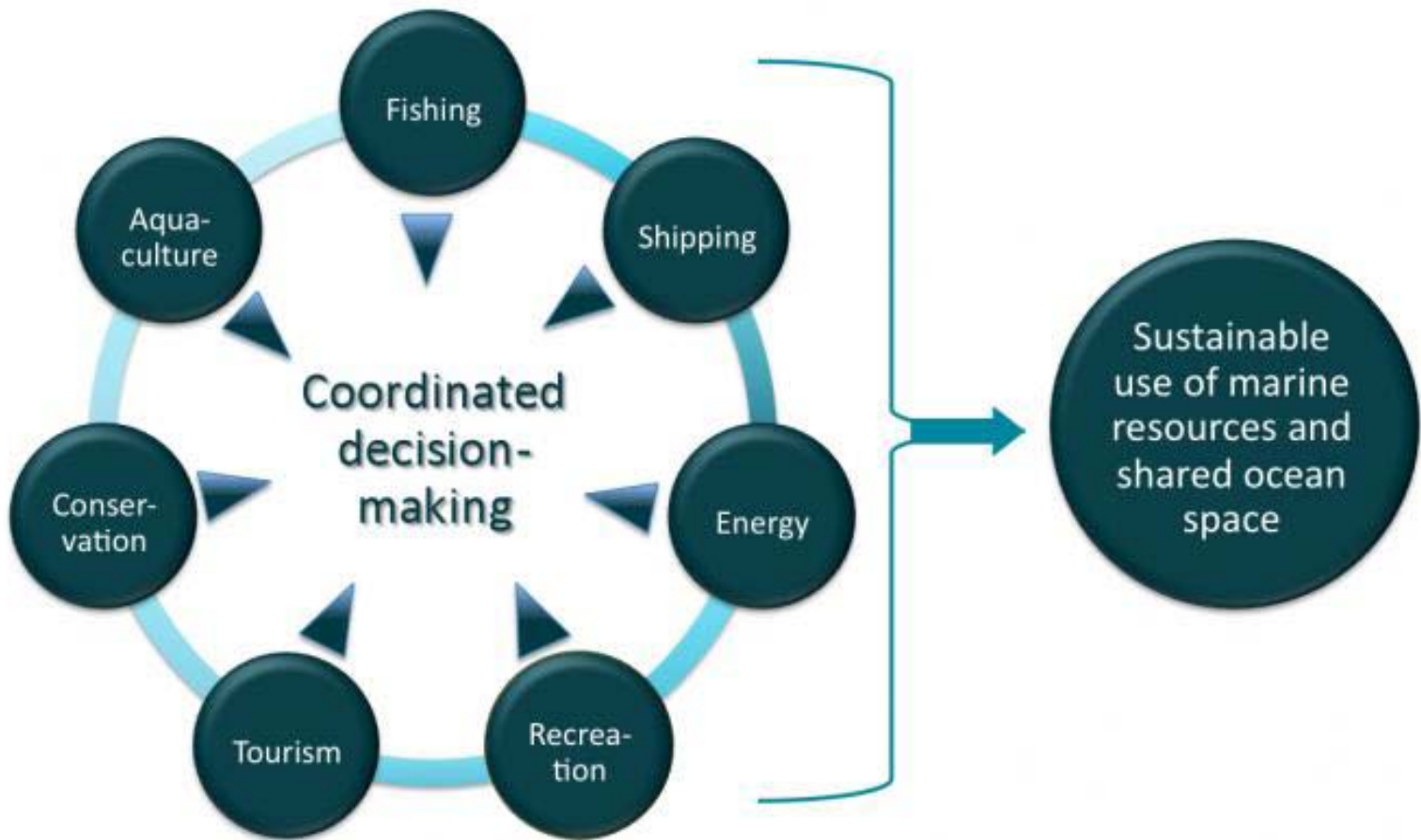
Integrated Management (IM) is a collaborative approach to planning and managing human activities to achieve conservation, development and sustainable use of coastal and marine resources.

Ecosystem-Based Management Sustainable Development

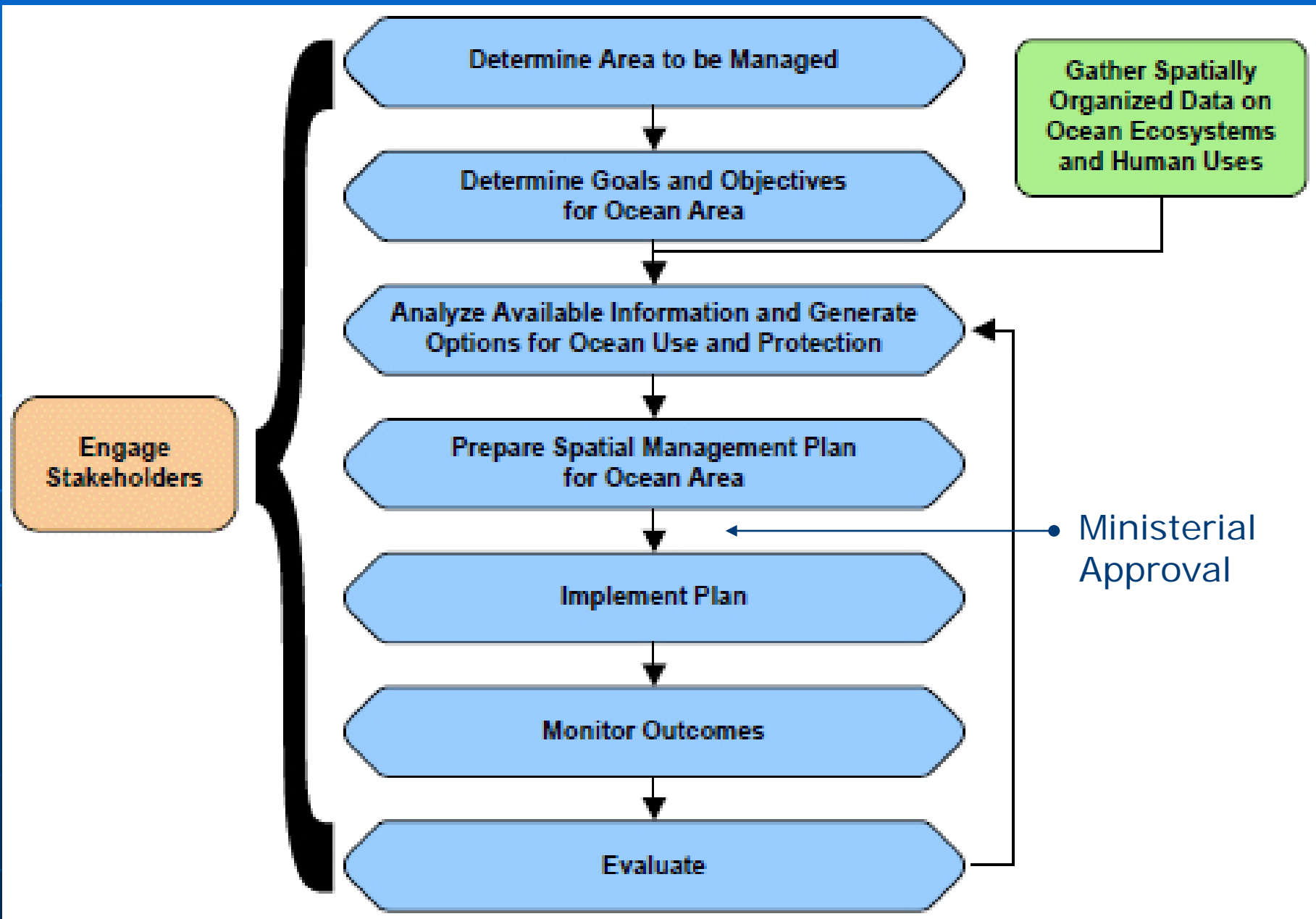
Integrated Management Framework

- maintains the integrity or health of marine ecosystems
- addresses and reduces user conflicts
- manage the cumulative impacts of a multitude of activities
- consider long term direct and indirect impacts of decisions





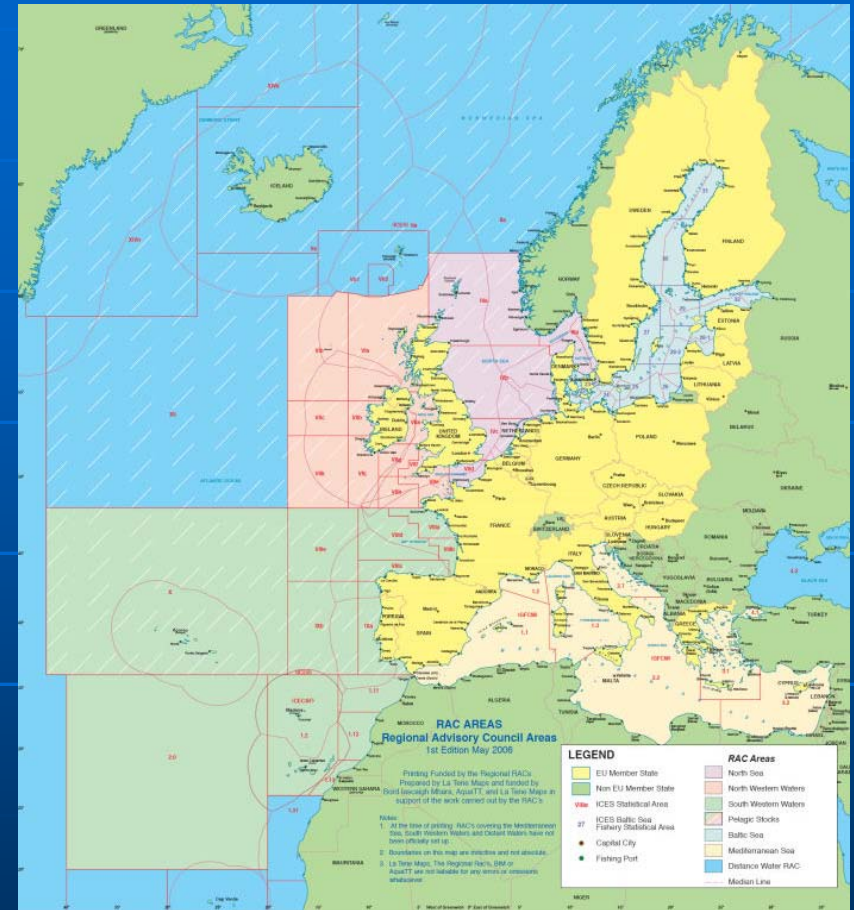
Development of Marine Spatial Planning in Canada



