The Eastern Scotian Shelf Integrated Management (ESSIM) Initiative

Issues, Challenges and Opportunities

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The Eastern Scotian Shelf Integrated Management (ESSIM) Initiative

Issues, Challenges and Opportunities

A Discussion Paper prepared for the
Federal-Provincial ESSIM Working Group

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Oceans and Coastal Management Division
Oceans and Environment Branch
Fisheries and Oceans Canada
Maritimes Region

Preface

This revised draft *Issues, Challenges and Opportunities Discussion Paper* attempts to capture the principal issues for oceans management on the eastern Scotian Shelf. It should be reviewed in conjunction with the companion ESSIM discussion paper on the *Development of a Collaborative Management and Planning Process*. The issues and challenges have been organized into several broad categories or themes to support discussion. This document is based on investigations, research and discussions held to date for the ESSIM Initiative. The details and prioritisation of issues will be elaborated through further dialogue and collaborative efforts. This revised draft has been prepared for and vetted through the Federal-Provincial ESSIM Working Group.

We now invite written comments from stakeholders with interests in the Eastern Scotian Shelf Oceans Management Area. On the basis of written comments received and discussions with stakeholders, issue prioritisation will be developed under the multi-stakeholder ESSIM planning and management process.

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Contents

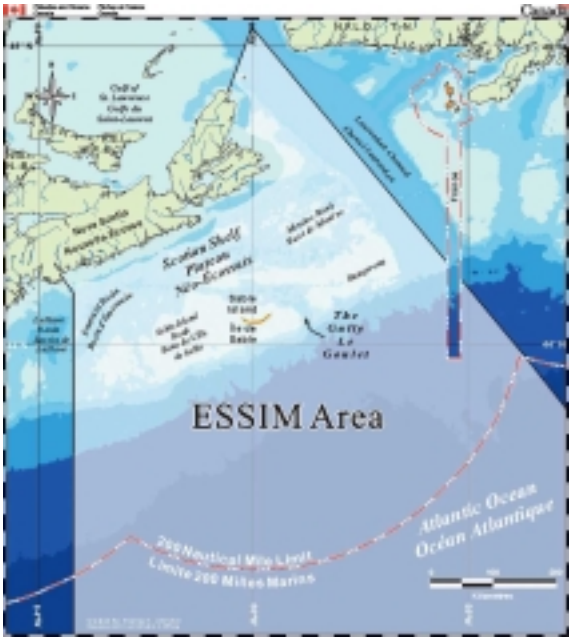
I. INTRODUCTION

The ESSIM Initiative

The 1997 *Oceans Act* extended Canada's rights and jurisdiction over its oceans to the full extent allowed under international law.[1] With these rights come responsibilities, including the establishment of a governance process based on the principles and approaches identified in the Act. These are the *integrated management* and *sustainable development* of Canada's oceans and their resources; the application of both an *ecosystem* and *precautionary approach* to the conservation, management and use of marine resources; and the use of inclusive, *collaborative approaches* for ocean and coastal management. Greater participation in planning and governance is based on the premise that those affected by a decision should participate directly in the decision-making process. This requires the horizontal and vertical integration of government to improve service delivery for all ocean-related activities, programs and policies. Strong working relationships among the various government bodies, First Nations, industry, and community, marine user and interest groups are the foundation of sound management. The *Oceans Act* affirms the lead role for Fisheries and Oceans Canada (DFO) in coordinating federal policies and programs relating to Canada's oceans. While DFO has the lead regulatory role for fisheries, the regulatory responsibilities for other ocean uses (*e.g.*, cables, pipelines, shipping, oil and gas) fall under the mandates of other departments and agencies.

A new and integrated approach to oceans management is needed—one that takes into consideration the impacts that multiple activities may have at an ecosystem level. The Act is the principal legislative framework for an integrated planning and management process, as section 31 provides the Minister of Fisheries and Oceans with a mandate to "lead and facilitate the development and implementation of plans for integrated management of all activities or measures in or affecting estuaries, coastal waters and marine waters." Integrated management will ensure diversified, balanced economic development of oceans and coastal waters by protecting the health of our oceans, preserving its biodiversity, and maintaining productivity. To fulfil the requirements of the *Oceans Act*, DFO is developing a national policy and operational framework to link and support regionally-driven integrated

Figure 1. Eastern Scotian Shelf Oceans Management Area



[1] Canada has made international commitments with respect to oceans stemming from new ocean management approaches on the international stage. These commitments relate to biodiversity, climate change, responsible fisheries, straddling and highly migratory fish stocks, environmental protection from land-based activities, ship safety, and pollution prevention from ships.

management initiatives such as the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative, led by the Oceans and Coastal Management Division (OCMD) of the Oceans and Environment Branch in the Maritimes Region.

Oceans Management Area

The ESSIM Initiative was announced in December 1998 following the recommendation of the 1998 Sable Gully Conservation Strategy[2] that integrated management approaches be applied to the offshore area surrounding the Sable Gully Area of Interest under the Marine Protected Areas Program. DFO selected the eastern Scotian Shelf area for the development and implementation of integrated management for several reasons: (i) it possesses important living and non-living marine resources that are used by multiple industries or sectors and regulated by two levels of government; (ii) it is an area of high biological diversity and productivity; and (iii) the multiple-use and multi-regulated nature of the area has led to a number of existing and potential user and resource conflicts. The aim of the ESSIM Initiative is to develop and implement an integrated management plan for the eastern Scotian Shelf ecosystem, a Large Oceans Management Area (LOMA) as defined by DFO's draft *Policy and Operational Framework for Integrated Management in Canada's Estuarine, Coastal and Marine Environments*. The specific objectives for the Initiative are as follows:

- to integrate the management of all activities in the eastern Scotian Shelf area;
- to encourage the conservation, effective management and responsible use of marine resources;
- to support the maintenance of natural biological diversity and productivity; and
- to foster opportunities for economic diversification and sustainable wealth generation for coastal communities and stakeholders.

The ESSIM Initiative is being used to design an intergovernmental and multi-stakeholder planning and management process to develop and implement an integrated oceans management plan for this large offshore biogeographic region. At the governmental level, DFO is working through a Federal-Provincial ESSIM Working Group, comprised of over 20 oceans-related departments, agencies and boards, to focus on policy, management and regulatory coordination in support of integrated oceans management. As part of its joint workplan for Summer/Fall 2001, the ESSIM Working Group recommended the development of a comprehensive report on oceans management issues and challenges in the eastern Scotian Shelf area. It was agreed that such a document would provide a useful basis for the prioritization of issues to be addressed in the near-, medium-, and longer-term through the ESSIM process. The present document on *Issues, Challenges and Opportunities* is designed to fulfil this function by providing an information resource for the Oceans and Coastal Management Division and the ESSIM Working Group.

The reader is also directed to two companion documents for the ESSIM Initiative:

[2] DFO, 1998. The Sable Gully Conservation Strategy, Oceans Act Coordination Office, Maritimes Region, unpublished committee document. 51 pp.