1. Initiate the planning process

Delineate the eco-region

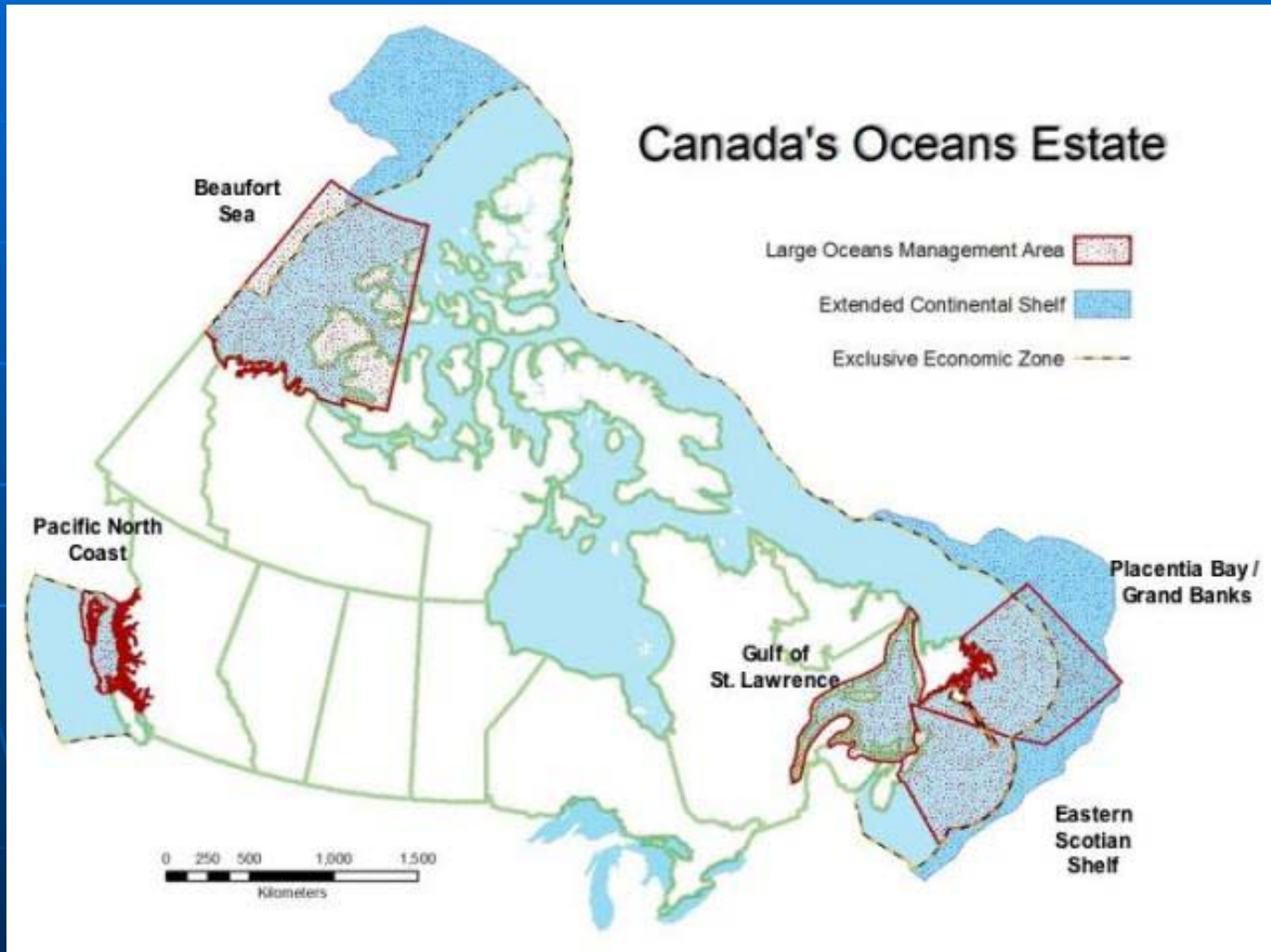
- Large Ocean Management Areas are the equivalent of the European Marine Regions
- MEFEPO work focuses on 3 EU Marine Regions: North Sea, North Western Waters, South Western Waters



Large Ocean Management Areas

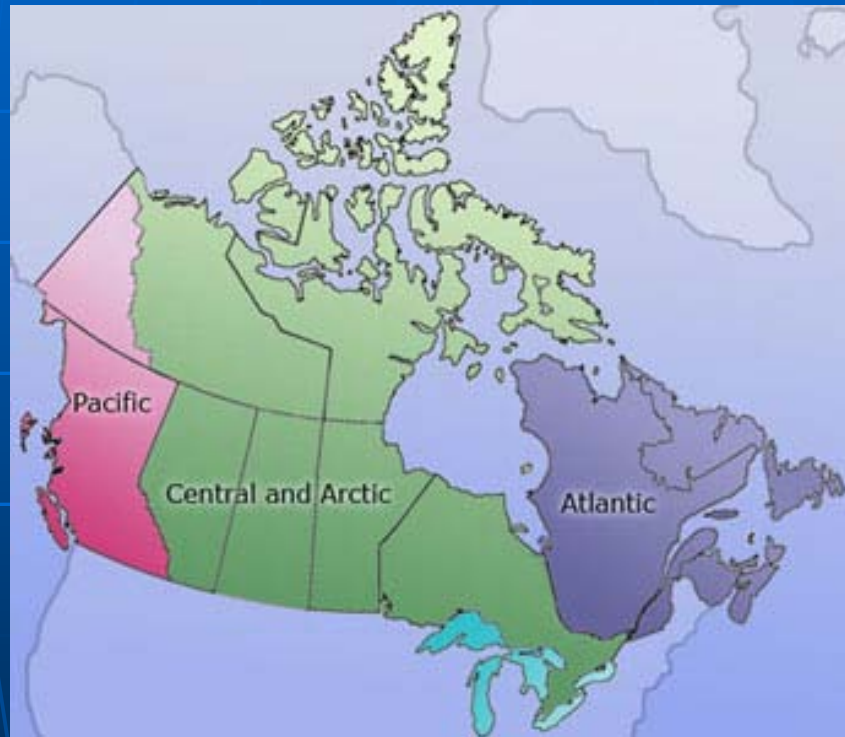
- LOMAs are typically hundreds of square kilometres in size
- Their boundaries are determined using a combination of ecological and administrative considerations

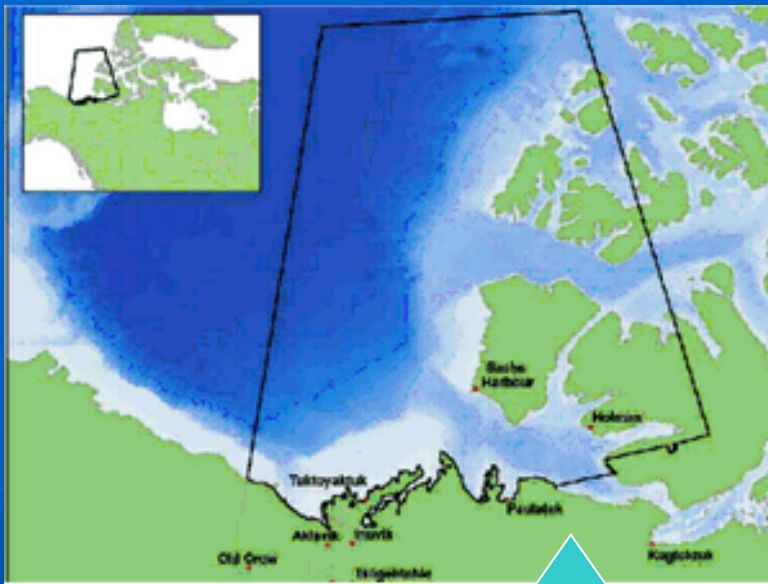
Five LOMAs in Canada



Pacific North Coast (PNCIMA)

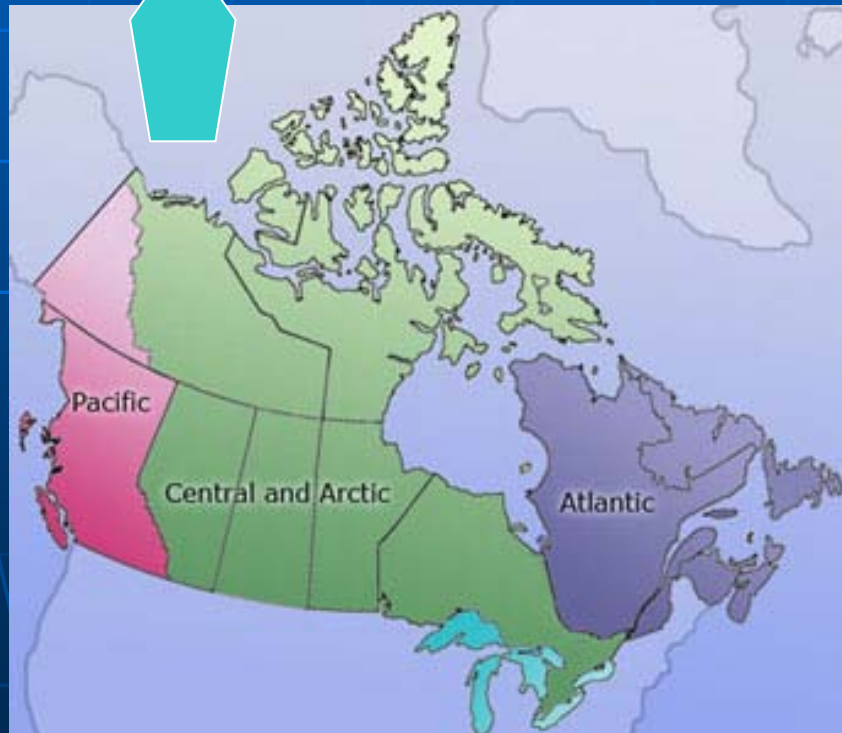
(88,000 km²)





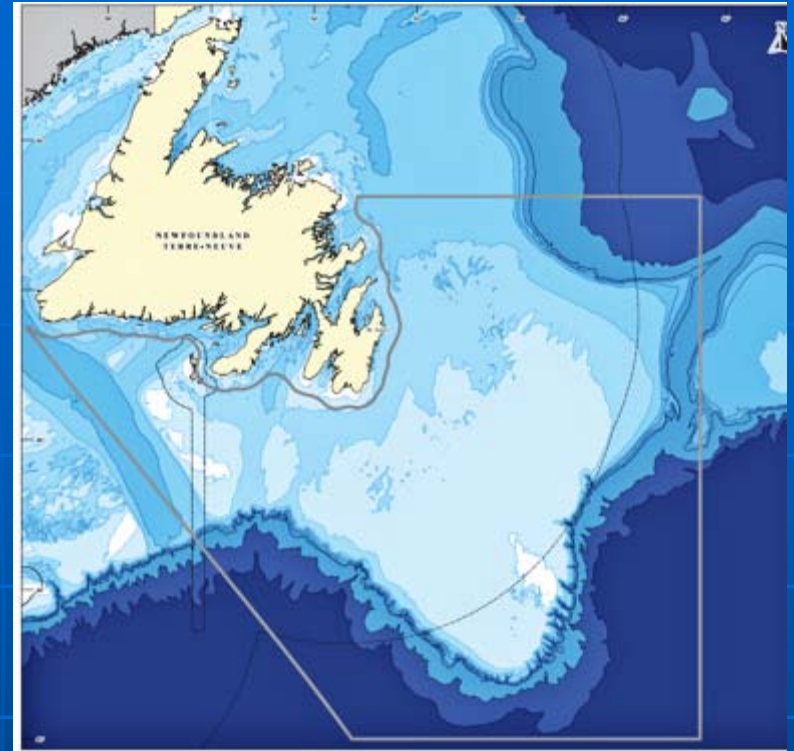
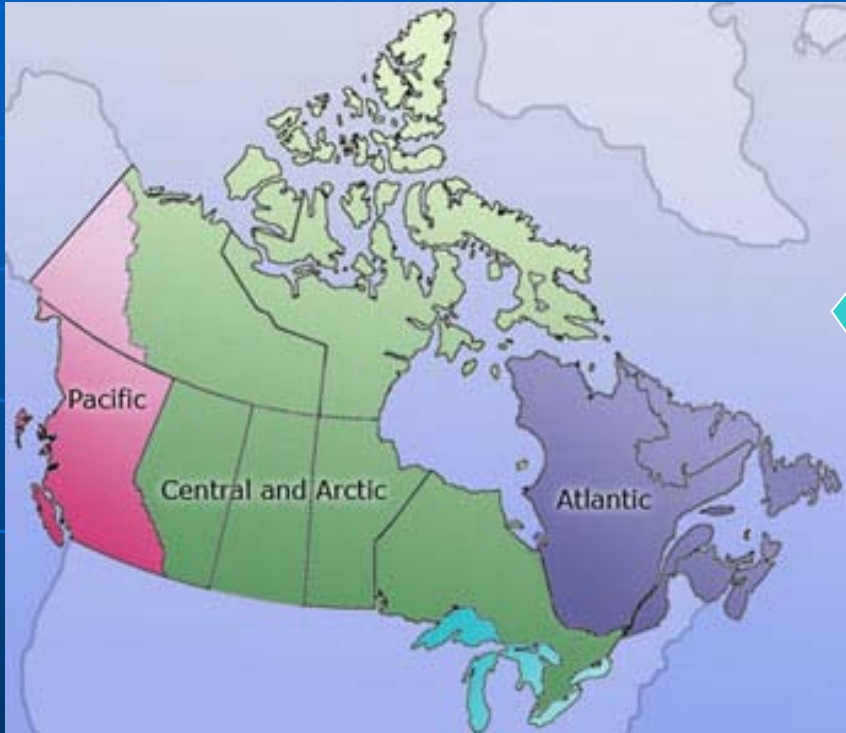
Beaufort Sea
(BSLOMA)

(1,750,000 km²)



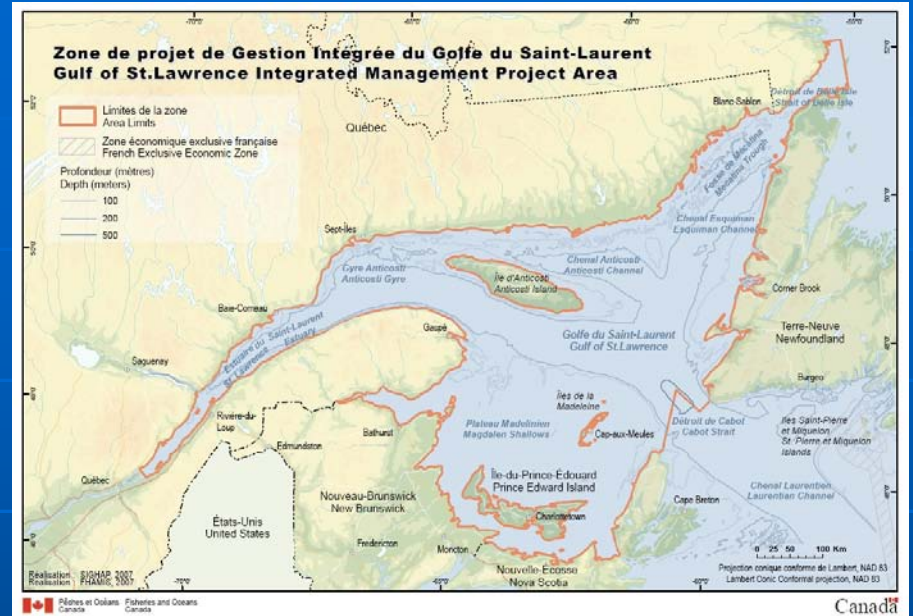
Placentia Bay/Grand Banks (PBGLOMA)

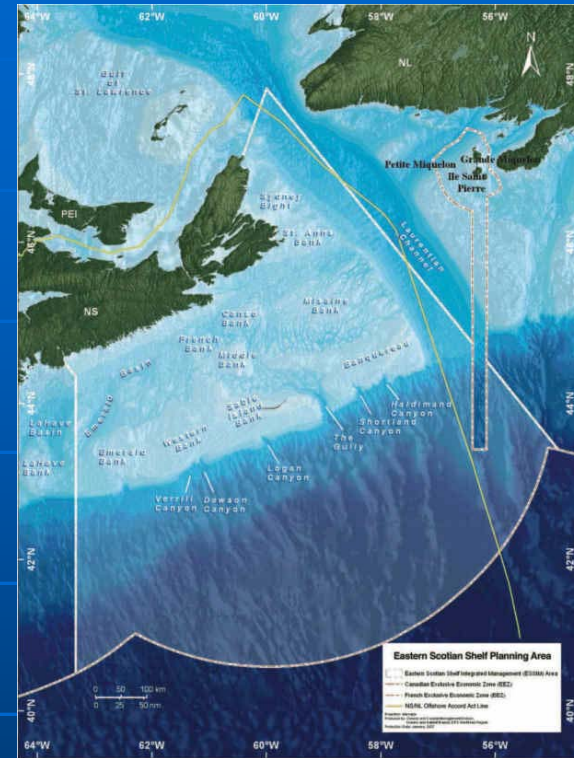
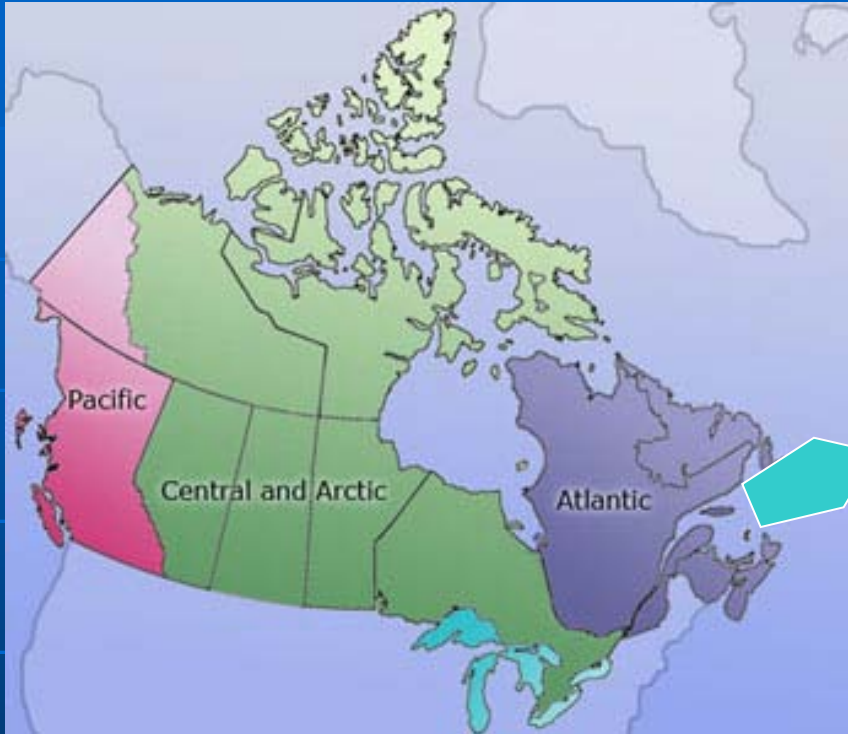
(500,000 km²)



Gulf of St. Lawrence (GOSLIM)

(461,400 km²)



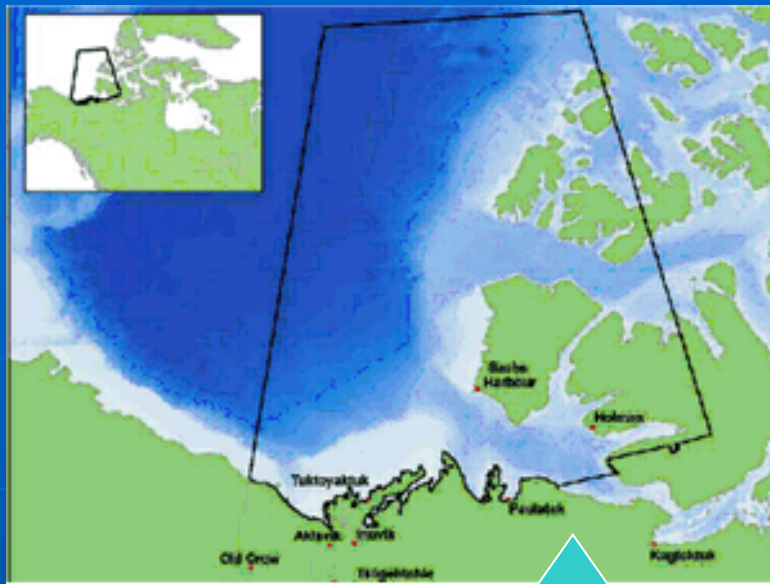


Eastern Scotian Shelf (ESSIM)
(108,000 km²)