(i) The *Development of a Collaborative Management and Planning Process* describes the key activities conducted to date for the ESSIM Initiative in terms of the identification of human use interests and activities, ecosystem considerations, and management issues and requirements for the Oceans Management Area. The process of identifying and engaging stakeholders, including DFO Sectors, federal and provincial departments, agencies and boards, First Nations, marine industry and resource user groups, and community groups, is described. The document also places the ESSIM Initiative in the national oceans policy and management context under the *Oceans Act,* highlighting the links to the Canadian Oceans Strategy and DFO's draft *Policy and Operational Framework for Integrated Management in Canada's Estuarine, Coastal and Marine Environments*. The key elements of a future management and planning process and structure for the ESSIM Initiative are identified to stimulate and guide discussion on the structure and process needed to design, develop and implement integrated oceans management and planning for the Oceans Management Area.

(ii) The *Overview of Federal, Provincial and International Ocean Regulatory Frameworks on the Scotian Shelf* (unpublished) will describe existing regulatory powers and management frameworks for the key ocean uses in or affecting the eastern Scotian Shelf area. The objective of this document is to identify the roles, responsibilities and decision-making activities of the various federal, provincial and international regulatory and advisory bodies, and provide an assessment of intra- and inter-sectoral requirements for integrated planning and management in the ESSIM Area. The Overview covers eight key categories of oceans use in the area as follows: fisheries; oil and gas; marine conservation and protection; marine transportation; maritime defence; communications and submarine cables; marine science and technology; and recreation, culture and tourism.

II. OVERVIEW OF OCEANS MANAGEMENT ISSUES

One of the first activities undertaken for the ESSIM Initiative was an *Overview and Use Audit* of oceans activities, management and issues in the eastern Scotian Shelf. This exercise was largely an internal exercise for DFO staff to identify existing and potential issues and challenges facing oceans management on the eastern Scotian Shelf. **This paper expands upon the issues identified in the ESSIM *Overview and Use Audit* but does not attempt to list all issues that may be relevant to DFO's partners in the federal and provincial governments and the oceans sectors. Additional issues may be identified during the ongoing collaborative planning process during the Winter of 2002.** It also incorporates information gained from information sessions and dialogue with a variety of groups and individuals involved in the ESSIM Initiative, including other government departments, First Nations, marine industry and user groups, conservation interests, and academia.

The issues outlined below have been grouped under the following thematic categories:

- multiple oceans use;
- marine safety;

- marine conservation and environmental protection;
- compliance and enforcement;
- jurisdiction and institutional arrangements;
- science, research and development; and
- cultural resource protection.

After providing an overview of the issues and challenges for the Initiative, this document identifies a set of benefits and opportunities stemming from implementation of the ESSIM Initiative.

MULTIPLE OCEANS USE

One of the main objectives of oceans and coastal management under the *Oceans Act* is to address and manage multiple use in Canada's estuarine, coastal and offshore areas. The eastern Scotian Shelf is characterized by increasing levels of multiple use involving virtually all ocean sectors. Some general issues relating to multiple oceans use in the ESSIM Area are identified below.

Timelines for Management

The timelines for integrated management versus the timelines for ocean development and potential ecosystem impacts are a primary issue in the context of multiple oceans use. There are general concerns that the pace of ocean development may foreclose conservation opportunities. For example, the longer term planning process for ESSIM is operating at a pace slower than the bidding/leasing process for oil and gas activity and the related requirements for environmental assessments and sensitive area identification. Some industries are concerned that ESSIM and government regulations in general will be too time-consuming. In particular, the requirements for environmental assessment can be lengthy, but the ESSIM Initiative has the potential to lead to a more efficient and timely regulatory process.

Competing Values for Oceans Use

Opinions on the use of ocean space and resources, both living and non-living, are based on differing personal/sectoral values. The challenge of the *Oceans Act* is to balance competing social, cultural, economic and environmental objectives. This includes trying to accommodate the full spectrum of views from ardent environmentalists to enthusiastic entrepreneurs. As discussed later, economic valuation models may be used as one of a suite of decision-making tools for integrated management and planning.

A fundamental challenge in integrated management of the ESSIM Area relates to priority of ocean use. At the crux of this challenge is how decisions are made. Through what process will decisions on priority of ocean use be made? Does or should any particular use take priority over other uses in specific areas? How can we satisfy the wide range of demands for fisheries, marine conservation, oil and gas, submarine cables, shipping, ocean mining, tourism/recreation, aquaculture, and other ocean uses? How can we balance economic, environmental, cultural/traditional and social interests in decisions on how ocean space and resources will be used in the future? Similarly, how do we balance renewable and non-renewable resource use? What determinants and information sources will assist in the decision making? Some key factors include compatibility in space and time, historic patterns, and economic models.

During discussions with various oceans sectors on the ESSIM Initiative, priority of

ocean use has been raised as an issue on several occasions. As an example, discussions with components of the offshore fisheries sector highlighted a perception that the fishing industry should have a higher priority in the integrated management and planning process based on its traditional and historical rights, industry value, and the renewable nature of the resource exploited. Similarly, the oil and gas sector has indicated that its interests be given equal footing with other sectors given that it is a legitimate user, providing economic benefits to Nova Scotia.

Varying forms of permissions or consents (*e.g.*, licenses, permits and authorizations) are issued for resource and offshore seabed use, with different administrative systems established to implement and manage issuance processes, *e.g.*, DFO, Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), National Energy Board, Industry Canada, Environment Canada, Transport Canada and NS Department of Natural Resources. There is a need for a consistent, cross-sectoral database registry to record all spatial and resource use permissions in the offshore.

Inter- and Intra-sectoral Spatial Conflicts

There are a number of inter-sectoral conflicts in the eastern Scotian Shelf area involving fishing sectors, the oil and gas industry, submarine telecommunications cables, shipping, defence operations, and potential marine aggregate mining. Given that marine conservation is a viable ocean use activity, conflicts between it and other uses must also be considered. Spatial conflicts can occur over long periods of time, as exemplified by submarine cables and fishing or oil and gas production and fishing activity, or they can occur for shorter intervals, such as recurring seasonal spatial conflicts between fishing fleets, or conflicts between seismic operations and other ocean uses.

Within the fishing industry, intra-sectoral conflicts exist among various fleet sectors and between inshore and offshore groups over access to the resource and ocean space. Intra-sectoral conflicts are, in most cases, most effectively addressed within the context of the existing sectoral management structures and processes, such as the Integrated Fisheries Management Plan process. However, the integrated management and planning process can be used to facilitate dialogue and support the development of enhanced sectoral management consistent with the objectives of the *Oceans Act*.

Concerns have been expressed about interactions between fishing activities and submarine telecommunications cables off the coast of Nova Scotia. These concerns relate primarily to loss of fishing areas, cable damage, the use of non-legally binding exclusion zones or clearance areas, potential issues of legal liability for damaged cables and lost fishing gear, as well as transparency in the planning process.

Conflicts may arise between the oil and gas industry and a number of other ocean uses in the area. These issues relate to the preclusion of access particularly by fishing and commercial shipping activities, through the establishment of internationally recognized 500-m safety zones around oil and gas infrastructure, and short- and long-term impacts on marine resources and habitats.

There have also been spatial overlaps between oil and gas licensed areas and offshore fisheries conservation areas. For example, there is overlap between the Emerald and Western Bank Juvenile Haddock Closed Area and two lease bid areas from the CNSOPB Call for Bids 99-1 and a previous parcel issued under the 98-1 Call for Bids. Under the Accord legislation provisions for protection of confidentiality[3], the location of lands in the leasing process remains confidential until the bidding process is open. The process is of concern to other users and management bodies. The interaction between seismic vessels and the fishing industry is another ocean space competition issue of growing importance. Vessels targeting swordfish near the Sable Gully have been required in the past to adjust their fishing plans to avoid seismic vessels working in the area, although this spatial conflict has improved through effective communication. More effective planning and communications are required to avoid future conflicts between these activities.