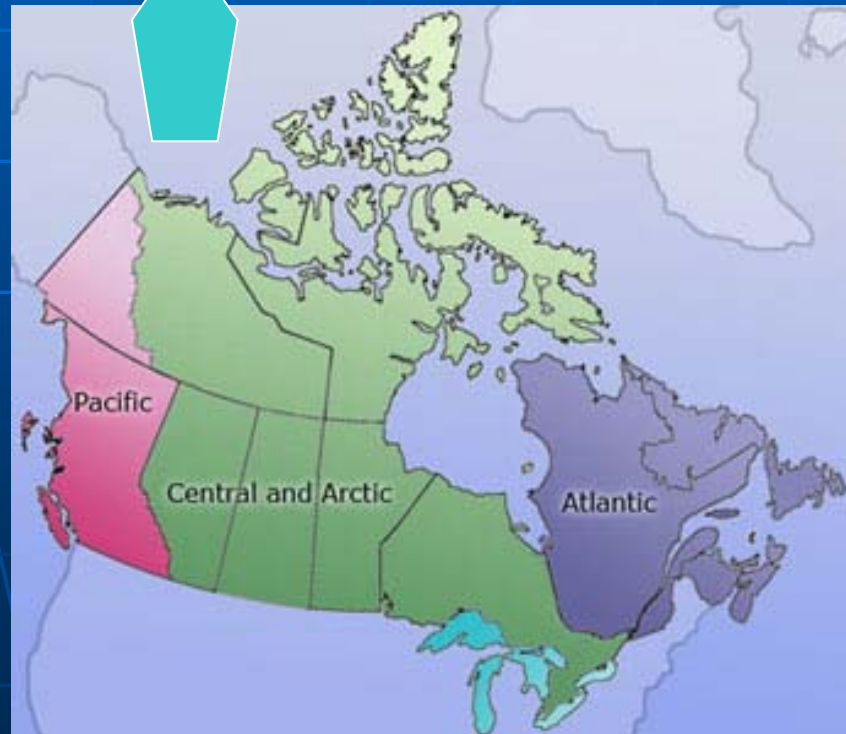


1. Initiate the planning process

Define the planning area/team

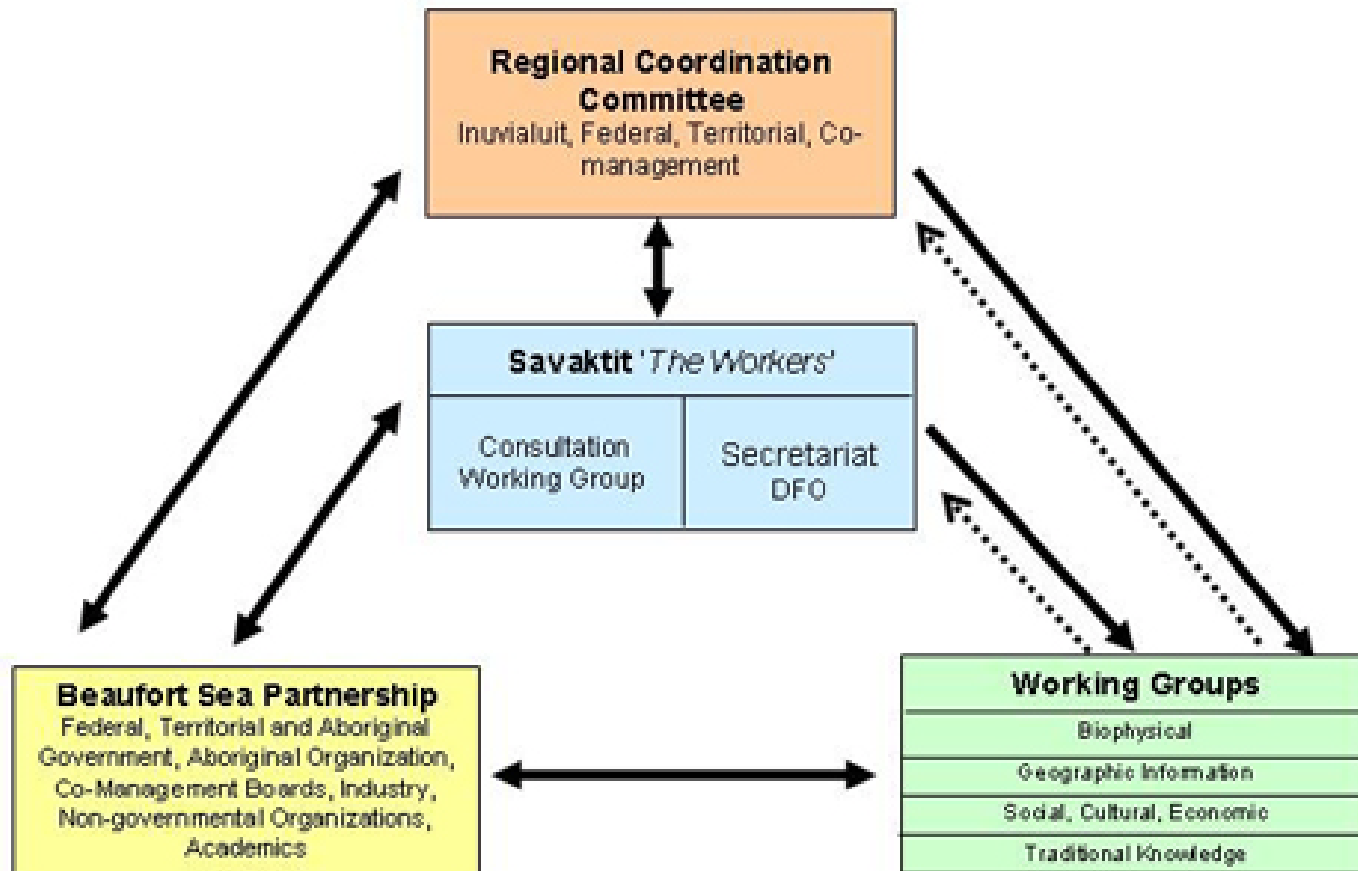


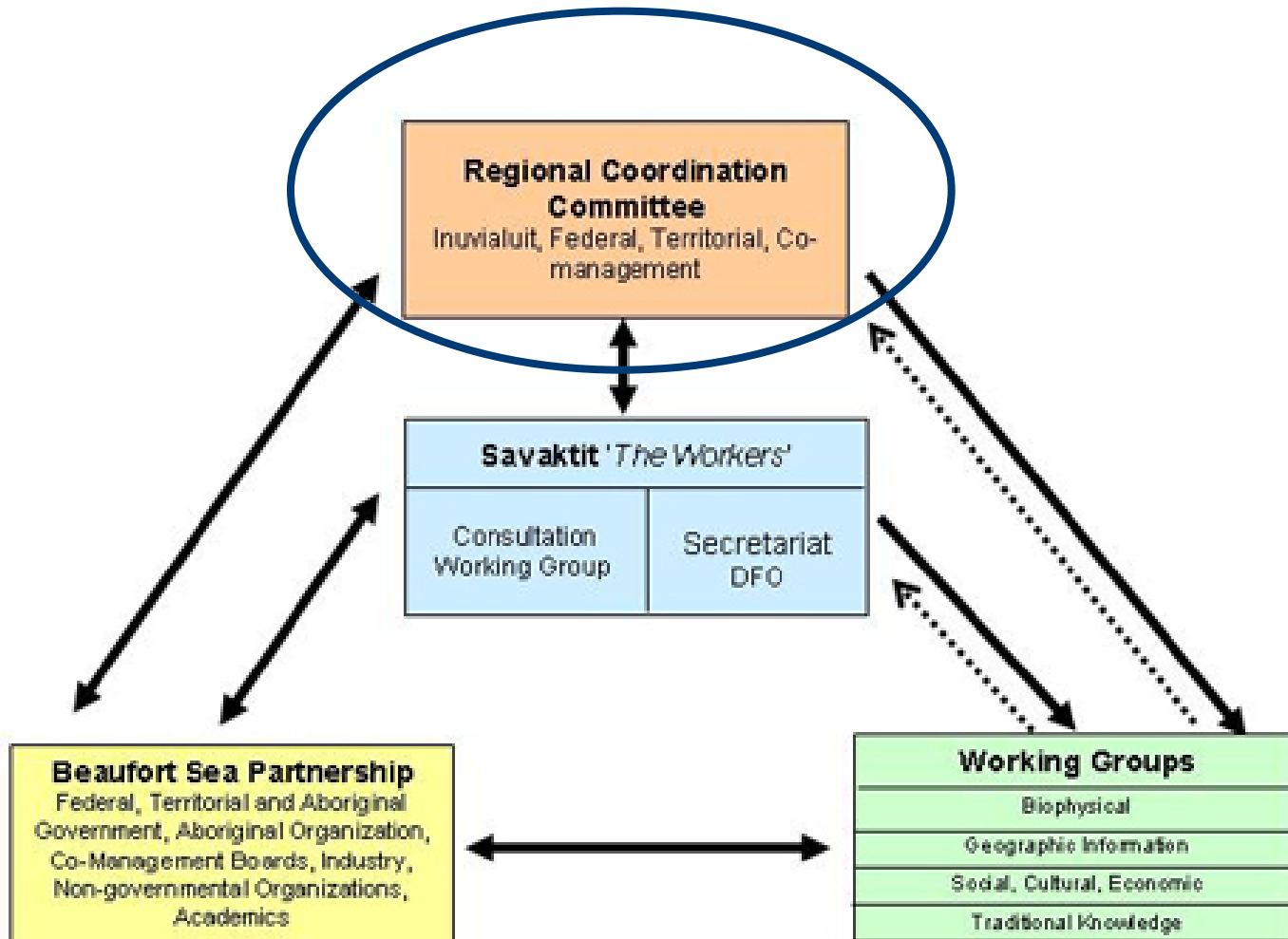
Beaufort Sea (BSLOMA)





GOVERNANCE STRUCTURE





Decision-making, Oversight and Direction

Regional Coordination Committee

Co-Chairs:

Fisheries and Oceans Canada

Inuvialuit Regional Corporation

Inuvialuit Game Council

Fisheries Joint Management Committee x1

Environment Canada x2

Government of the Northwest Territories x2

Indian and Northern Affairs Canada x2

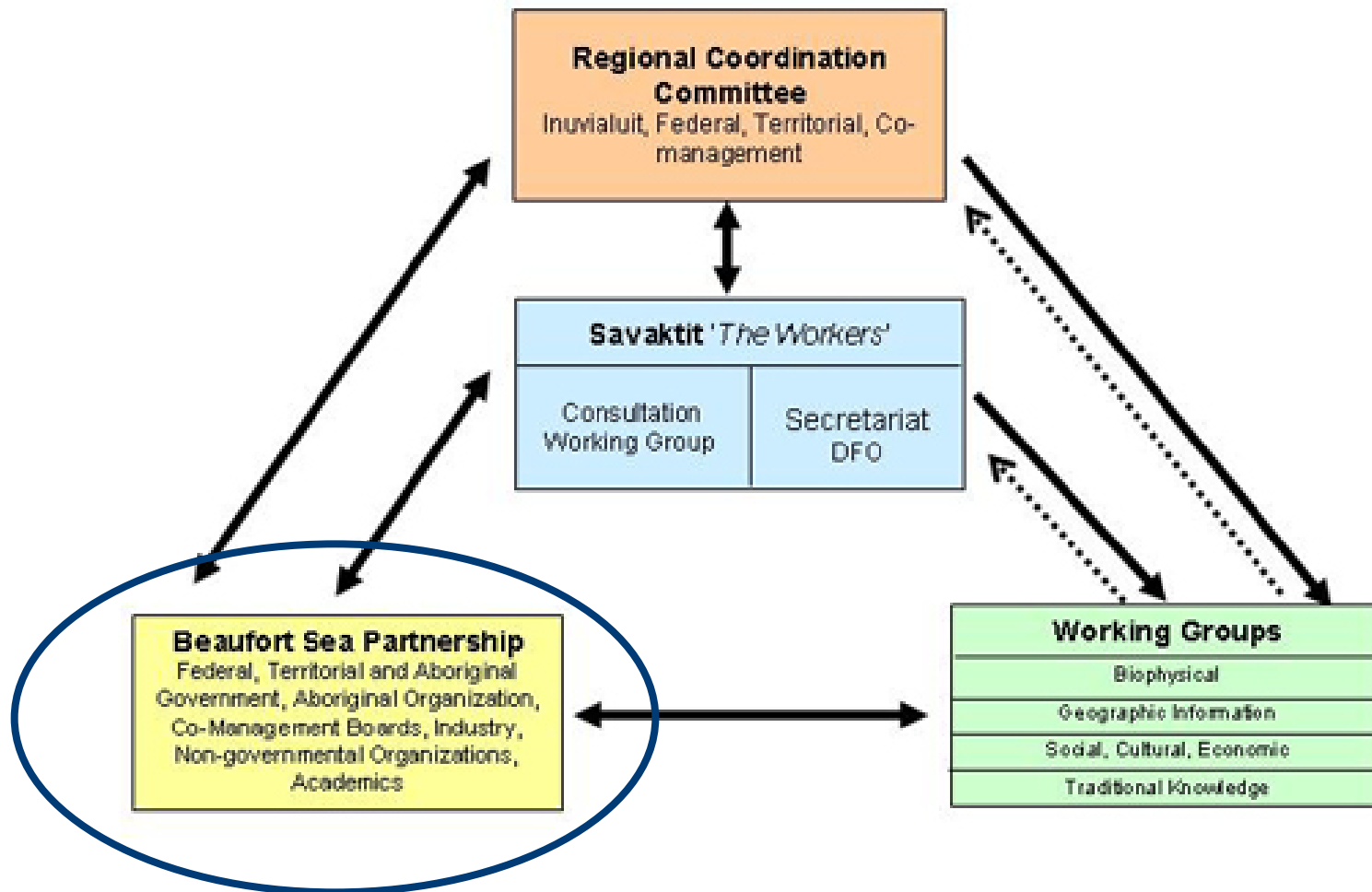
Natural Resources Canada x2

Parks Canada Agency x2

Transport Canada x2

Yukon Government x2





Management and Stakeholder Engagement Very Inclusive!!

Beaufort Sea Partnership

Aklavik Hunters and Trappers

Arctic Council- Foreign Affairs and International Trade Canada

Arctic Institute of North America

ArcticNet Inc

Association of Canadian Universities for Northern Studies

Aurora Research Institute

Beaufort Delta Education Council

Canadian Arctic Resources Committee

Canadian Association of Petroleum Producers

Canadian Circumpolar Institute

Canadian Environmental Assessment Agency

Canadian Parks and Wilderness Society

Community Consultation Working Group

Conoco Phillips Canada

Department of Foreign Affairs and International Trade

Department of National Defence

Beaufort Sea Partnership

Environment Canada

Environmental Impact Review Board

Environmental Impact Screening Committee

Fisheries and Oceans Canada

Fisheries Joint Management Committee

**Government of the Northwest Territories - Industry,
Tourism and Investment**

Gwich'in Renewable Resources Board

Gwich'in Tribal Council

Imperial Oil

Indian and Northern Affairs Canada

Industry Canada

International Polar Year

Inuvialuit Joint Secretariat

Inuvialuit Land Administration

Inuvialuit Regional Corporation

Kavik-Axys



Beaufort Sea Partnership

National Energy Board

National Research Council

National Transportation Company Limited

Natural Resources Canada

Northwest Territories Federal Council

NWT Tourism Association

Oceans and Science Technology Partnership

Oceans Management Research Network

Parks Canada Agency

Royal Canadian Mounted Police

Shell Canada Energy

Traditional Knowledge Working Group

Transport Canada

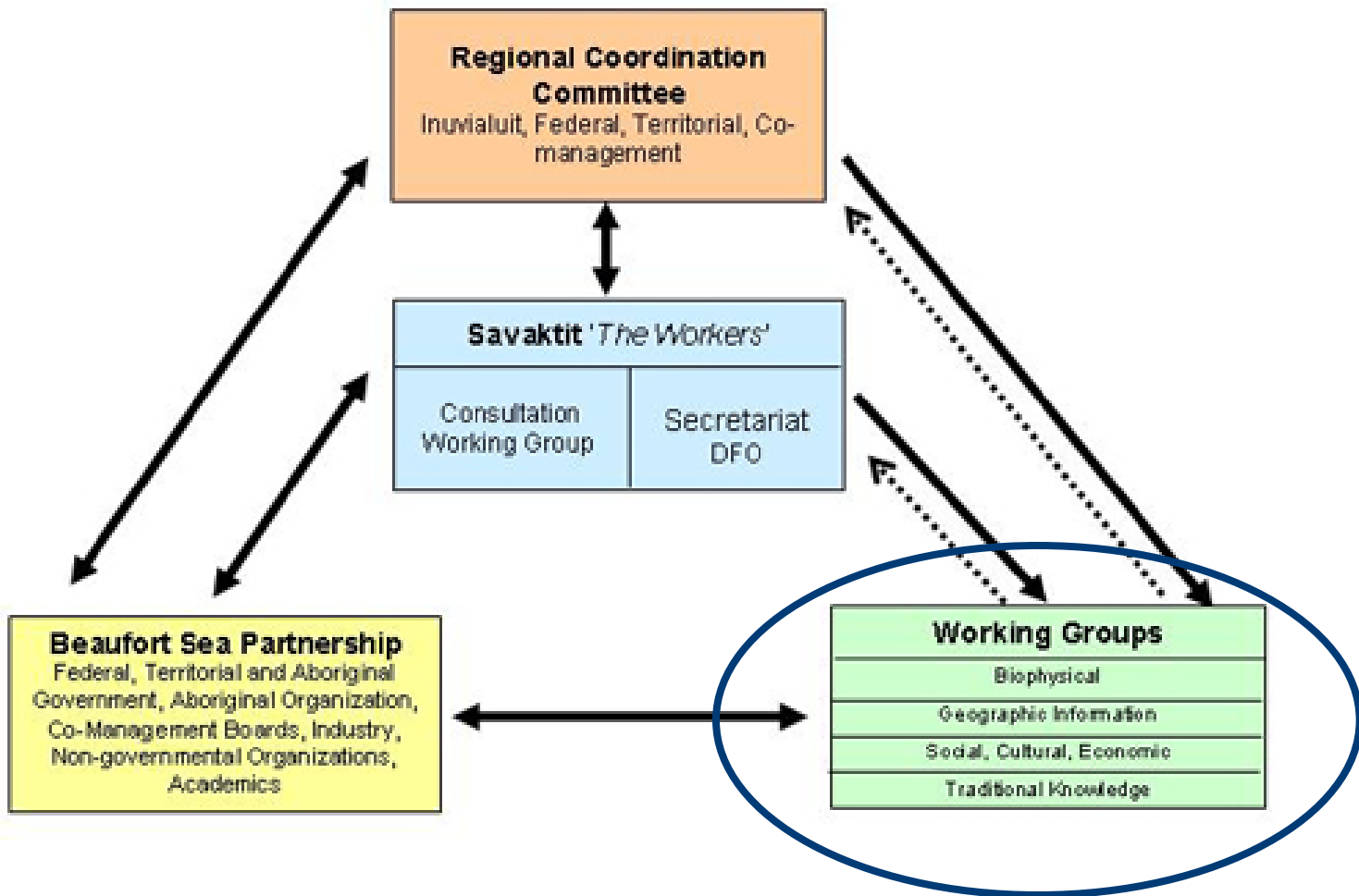
Wildlife Management Advisory Council of the North Slope

Wildlife Management Advisory Council
of the Northwest Territories

World Wildlife Fund Canada

Yukon Government





Working Groups

Biophysical

Community Consultation

Geographic Information

Social, Cultural, and Economic

Traditional Knowledge

Biophysical Working Group

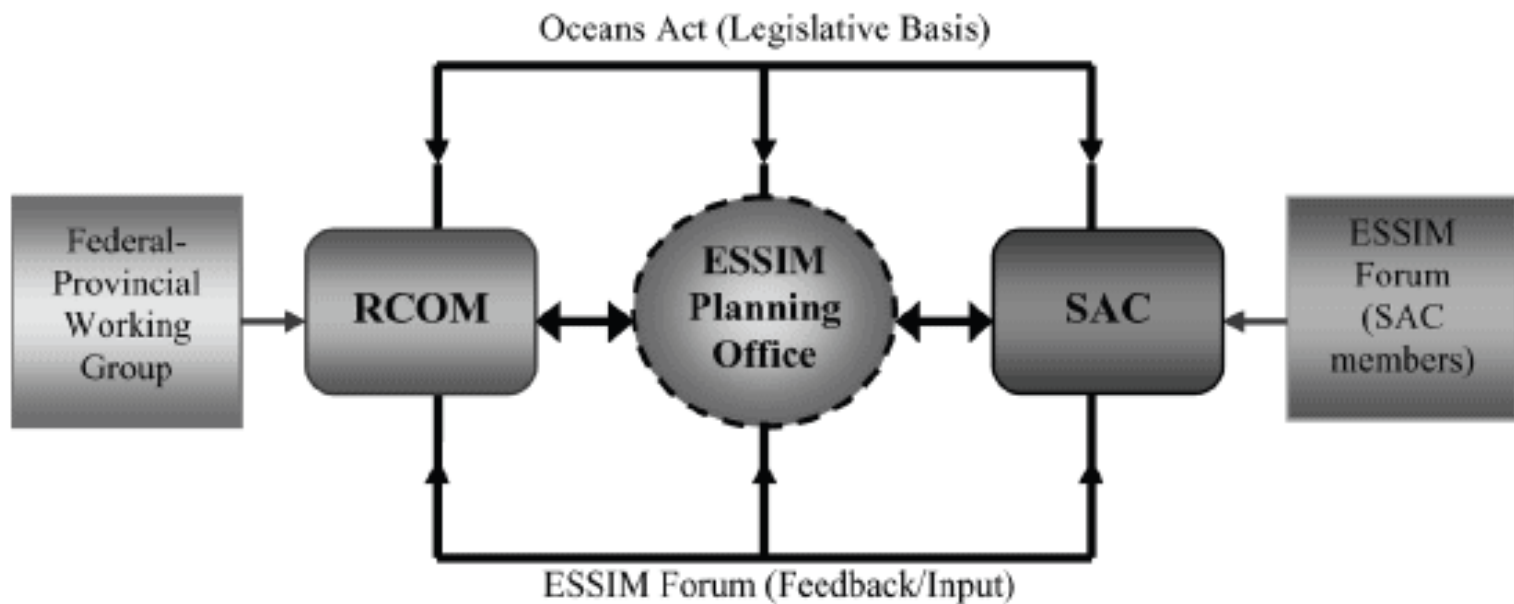
Purpose:

To document the biophysical baseline conditions through an overview and assessment report.