At-sea defence training exercises and mine warfare counter-measure operations are ongoing issues in that they can limit and/or preclude access to ocean areas spatially and temporally.

The eastern Scotian Shelf has high potential for ocean mining activities. There are a number of potential multiple use issues related to ocean mining, including overlaps with international shipping routes, lost fisheries access, and potential fish habitat alteration and/or destruction.

[3] *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*, S.C. 1988, c.28, and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act*, S.N.S. 1987, c.3. ("Accord Implementation Acts" or "Accord Acts").

When considered as a non-consumptive ocean use, it is recognized that marine conservation and protection competes for ocean space and may be compatible or incompatible with other users of ocean space and resources. The interactions between marine conservation approaches (*e.g.,* MPAs, whale sanctuaries) and all other ocean use activities must be addressed through oceans management and planning processes.

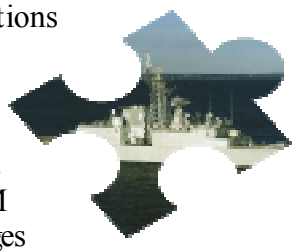
Sensitive Area Identification

The identification of sensitive marine and coastal ecological areas is a priority for government, environmental non-governmental organizations, and the industry sector. A cooperative process is required in the pursuit of this knowledge-intensive, science-based initiative. The development of an ecosystem characterisation model for the maintenance of diversity of ecosystem types on the Scotian Shelf and in the Bay of Fundy will contribute to this identification process. As part of the scientific process for identifying these areas, important questions must be addressed regarding sensitivity of ecosystem types and components to various ocean activities (i.e., sensitive to what?).

Economic Valuation of Uses/Resources

It may be illustrative to conduct an ocean economics valuation study of all ocean use sectors (existing and potential) in the ESSIM Area. This would include the major ocean sectors of fisheries, oil and gas, and marine transportation/shipping, plus other sectors such as marine industry, technology, science, R&D, maritime defence operations, recreation and tourism, marine conservation areas as a non-consumptive use, submarine cables, and potential ocean mining. It would

be useful to know the competing economic values of all interests and resources in the ESSIM Area. These values are obviously dynamic, but how might a valuation model be used in decision making? Given that comparisons of renewable and non-renewable resource evaluations are complex, what are the cumulative economic values from these industries on temporal and spatial scales in the ESSIM Area? One of the challenges posed by the *Oceans Act* is the requirement to set economic objectives in addition to environmental and social objectives. An ocean economics valuation study may aid decision making on the allocation of ocean space and provide input to developing sustainable development indicators for the monitoring of economic objectives.



MARINE SAFETY

Prevention and Response Capabilities

The eastern Scotian Shelf is a harsh and challenging environment to operate within and there are numerous general safety concerns regarding all uses in the area. These can be divided into issues of prevention and response. In terms of prevention, effective approaches to marine safety require continuous monitoring, forecasting and timely provision of weather systems and sea-state conditions. The maintenance and modernization of aids to navigation and marine communications are essential to improve safety levels at sea. Also associated with prevention are the implementation of safety training, planning and auditing programs for all ocean use sectors. The issue of outdated and inadequate response equipment is of concern to some stakeholders.

In terms of response, the level of coordination between industry operators and the government response agencies (*e.g.,* Rescue Coordination Centre, Coast Guard, Maritime Forces) for search and rescue operations is the most important aspect of marine safety. Adequate budgetary resources and the availability of modern equipment and platforms are ongoing concerns. Training and communications are also essential for effective response to marine safety incidents.

MARINE CONSERVATION AND ENVIRONMENTAL PROTECTION

Ecosystem Approaches to Oceans Management

There are a number of marine ecosystem issues in the eastern Scotian Shelf area, including localized and potential cumulative effects of bottom trawling, oil and gas activities, operational discharges from shipping, the long-range air transport of pollutants, and multiple-use impacts on water quality and habitat integrity (e.g., shellfish tainting, noise, impacts on productivity). Concerns exist regarding the scale and impacts of marine debris from the shipping, fishing and oil and gas industries. Land-based sources of pollution must also be addressed in the area.

The Fisheries Resource Conservation Council (FRCC) has highlighted the fact that ecological change in the environmental regime of the eastern Scotian Shelf is a critical factor affecting the recovery of groundfish resources. Continued poor ecological conditions for groundfish will affect survivorship and recruitment success. Since the moratoria were put in place, harsh environmental conditions have been identified as a major factor in the high levels

of natural mortality of cod and haddock on the eastern Scotian Shelf.

Canada's *Oceans Act* calls for an ecosystem approach to the management of multiple oceans use. It emphasizes the need to collect and synthesize information on ecosystem structure and function, recognizes that different components within an ecosystem are interrelated and interdependent, and necessitates management strategies that are anticipatory, ecologically sound[4], and may be applied on an ecosystem scale. The provisions of the Act for marine protected areas and marine environmental quality objectives (with associated MEQ guidelines and standards, as required), can be used to maintain natural biological diversity, the productivity of all living resources in the marine ecosystem, and provide habitat protection.

However, the Act does not prescribe specific marine ecosystem attributes to be used as indicators of environmental health and the sustainability of ocean use. To date, fisheries management has provided the primary focus for the development of indicators and reference points for marine ecosystem attributes. The development of ecosystem objectives and indicators for water quality management in freshwater systems also offers guidance for marine ecosystem objectives and indicators. However derived, ecosystem objectives and indicators must be applied to the integrated management of other ocean use sectors, *e.g.*, oil and gas, marine transportation. Recently, a set of proposed ecosystem objectives for use in Large Oceans Management Areas was approved by DFO's Policy Committee in 2000. These objectives, related to biological diversity (quality) and productivity (quantity), are aimed at restoring and maintaining:[5]

- natural diversity of ecosystem types
- natural species diversity
- genetic variability within species
- productivity of directly impacted species
- productivity of ecologically dependent species
- ecosystem structure and function

Marine environmental quality (MEQ) objectives are employed through the oceans management plan to support the six ecosystem objectives listed above. The following ecosystem management objectives were developed in March 2001 at a DFO national workshop on objectives and indicators for ecosystem-based management:[6]

1. To conserve enough components (ecosystems, species, populations, etc.) so as to maintain the natural resilience of the ecosystem.
    a) to maintain communities within bounds of natural variability
    b) to maintain species within bounds of natural variability
    c) to maintain populations within bounds of natural variability
2. To conserve each component of the ecosystem so that it can play its historic role in the foodweb (*i.e.*, not cause any component of the ecosystem to be altered

[4] Ecologically sound is defined as maintaining natural biological diversity and the productivity of all living resources in the marine ecosystem.

[5] R. O'Boyle, 2000. Proceedings of a Workshop on the Ecosystem Considerations for the Eastern Scotian Shelf Integrated Management (ESSIM) Area. CSAS Proceedings Document 2000/14, 92 pp.

[6] G. Jamieson and R. O'Boyle. 2001. Proceedings of the National Workshop on Objectives and Indicators for Ecosystem-based Management. Sidney, BC, 27 February–2 March 2001. CSAS Proceedings Series, 2001/09. This list may still change, but it represents the current thinking within DFO nationally.

to such an extent that it ceases to play its historical role in a higher order component).

   a) to maintain primary production within historic bounds of natural variability
   b) to maintain trophic structure so that individual species/stage can play their historical role in the foodweb
   c) to maintain mean generation times of populations within bounds of natural variability

3. To conserve the physical and chemical properties of the ecosystem.

   a) to conserve critical landscape and bottomscape features
   b) to conserve water column properties
   c) to conserve water quality
   d) to conserve biota quality

DFO, in collaboration with the broader oceans science and research community is engaged in a number of initiatives to help provide the scientific basis for future management decisions regarding the use of ocean space through integrated management plans. For example, DFO has recently launched efforts to develop an ecosystem characterization model for the maintenance of diversity of ecosystem types on the Scotian Shelf and in the Bay of Fundy. The implementation of ecosystem objectives and related indicators and reference points will proceed through input from the broader scientific community in the planning process. It is emphasized that the existing sectoral institutions and their policy and management frameworks to regulate various ocean uses were established to meet only a subset of these criteria. Adoption of ecosystem objectives by the various oceans sectors will take time and needs to occur in a collaborative manner through integrated management and planning.

Cumulative Ecosystem Effects

A cumulative effect may be defined as "a change to the environment caused by an action in combination with other past, present and future human actions,"[7] or as "environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out."[8] Cumulative effects are important when the effects of an ocean use are persistent over time (*i.e.,* difficult to reverse), such as pollution with heavy metals and some pesticides or large-scale destruction of habitat, or when activities are in close proximity in time and space. When environmental effects of activities are considered separately they may all be below the threshold levels that cause impacts. Some effects, although thought to be transitory or of minor importance on the scale of a single source (*e.g.,* a vessel discharge, an otter trawler, an oil well, or a seismic survey) may prove to be of serious concern when combined. Cumulative effects need to be addressed at varying scales, from local/site-specific to broader regional ecosystems.

When all sources (*i.e.,* noise, pollutants, and physical alteration) are taken into account, do the collective effects give grounds for additional concerns? If activities and sources are considered collectively in time and space, their additive and/or synergistic effects—*i.e.,* cumulative effects—may cause serious impacts. Currently, there is no

[7] G. Hegmann *et al*. 1999. Cumulative Effects Assessment Practitioners Guide. Prepared by Axys Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency.

[8] Section 16(a), *Canadian Environmental Assessment Act*.

process or mechanism to take into account the cumulative effects of human activity on the marine environment. The concept has been addressed in the *Canadian Environmental Assessment Act (CEAA)* and in policies associated with fish habitat provisions of the *Fisheries Act*. However, these capture only physical works and undertakings and certain activities, as in the case of *CEAA*[9], or activities that are accompanied by requests for review or authorization for harm of fish habitat. To date, there is no operational mechanism to capture the effects of all activities, spatially or temporally. There are three main problems. First is the lack of established ecosystem quality indicators with target levels to work toward. In an attempt to address this, integrated ocean management plans will require ecosystem objectives/indicators and target levels to achieve for the combined effects of all activities. Secondly, there is a need to capture all activities, both temporally and spatially. Currently, there is no existing body that monitors all activities, so we cannot assess them against target levels. Thirdly, monitoring of activities is difficult and compliance with rules is hard to enforce—*e.g.*, who is to blame for exceeding a regulated target level, all collectively or the last one in? The solution may lie in a collaborative, integrated management approach.

A collaborative administrative vehicle may be required to provide an oversight function with respect to cumulative ecosystem impacts, with a mandate to implement an action plan to reduce overall impacts to within target levels. Such an institutional body could be mandated to monitor and quantify the cumulative quantities of oil, noise levels and contaminant load entering the eastern Scotian Shelf annually. For example, by using a cross-sectoral inventory of activities for spatial and temporal coordination, this body could act as "gatekeeper" in situations such as in the summer of 2001 when the Department of National Defense, the Geological Survey of Canada, and nine seismic survey programs were permitted, each under separate permitting processes, to generate noise on the Scotian Shelf but without cross-linking conditions. An overview of potential cumulative effects of future development activities on the eastern Scotian Shelf is needed. Future applications for development could include a thorough evaluation of the potential cumulative effects of the project in question, in conjunction with past, present and foreseeable projects and stresses on the marine environment.

Variation exists between oceans sectors regarding the application of environmental assessment regulatory requirements. Environmental assessments are undertaken and approved in the oil and gas and aquaculture sectors, while scientific research and fishing industry activities that may have disproportionate impacts on habitat and deep-sea corals are not subject to the same level of environmental assessment. For example, a multibeam survey for the oil and gas industry requires an environmental assessment and approval by the CNOSPB, but a similar operation on a government research vessel does not need an environmental assessment.

Fishing Industry Impacts

A diversity of gears is used in groundfish fishing, including otter trawls,

[9] Although *CEAA* does not cover all activities, it requires that all federal environmental assessments include a consideration of cumulative environmental effects. Despite this legislated requirement, federal environmental assessments to date have not given close attention to cumulative effects.

Danish seines, bottom gillnets and hook-and-line gears (primarily longline).[10] Otter trawls employ boards that stir up sediment plumes that aid the fish-herding effect of the bridles that connect the doors to the wings of the net. The footrope of the net is usually equipped with rollers that also cause some bottom disturbance. Danish seiners, although also dragged over the bottom, do not employ boards or rollers and hence bottom disruption is substantially lower. Other groundfish gears (*e.g.,* gillnets and longlines) disturb bottom habitat very little.

Scallop dredges, or rakes, and the hydraulic dredges used in the surf clam fishery, cause bottom disruption. Shrimp fishing is conducted primarily by otter trawl with traps being used on coastal grounds. Shrimp trawls use otter boards and heavy rollers similar to those used on groundfish trawls. Crab fisheries are conducted using traps, which are usually considered to have little or no effect on bottom habitat, although the setting of large numbers of traps in sensitive areas (*e.g.,* coral-rich) could have adverse ecological effects. The offshore banks herring fishery is conducted with pelagic purse seines and large pelagic species are caught using surface longlines. Neither of these gears affects bottom habitat.

All these fishing gears catch not only the target species but also various other species as well as by-catch. In some cases, these species also have commercial value and are landed and sold. However, there are cases where incidentally caught species are discarded at sea because they are of little or no value, or as a direct or indirect result of regulation. In some circumstances, incidental catches may be of species considered to require special protection. For example, marine mammals may become entangled in fixed gears, such as pelagic longlines or gillnets. Various modifications to gears, or to the spatial or temporal distribution of fishing, have been adopted to address species by-catch problems. Within the context of the shift from species-based to ecosystem-based fisheries management, there is scope to find new approaches to deal with by-catch, including technological fixes and management measures for by-catch discards. Various features of gears are designed to tailor the size range caught to that that can be retained and sold, such as mesh sizes and types, separator grates and escape vents.