To identify ecologically and biologically significant areas, species and community properties in the Large Oceans Management Area.

To develop regionally relevant conservation objectives, management strategies, indicators and implementation plans including monitoring and evaluation.

ESSIM



Canadian Integrated Management

all levels of government, Aboriginal groups, industry organizations, environmental and community groups, and academia

Regional Advisory Councils

involves stakeholders in the fisheries sector, environmental organizations and groups, aquaculture producers, consumers and representatives of recreational or sport fishing

2. Inform and report on the area

Ecosystem overview and
assessment report

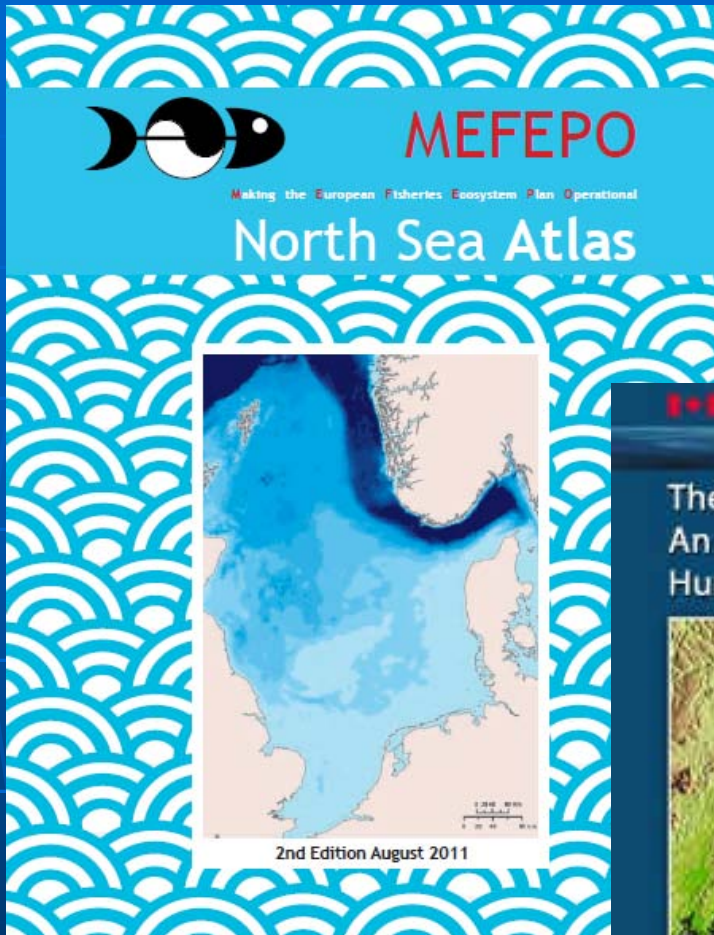
Social, economic and cultural
overview and assessment
report

Ecosystem Considerations


- Ecosystem-based management sets objectives for various aspects of marine ecosystem structures and functions, such as productivity, key species and sensitive habitats

Other Ecosystem Considerations

- *Ecologically and Biologically Significant Areas (EBSAs)*
- *Marine Protected Areas*
- *Species of Conservation Concern (COSEWIC)*



Other Ecosystem Considerations



**Fisheries and Oceans Canada
Ecologically and Biologically Significant Areas**

Background: As Part of its mandate, DFO has taken an integrated approach to management and decision making. Consistent standards are needed to guide selection of areas where protection should be enhanced, while allowing sustainable activities to be pursued where appropriate. The identification of Ecological and Biologically Significant Areas (EBSAs), provide a tool for directing attention to areas of significant ecological or biological importance.

Regulatory Responsibilities: The Department of Fisheries and Oceans is authorized to provide protection to areas of Canada's oceans and coasts which are ecologically or biologically significant. In addition to the Oceans Act the concept of the EBSAs also falls under the Species at Risk Act (SARA). SARA emphasizes the importance of EBSA's as habitat for all species.

Importance: Ocean areas can be ecologically "significant" because of their biophysical structure and ecological function. For the purposes of the creation of the EBSAs, the term's significance refers to the relative role of a species, habitat feature, community attribute, area, etc. in the ecosystem. While all areas have some ecological function, the significance of these areas is viewed in terms of ecological consequences due to severe perturbations. Three main aspects of Ecological and Biological significance were evaluated and include – Uniqueness, Aggregation and Fitness Consequences.

Map Description: The shaded areas in this map represent the EBSA's created by the Department of Fisheries and Oceans Canada.

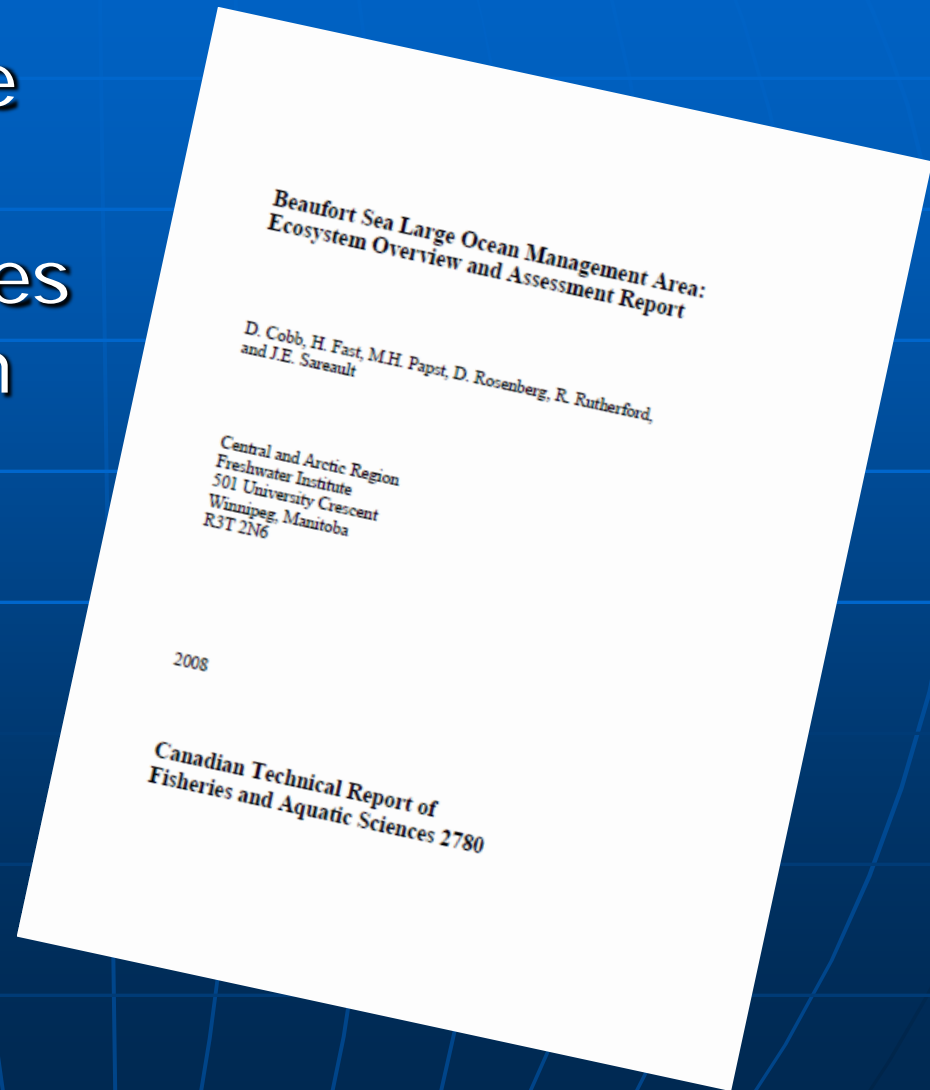
Sources and Additional Information

DFO. 2004. Identification of Ecologically and Biologically Significant Areas. DFO Can. Sci. Adv. Ser. Ecosystem Status Rep. 2004/06 - available at:
http://www.dfo-mpo.gc.ca/science/conservation/2004/EBSA004_06_E.pdf

Department of Fisheries and Oceans. 2006. Terms of Reference, National Workshop: Development of criteria to identify Ecologically and Biologically Significant Species - available at:
http://www.dfo-mpo.gc.ca/science/conservation/Details/200609_SpecEBSA_Terms_E.pdf

Ecosystem Overview and Assessment Report

- Description of the system
- Impact of activities on the ecosystem
- Stressors on the ecosystem



Socio-Economic Considerations

- A social, economic and cultural overview and assessment (SECOA) is carried out
- SECOA provides a basis for developing and refining the operational objectives of the integrated management plans