In ongoing discussions on objectives-based fisheries management, DFO's Integrated Fisheries Management Plan process is being revised to address ecosystem considerations for management and responsible fisheries management practices.[11]

Marine Invasive Species

The introduction of invasive marine species into new environments by ships' ballast water, attached to ships' hulls and via other vectors has been identified as one of the four greatest threats to the world's oceans. The other three are land-based sources of marine

[10] Internationally, there is a large body of scientific information on the effects of mobile fishing gear on benthic habitat and communities, and understanding is growing rapidly. For a review, see G. Richard. 1999. "An Assessment of Trawling Technology in Canada", (Ottawa: Program Planning and Coordination, Fisheries Management, Fisheries and Oceans Canada). D.C. Gordon has prepared two summaries on this issue: Brief Scientific Overview: Effects of Fishing Gear on Benthic Habitat and Communities (January 1999) and Summary of DFO Program on the Effects of Mobile Fishing Gear on Benthic Habitat and Communities (February 1999), both available from OCMD.

[11] Ecosystem considerations in the management of capture fisheries was the theme of the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem in October 2001. Abstracts and full texts of conference papers can be found at ftp://ftp.fao.org/fi/document/Reykjavik/default.htm.

pollution, overexploitation of living marine resources and physical alteration/destruction of marine habitat. Principal vectors for the transport of non-indigenous aquatic species in the ESSIM Area include international shipping and aquaculture industries. To date, a number of invasive species have been identified in coastal waters around Nova Scotia, including the North American green crab (*Carcinus maenas*) and the seaweed *Codium fragile* ssp. *tomentosoides*. However, the potential for adverse impact from invasive species on offshore ecosystems is not well understood.

Ballast Water

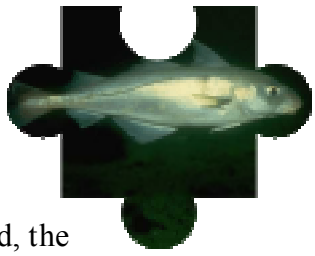
The practice of ballasting and de-ballasting ships can introduce harmful aquatic organisms and pathogens to marine ecosystems. The high volume of shipping in the region coupled with the fact that ships arrive from all over the world makes ballast water an important issue. Under current guidelines, ships entering Canada's EEZ and Territorial Sea are asked to exchange ballast in depths greater than 2000 metres. This voluntary procedure is not always possible, however, due to unsafe weather conditions in the open ocean, or to the fact that some vessels entering Canadian waters do not transit waters of this depth. The latter situation is particularly the case with shipping traffic coming from the eastern seaboard of the United States. Under Canada's 2000 Ballast Water Guidelines (administered by Transport Canada), an Alternative Ballast Water Exchange Zone is in the process of being identified for ships transiting the Scotian Shelf. The key issue for the eastern Scotian Shelf area is the extent to which ballast water may cause offshore ecosystem effects.

Ballast water can be an issue with naval ships given the international nature of their operations. At present, naval ships are required to deballast outside the Territorial Sea in waters greater than 200 metres. Although ballast water guidelines are primarily for commercial shipping, it is important that naval ships meet the same standards.

Hull Fouling

Anti-fouling paints are applied to ships' hulls as biocides to prevent algae and molluscs from attaching to the hull and thereby slowing the ship and increasing fuel consumption. The compounds leach into seawater, killing barnacles and other marine life attached to the ship. Studies have shown that these compounds persist in harbours, kill marine life, and possibly enter the food chain. One of the most effective anti-fouling paints, the organotin tributyltin (TBT), causes deformations in oysters and sex changes in whelks. The International Maritime Organization (IMO) is set to adopt an International Convention on the Control of Harmful Anti-fouling Systems, a legally binding instrument to address the harmful effects of anti-fouling paints. An IMO resolution calls for a global prohibition on the application of organotin compounds as biocides in anti-fouling systems by 1 January 2003 and a complete prohibition on the presence of organotin compounds in anti-fouling paints by 1 January 2008.

Alternatives to organotin compounds include copper-based coatings and silicon-based paints, while ultrasonic or electrolytic devices may also work to rid the ship of foulants. Unless successful alternatives are developed, the increased presence of foulants on ships' hulls increases the potential for the transplantation of marine bioinvasives globally. As in the case of ballast water



discharges, the nature and extent of the invasive species threat to offshore ecosystems needs to be assessed.

Acoustic Disturbances

Seismic Survey Effects

To detect petroleum deposits beneath the ocean floor, seismic airguns, arranged in rows behind a ship, are used. The airguns fire at short intervals, discharging sonic blasts intense enough to penetrate to and rebound from layers of sedimentary rock within the seabed. A large-scale airgun array can produce sounds over 250 decibels. Fish will be driven away by the approaching noise source prior to coming close to airguns, but available information indicates that behavioural effects on adult fish are transitory. The pressure pulses from seismic arrays could injure adult fish when adjacent to an airgun. Studies on squid and captive fish have shown startle responses at 2–5 km from an approaching large seismic source, including faster swimming rates, altered behaviour, or schooling in tighter circles. Eggs and larvae could be damaged at 1.5–3.0 m from individual airguns and suffer mortality up to 5.5 m from the largest sub-array.[12] In Norway, regulations forbid seismic operations in Norwegian waters within 50 km of spawning areas and migration corridors during summer months when fish larvae and eggs are present.[13]

There are important and unanswered questions relating to the impacts of seismic operations on marine mammals. There may be differences in frequencies heard by baleen vs. toothed whales. Compared to baleen whales, there is little information on responses of toothed whales to seismic exploration. Although baleen whales seem tolerant of noise pulses from seismic operations, substantial numbers within 15 km of an array show avoidance or other strong disturbance reactions. Potential adverse effects on northern bottlenose whales and sperm whales are less clear. Although such seals are not found in the ESSIM Area, ringed and bearded seals in Alaska show localized displacement to an approaching seismic array, with some seals avoiding the area within 150 m of airguns, but few moving to distances beyond 500 m.[14] Sea turtles at 2 km from seismic surveys in Australia displayed an alarm response. However, a study using both a single airgun, and two smaller airguns, showed considerable tolerance in loggerhead turtles. Effects on seabirds have not been extensively studied, but since no disturbance or mortality has been observed in the few studies undertaken, potential effects are expected to be minor.[15]

Other Acoustic Disturbances from Oil and Gas

Exploration and development activities in the oil and gas industry are responsible for a variety of acoustic disturbances on the continental shelf, including drilling rigs that emit high-energy, low-frequency undersea noise during various phases of exploration

[12] R.D. McCauley *et al*. 2000. Marine Seismic Surveys: A Study of Environmental Implications. *Australian Petroleum Production and Exploration Association Journal,* 40: 692-705; LGL Ltd., 1998. Environmental Assessment of Seismic Exploration on the Scotian Shelf. p. 181 + iv Appendices.

[13] D.H. Thompson, J.W. Lawson and A. Muecke. 2001. Proceedings of a Workshop to Develop Methodologies for Conducting Research on the Effects of Seismic Exploration on the Canadian East Coast Fishery, Halifax, NS, 7-8 September 2000. Environmental Studies Research Funds Report No. 139. 92 pp.

[14] LGL Ltd., 2000. Assessment of Noise Issues Relevant to Key Cetacean Species (Northern Bottlenose and Sperm Whales) in the Sable Gully Area of Interest. LGL Report TA2446-2; LGL Ltd., 1998 (n. 12 above); J.W. Richardson, C.R. Greene Jr., C.I. Malme and D.H. Thomson, 1995. Marine Mammals and Noise. San Diego: Academic Press.