Socio-Economic Considerations

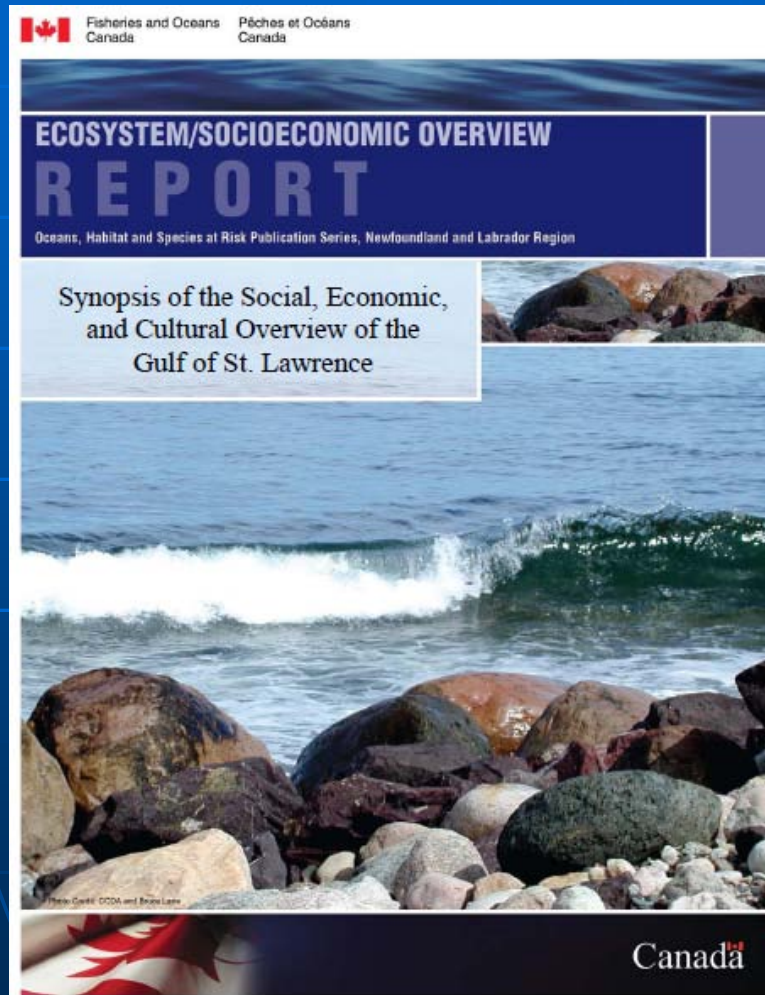


Table of Contents

Table of Contents	iii
Preface	v
1.0 Introduction	1
1.1 Purpose of the Report	1
1.2 Study Area	1
1.3 Integrated Management	2
1.4 Methodology, Data Sources and Limitations	3
2.0 Overview of the Social Context	5
2.1 Demographic Profile	5
2.1.1 Population Size and Distribution	5
2.1.2 Aboriginal Population	6
2.1.3 Age Distribution	6
2.1.4 Language Structure	6
2.2 Education	7
2.3 Health	10
3.0 Overview of the Economic Context	10
3.1 Economic Performance	10
3.1.1 Resource Based Industries and Work Force	11
3.1.2 Employment Structure	11
3.1.3 Income	12
3.1.4 Housing Value	13
3.2 Economic Impact of Marine Activities in the GOSLIM Area	13
3.3 Fisheries	16
3.3.1 Commercial Fishing	16
3.3.2 Aboriginal Fisheries	17
3.3.3 Seal Hunt	17
3.3.4 Fish Processing	18
3.3.5 Aquaculture	19
3.4 Marine Transportation	19
3.5 Tourism and Recreational Activities	20
3.5.1 Recreational Fishing	20
3.5.2 Cruise Ship Tourism	21
3.5.3 Marine Related Tourism	21
3.6 Energy	22
3.6.1 Renewable Energy	22
3.6.2 Nonrenewable Energy	22
3.7 Agriculture	22
3.8 Forestry	23
3.9 Mining	24

3. Set management objectives for the area

Conservation objectives

Table 7: Ecosystem Goal – To understand the Beaufort Sea ecosystem, to identify important areas and priority species, and to maintain or enhance ecosystem integrity

OBJECTIVE	STRATEGY
Maintain ecosystem integrity within the LOMA	<ul style="list-style-type: none"> • Identify all species likely to be affected by human activities within priority areas of concern • Minimize non-indigenous species in the LOMA • Reduce potential sources and effects of chemical introductions from industrial activities
Protect and conserve representative marine areas and special species within the LOMA	<ul style="list-style-type: none"> • Implement a national and federal marine protected area strategy • Identify additional rare and unique habitats within the LOMA
Determine baseline environmental quality conditions within the LOMA	<ul style="list-style-type: none"> • Carry out physical, desktop and/or TK surveys to determine baseline conditions within LOMA • Develop baseline information and determine rates of change in chemical properties of water • Develop baseline information on coastal processes • Improve knowledge of the relationship between the physical environment and ice as well as the impacts of ice processes on the seabed and coastal environments • Increase knowledge of productivity in the LOMA

3. Set management objectives for the area

Social, economic and cultural
objectives

Objectives-based management framework

Table 3: Economic Goal – To foster sustainable economic opportunities and options for Canadians, northerners and coastal communities

OBJECTIVE	STRATEGY
Manage large-scale marine traffic	<ul style="list-style-type: none"> • Develop means to track Arctic marine traffic • Use Marine Mammal Regulations, Community Conservation Plans, the Environmental Impact Screening Committee and other processes to minimize negative impacts on communities and maximize economic opportunities
Prepare to take advantage of large-scale economic opportunities in the coastal and marine environment	<ul style="list-style-type: none"> • Support sustainable large-scale economic development (e.g., oil & gas, shipping) • Coordinate with community socio-economic development agendas
Strengthen and diversify local and northern economy	<ul style="list-style-type: none"> • Enhance existing small businesses and development of new innovative local and northern businesses connected directly or indirectly to marine resources and services

**4. Develop an integrated-
management plan for the area**

Integrated Management Plans

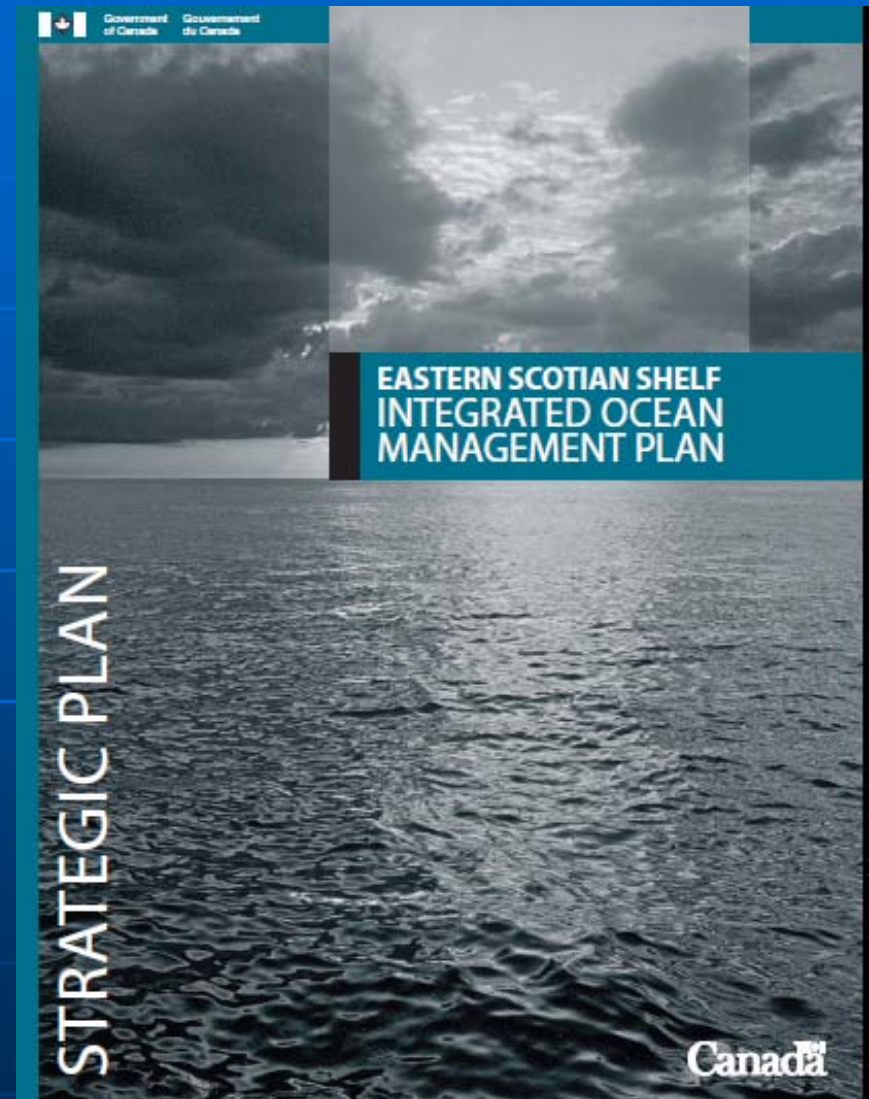
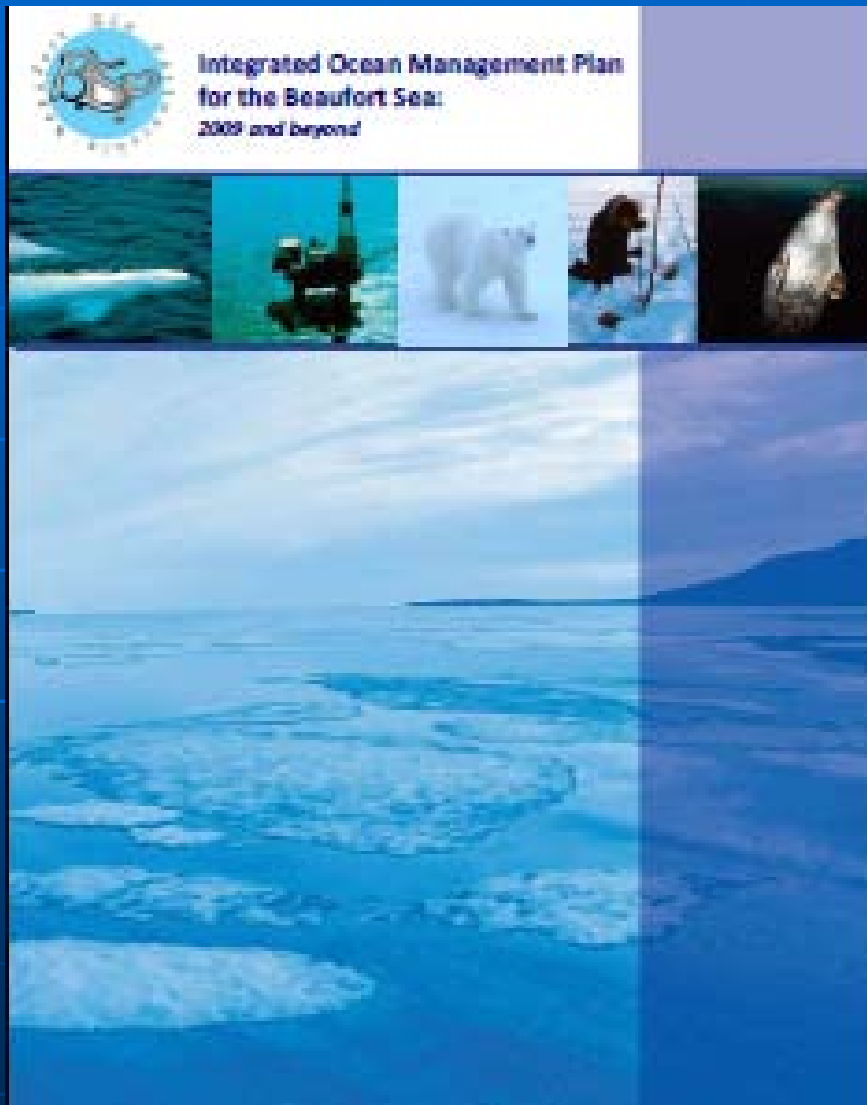


Table 1: Summary of 24 Objectives & RCC Organizations Involved in Implementing the Beaufort Sea Integrated Ocean Management Plan

	RCC	DFO	EC	FIMC	GNWT	IGC	INAC	IRC	NRCan	PCA	TC	YG
Governance Goal - To achieve effective governance for the sustainable use of the Beaufort Sea / Objectives												
Establish collaborative inter-governmental and inter-departmental structures and processes												
Conduct spatial planning in the LOMA												
Promote an effective regulatory environment												
Promote effective planning and decision making												
Ensure Aboriginal organizations have the capacity to be involved in the IOMP												
Profile the Beaufort Sea LOMA in the circumpolar context												
Establish an inter-governmental Implementation Coordination Office to oversee implementation and renewal of this plan												
Assess and develop an adaptive management response to climate change.												