[15] LGL Ltd., 1998 (n. 12 above).

and production. To extract the oil and gas, platforms and pipes are constructed, drills positioned, and holes bored into bedrock, leaving a complex of industrial structures which may be demolished upon decommissioning.

Vessel-related Noise

The effects of vessel-related noise on marine mammals is not well understood. It is known, however, that international shipping is the largest contributor of noise inputs to the marine environment globally. With the increased offshore development and associated vessel traffic, research is needed on the combined effects of noise from shipping (including cruise ships), oil and gas operations, and fishing vessels on marine mammals. The issue of cumulative environmental effects of noise needs further research since marine environmental quality standards (*i.e.,* thresholds) for noise could be established to regulate activities in Large Oceans Management Areas under the *Oceans Act*.

Maritime Defense-related Noise

Despite their relatively short duration, naval operations can result in high levels of noise. Maritime Forces Atlantic (MARLANT) surface vessels and submarines use hull-based sonars, towed arrays and towed variable depth sonars, and aircraft use dipping sonars and small sonobuoys. Acoustic counter-measures also emit sound energy to decoy acoustically homing torpedoes, but are used infrequently with localized effects similar to a ship's propeller. Sonar emissions, particularly from active sonar modes in hull-based sonars, variable depth sonars and counter-measures, have the greatest potential to affect marine life. Active sonar is used in designated exercise areas for which an environmental assessment has been conducted, and is also used outside operational areas under a non-activity specific assessment. All MARLANT exercise areas on the eastern Scotian Shelf are used for sub-surface operations. Additional noise impacts arise from the use of explosive ordinance, such as for live fire exercises, anti-submarine warfare, and mine-countermeasures. The largest explosives are for mine-countermeasures, ranging from 10 to 100 kg charges, and a full environmental assessment is required for each exercise. Any use of explosives where the explosive charge exceeds 0.4 kg requires an activity specific environmental assessment.

The future use of Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) sonar by the US Navy in Canada's exclusive economic zone is a potential issue for the ESSIM Area.[16] DFO's review of the environmental impact statement is covering all aspects of the sonar operations, focussing on the modelling approaches used to determine potential impacts on marine mammals and other marine life, with particular reference to the inputs and results for the acoustic modelling scenario for Sable Island Bank. An assessment is required of the effectiveness of the mitigation measures proposed to minimize impacts on marine life. Additional mitigation measures or safeguards for LFA sonar operations in Canadian waters may be identified, possibly including a request to expand the existing Offshore Biologically Important Area identified by the US Navy for protection within the 200-m isobath along Canada's east coast to encompass deeper water ecosystems and habitats for certain marine species, (*e.g.,* the Gully).

[16] To date, the use of LFA sonar by the US Navy in Canada's EEZ has only occurred in conjunction with the Canadian Defence Research Establishment Atlantic (DREA).

Ship/Whale Conflicts

The relatively unknown spatial and seasonal distribution of whales in the eastern Scotian Shelf offshore area impedes efforts to prevent future ship/whale collisions. Ship strikes can significantly affect small, localised populations of whales in the western North Atlantic. Given that the Northern bottlenose whales in the Gully are categorized as a vulnerable species under Canada's future *Species At Risk Act*, even a few mortalities from ship collisions may have a significant impact on the population. The developing *Species at Risk Act* will be used to provide enhanced protection for vulnerable and endangered marine species in the ESSIM Area, including the Northern bottlenose whale (vulnerable), the leatherback turtle (endangered), and the North Atlantic right whale (endangered). Endangered or threatened species on the eastern Scotian Shelf should be identified on lists of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The ESSIM Area also has a number of other whale species of concern, including humpback, fin and occasionally Northern right whales. The cetacean migration route running northeast and southwest along the Scotian Shelf break increases the potential for whale interactions with oil and gas industry activities, offshore pelagic fishing vessels (including fishing gear entanglements), and shipping routes to the USA and Europe. There is limited data on the actual number of ship/whale incidents in the eastern Scotian Shelf area, although several incidents are recorded on an annual basis, usually involving fin, humpback and occasionally Northern right whales stranded on the bows of ships entering Nova Scotia harbours. The present use of voluntary procedures (*e.g.*, Whale Sanctuary Notice to Mariners) for avoiding ship/whale collisions in the Gully area has been fairly successful in raising awareness and reducing ship/whale interactions. In areas where special caution is needed to avoid such events (*e.g.,* Gully, off Halifax Harbour), measures to reduce vessel speed may also be beneficial.[17]

Land-based Pollution Sources

Based on sparse data from water and sediment samples, the environmental effects of land-based sources of marine pollution do not appear to be significant in the offshore ESSIM Area. Declines have been observed for controlled contaminants such as DDT and PCBs in seals around Sable Island. Ongoing monitoring of the transport of land-based pollutants, such as industrial and agricultural inputs, to the offshore is needed. Long-range inputs from the St. Lawrence River via ocean currents, as well as air pollutant deposition, should also be included.

Point-source Pollution Sources

Point-source pollution issues on the Scotian Shelf specifically relate to shipping, oil and gas, maritime defence operations, and fishing and recreational vessels.

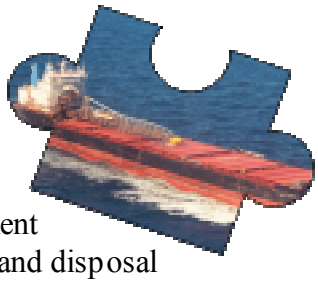
Ship-source Discharges

The eastern Scotian Shelf is a major thoroughfare for shipping to and from ports in Canada, the USA and Europe. The high volume of shipping activity in the area raises important issues related to pollution and interactions with marine life. Shipping routes through marine waters between Nova Scotia and Newfoundland overlap with migratory seabirds. The illegal operational

[17] D.W. Laist *et al.* 2001. Collisions between Ships and Whales. *Marine Mammal Science*, 17(1): 35-75.

and accidental discharge of oil and oily wastewater (*e.g.,* release of bilge water) results in thousands of oiled seabirds each year in the eastern Scotian Shelf area.[18] Given the small amount of oil required for lethal effects, the chronic occurrence of small operational discharges is of concern. Birds oiled at sea die at sea, and pelagic mortalities are likely underestimated based on the number that wash ashore. The cumulative environmental effects of small operational discharges, both accidental and deliberate, may pose more of a threat to seabird populations than a large-scale accident (e.g., tanker grounding), although the potential of such an event is growing given the increased shipping activity in the region. The *Oil Pollution Prevention Regulations*, administered by Transport Canada, currently authorize ship discharges of oily water at 15 ppm in offshore waters and 5 ppm in inland waters. An assessment of the risks and preparedness levels for shipping accidents is also required.

There is potential for accidental discharges of other pollutants and shipboard wastes, including black and grey waters, various chemicals (*e.g.*, polychlorinated biphenyls or PCBs) and solid wastes (*e.g.*, garbage, plastics). The maintenance of equipment for waste management and disposal is regulated by the *Canada Shipping Act* and international regulations. However, compliance remains an issue given the continued presence of sub-standard ships and practices. These concerns are not limited to commercial shipping vessels but also involve fishing and recreational vessels.



Oil and Gas Industry Discharges

In addition to ship-source oil pollution, discharges from offshore oil and gas operations are a risk to seabirds and localized habitat near production platforms. There are a number of environmental concerns and issues related to offshore oil and gas sector activities in the area. These issues involve both current and future offshore operations. Inputs from oil and gas operations include produced water, drilling muds, drill solids, storage displacement water, bilge and ballast water, deck drainage, produced sand, well treatment fluids, cooling water, desalination brine, sanitary and food wastes, and other wastes and residues. Localized operational waste discharges (*e.g.,* drill cuttings) from oil and gas operations have potential to impact the marine environment. DFO research has shown that sea scallops are sensitive to impacts from a variety of used drilling wastes.[19] Evidence in the North Sea suggests that long-term ecosystem effects on primary production and benthic biota may be induced by low-level exposures of produced water. Produced water discharges can induce flocculation processes that mediate the concentration and transport of contaminants to the benthos and the sea-surface microlayer.[20]

The CNSOPB uses a three-level approach to environmental protection, namely regulations, guidelines and policies. Regulations exist under Accord legislation and two sets of guidelines on waste

[18] P.G. Wells, 2001. Oil and seabirds – the imperative for preventing and reducing the continued illegal oiling of the seas by ships, *Marine Pollution Bulletin*, 42(4): 251-252.

[19] P.J. Cranford *et al*. 2001. Scientific Consideration and Research Results Relevant to the Review of the 1996 Offshore Waste Treatment Guidelines. *Can. Tech. Rep. Fish. Aquatic. Sci*. 2364, 25 pp.

[20] D.C. Gordon Jr. *et al*. 2000. Understanding the environmental effects on scallops of water-based drilling mud from potential hydrocarbon exploration on Georges Bank. *Can. Tech. Rep. Fish. Aquatic. Sci*. 2317, 116 pp.

treatment and chemical selection are used as minimum environmental standards for offshore operators. The Board's policies relate to the discharge of oil-based muds, seismic fisheries liaison observers, environmental assessment procedures, and the Gully. Offshore Waste Treatment Guidelines describe minimum standards for the treatment and/or disposal of wastes associated with routine operations of drilling and production installations offshore. Offshore operators are encouraged to reduce the volume of waste discharged and the concentration of contaminants. Compliance monitoring programs are required for the measurement and reporting of waste discharges and the calculation of absolute quantities of oil and other waste contained in discharges. Environmental effects monitoring programs are required to detect and document any adverse environmental effects.

The Sable Offshore Energy Project (SOEP) hearings and public review panel dealt with many of these issues and determined that SOEP's methodology for the treatment and discharge of drilling and production wastes would not result in significant adverse effects on the Scotian Shelf. However, a determination of impacts on the marine environment from potential discharges from undersea flowlines and pipelines is also required and is currently being monitored. There is a requirement for an assessment of the risks of and overall preparedness for ruptured undersea equipment and large blowout/disaster scenarios. Moreover, given that the offshore oil and gas industry is in a state of growth on the eastern Scotian Shelf, an assessment and identification of approaches to address potential cumulative environmental effects are required. Concern exists in the fishing and environmental communities with the general trend toward offshore processing (e.g., Floating Production Storage and Offloading (FPSO) systems) and associated ecosystem risks. In the case of the Deep Panuke Offshore Gas Development Project, an offshore process is proposed to convert the sour gas component (0.2% hydrogen sulphide) into benign sulphates for ocean discharge. Gas processing for Deep Panuke will be addressed in a comprehensive study report under the *Canadian Environmental Assessment Act.*

Maritime Defence-source Pollution

DND policy is to eliminate vessel-source discharge and to meet and where possible exceed all federal/provincial environmental protection regulations. There is potential, however, for accidental discharge of pollutants from ships and submarines, including fuel spills, liquid wastes (*e.g.,* black and grey water), bilge water, ballast water and sediments, solid wastes, hazardous materials (*e.g.,* PCBs, flammable substances, biohazardous/infectious materials, poisons and corrosive agents) and air emissions. However, aside from live firing of non-explosive ammunition, naval vessels are less likely to experience an accidental discharge of a pollutant compared with other vessels on the Scotian Shelf. Ship-source pollutants with the highest occurrence and impact potential are fuel spills, bilge water and ballast water. Ship fuels are generally light with volatile components that disperse quickly in the marine environment. However, torpedo fuels are highly toxic and insoluble. At-sea fueling increases the risk of spills given the varying sea states and conditions involved. For other liquid wastes, the newer vessels are equipped with liquid waste purification systems, while older vessels have oily water separators, oil content monitors, liquid waste treatment systems, grey water collection systems, black water

vacuum collection and holding tanks, and chemical toilets. Standard operating procedures are in place for handling and disposing of hazardous materials and pollution mitigation.

Weapons and Equipment

Misfired ammunition, debris from firing, and spent equipment (*e.g.,* sonobuoys) in the marine environment may pose risks to marine life and other ocean users. For exercise purposes, non-explosive ammunition is used. However, in the case of live ammunition use, there are protocols to ensure that misfired ammunition is discarded overboard as it poses an immediate risk to the crew and ship. To comply with ocean dumping regulations under the *Canadian Environmental Protection Act*, the location and amount of dumped ordinance must be reported to Coast Guard for Notices to Mariners. Jettisoning of ordinance, although very rare, normally takes place in designated zones deeper than 100 m. Spent equipment (*e.g.*, sonobuoys or decoys/markers) may discharge chemical by-products or battery substances, which are deemed sporadic and non-accumulative, although localized impacts may occur from physical disruption of the bottom and chemical by-products. These activities are not considered to have significant marine environmental impacts and are localized in nature.

Marine Protected Areas (MPAs)

MPAs are an important tool for oceans and coastal management under the *Oceans Act*. There are questions regarding possible future designations of MPAs in the eastern Scotian Shelf area, the regulated restrictions within MPAs, and the process through which such action is taken. DFO recognizes that a piecemeal approach to identifying, assessing and mapping important ecological components of marine ecosystems is inherently flawed, and is currently engaged in a systematic approach to mapping and assessing Scotian Shelf ecosystems. In the area of marine conservation and protection, more coordination is required among Environment Canada, Parks Canada and DFO to ensure a consistent approach to the development of a national/regional system of MPAs.

While the overall management of activities in or affecting the ocean will be achieved through integrated management plans, there are highly productive areas, areas of high biodiversity, sensitive habitats, areas of particular importance to coastal communities, and key or limiting habitats for particular species that will need to be proactively identified and protected. These "special areas" may become marine protected areas or MPAs under the *Oceans Act*. Marine protected areas are increasingly used around the world as a long-term management tool for protecting and conserving important species, habitats, and ecosystem processes. Since the passage of the *Oceans Act*, DFO has been developing the Marine Protected Areas (MPA) Program to support the objectives of the Act in conserving and protecting important marine environments and resources. DFO joined two other federal departments, Parks Canada and Environment Canada, in having direct responsibility for the identification, designation, and management of protected areas in the marine environment. Section 35 of the *Oceans Act* provides the purposes for designation and directs DFO to lead and facilitate the development of a national system of marine protected areas. The MPA Program in the Maritimes Region is working toward the national MPA Policy objective and vision to designate "a system of MPAs." Developing the system is a collaborative

planning exercise over the long-term and is closely integrated with broader integrated management initiatives.