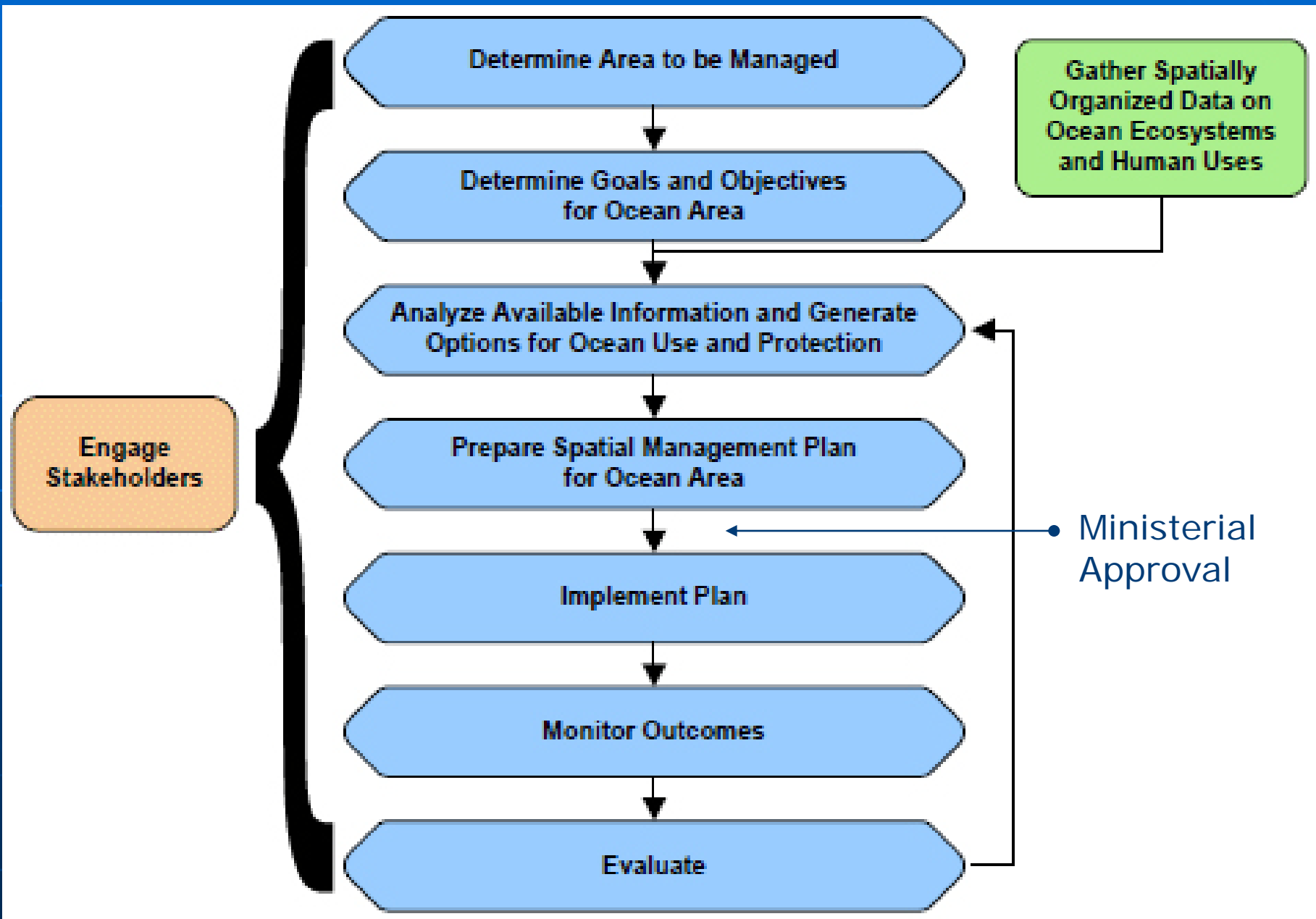
Table 9: Governance Goal – To achieve effective governance for the sustainable use of the Beaufort Sea (Actions and Partners)

OBJECTIVE	STRATEGY	ACTION	PARTNERS
1.1 Establish collaborative inter-governmental and inter-departmental structures and processes	1.1.1 Endorse the IOMP	<ul style="list-style-type: none"> • Implement the IOMP in 2009 • Conduct performance evaluation • Revise and renew IOMP 	RCC
1.2 Conduct spatial planning in the LOMA	1.2.1 Develop Ocean Use Plans for the LOMA beginning with priority areas	<ul style="list-style-type: none"> • Identify the areas of the LOMA that need protection, and the areas that are available for development • Develop management tools that dictate where and when various types of activities can occur 	RCC

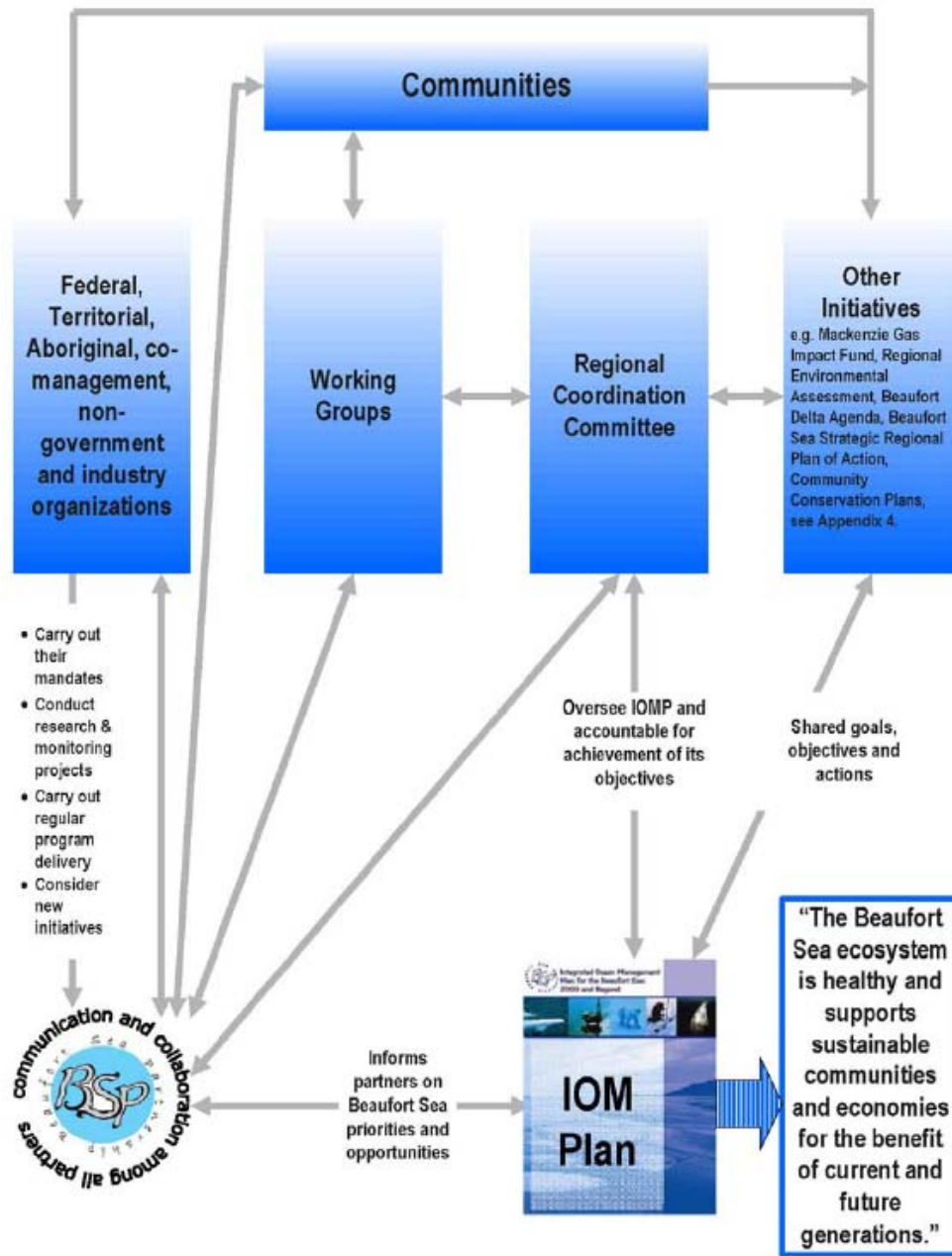
Social, Cultural and Economic												
	RCC	DFO	EC	FIMC	GNWT	IGC	INAC	IRC	NRCan	PCA	TC	YG
Economic Goal - To foster sustainable economic opportunities and options for Canadians, northerners and coastal communities/ Objectives												
Manage large-scale marine traffic												
Prepare to take advantage of large scale economic opportunities in the coastal and marine environment												
Strengthen and diversify local and northern economy												
Cultural Goal – To maintain and increase peoples' sense of place and preserve cultural identity and spiritual connections as they relate to oceans and coastal areas/ Objectives												
Generate and promote opportunities to practice and share culturally important marine traditions, sites and artifacts												
Promote a vibrant local subsistence economy												

Table 12: Social Goal - To improve human capacity, health, quality of life and opportunities as they connect to oceans and coastal areas (Actions and Partners)

OBJECTIVE	STRATEGY	ACTION	PARTNERS
2.6 Engage and support the objectives of the Beaufort Delta Agenda and the MGP Impact Fund ³	2.6.1 Develop partnerships, cooperative relationships, initiatives and funding arrangements	<ul style="list-style-type: none"> • Enter into partnership arrangements and relationships to further the objectives of the Beaufort Delta Agenda and the MGPIF 	GNWT, IRC, INAC, DFO
		<ul style="list-style-type: none"> • Develop a clear method using the IRC Indicators project to measure whether the Social, Cultural and Economic objectives of the Beaufort Delta Agenda and MGPIF Plans are being met and to ensure partners are accountable for their implementation commitments 	IRC, GNWT, Statistics Canada
2.7 Improve long-term local and northern career opportunities reliant on ocean based resources	2.7.1 Enhance access to local training and skill development	<ul style="list-style-type: none"> • Provide career counselling and mentorship opportunities 	GNWT, IRC, YG
		<ul style="list-style-type: none"> • Provide internships and on the job training programs • Provide and promote scholarships 	IRC, GNWT, YG



2010







Thank You!!