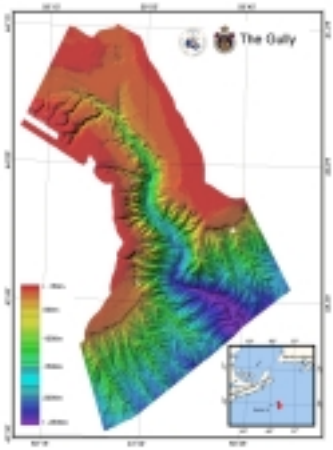
During the development of the Sable Gully Conservation Strategy there was unanimous support from a variety of agencies, industry organizations, conservation groups, and researchers for a more systematic approach to MPA selection, considering a broader ecosystem view, existing planning and regulatory frameworks, and the direct involvement of resource users and other interests. Specifically, the following recommendation was put forward and supported by DFO: "As part of integrated management, DFO lead the development of a comprehensive plan for the selection and prioritization of MPAs on the Scotian Shelf."

Practically, there are a number of activities that help support MPA planning on the Scotian Shelf, including:

- review of protected area system planning methodologies and approaches;
- review of existing management/conservation areas on the Scotian Shelf;
- discussion with various interests, providing suggestions for ecologically and community valued areas;
- ecological classification studies and workshops; and
- ecological overview of the Scotian Shelf environment (Fall 2001 publication).

All interests on the Scotian Shelf have a part to play in protected areas planning. Continued studies, discussions and joint planning efforts, such as though the ESSIM Initiative, will be an important part of identifying, developing and eventually managing a system of protected areas for the Scotian Shelf.

Protecting the Gully



The Sable Gully is a large submarine canyon that bisects the Scotian Shelf between Sable Island Bank and Banquereau. Due to its large size (70 by 20 km) it is unique among canyons along the eastern Canadian margin. The variety of habitat types associated with submarine canyons indicates a high level of biodiversity in the area. Evidence strongly suggests that the Gully is the most important habitat on the Scotian Shelf for some species of whales, particularly the Northern bottlenose whale, a vulnerable species. The Gully has been the focus of national and regional conservation efforts since the early 1990s, attracting attention from hydrocarbon, research and conservation communities. As a result, measures have been put in place by the oil and gas industry, the Coast Guard, the CNSOPB and DFO to reduce impacts on the Gully ecosystem.

In December 1998, following a comprehensive Science Review and the publication of the Sable Gully Conservation Strategy, DFO identified a "core area" of the Gully as an Area of Interest (AOI) in the Marine Protected Areas (MPA) Program. Before legal designation can occur, assessments, consultations and regulatory reviews must be undertaken, as described in the National Marine Protected Area Framework. The suggested conservation objective for the Sable Gully is to:

"conserve and protect the natural biological diversity and integrity of the Sable Gully ecosystem to ensure its long-term health and sustainable use."

The Sable Gully is a poorly understood shelf-edge canyon located in an area that is experiencing rapid growth in human use. To develop a management plan for the area, many questions need to be addressed by DFO together with well-informed working groups. Engaging these parties along with other regulators and the scientific community will continue to be a key part of the Gully planning process.

Several challenging issues are associated with managing human impacts on the Gully ecosystem, including: minimizing noise impacts on cetaceans; benthic disturbance; direct interactions on cetaceans; allowing compatible use; establishing ecosystem boundaries; determining the effects of surrounding activities; and the application of the precautionary approach, to name a few. Challenges aside, the Gully provides an unprecedented opportunity for collective learning and action around marine conservation issues on the Scotian Shelf.

Potential Issues

Offshore Minerals Development

Substantial mineral deposits exist in a variety of places on the ocean floor and may present significant mineral investment and development opportunities for Canada. The eastern Scotian Shelf has good potential for offshore mineral development focused on seabed aggregates and gold. The main issues involved in offshore mining are benthic habitat disturbance and the impact on productive fisheries habitat. As part of an initiative investigating the need for a Canadian offshore minerals management regime, Natural Resources Canada has prepared reports on the socio-economic, environmental and technical aspects of offshore mineral development and is considering a public consultation process in 2002 to examine the risks and opportunities associated with this ocean industry.

Open-ocean Aquaculture

Given current human population increases and shifts in consumption towards seafood globally, it is projected that wild fisheries may not be able to meet future consumer demands. It is expected that current population shifts toward coastal areas will increase user conflicts and anthropogenic sources of pollution limiting coastal aquaculture production. As a result, open-ocean aquaculture is viewed as a viable option for future seafood production to meet consumer demand. The feasibility of offshore aquaculture operations in the ESSIM Area is uncertain at the early stage of the development of this sector and is therefore an emerging issue.

Climate Change

Climate change is the greatest environmental and economic challenge facing the world today – one that calls for action on many fronts. Low-lying and coastal regions will be forced to cope with the impacts of rising sea levels, as increasing temperatures cause oceans to expand. Actions include: increasing our understanding of the science of climate change; reducing the volume of greenhouse gas emissions (GHGs) emitted to the atmosphere from industry, transportation and other activities; identifying present and future impacts of climate change; and adapting to the effects of climate change that will be felt during our lifetime and for future generations to come. Continued research is required to address the implications for offshore ecosystems (*e.g.*, effects of shifting

temperature regimes on biological productivity).

COMPLIANCE AND ENFORCEMENT

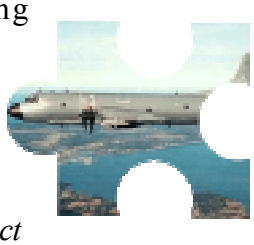
Surveillance and Enforcement Capacity

Integrated compliance and enforcement mechanisms and arrangements are essential for effective oceans and coastal management. The effectiveness of maritime surveillance, monitoring and control operations in the eastern Scotian Shelf area is dependent largely on co-operative and co-ordinated efforts among enforcement departments and agencies. However, even with the current good level of interagency co-ordination, shrinking budgets, competing enforcement priorities, and the limited availability of surveillance and patrol assets pose major challenges. In addition, the compliance component must be better understood and incorporated into maritime enforcement approaches, and the relationship between regulators and user groups regarding sanctions and self-regulation can be improved in all ocean use sectors. It is generally agreed that penalties against pollution-related violations do not provide sufficient deterrence value.

Nature of Illegal Activities

A range of compliance and enforcement issues has been identified for the eastern Scotian Shelf. Compliance issues exist with respect to quotas, gear restrictions, seasons, closed areas, and licence conditions under the *Fisheries Act* and associated regulatory mechanisms. Compliance and enforcement concerns relate to shipping in the area, including illegal operational ship-source discharges, non-compliance by ship masters of vessel traffic management regulations, and substandard shipping practices in violation of the *Canada Shipping Act* and international legal regimes, such as International Maritime Organization (IMO) conventions and Port State Control regimes.

There are concerns relating to the non-reporting of accidental waste discharges from operations in the shipping and oil and gas sectors. The coordination of enforcement agencies (*e.g.*, RCMP, Customs, DND, Coast Guard) for drugs and illegal immigration/smuggling is an increasing priority for the region. Violations of Environment Canada's ocean disposal permitting process under the *Canadian Environmental Protection Act* need to be addressed.



JURISDICTION AND INSTITUTIONAL ARRANGEMENTS

Management Jurisdictions and Mandates

There are a number of issues relating to management jurisdictions and mandates within the ESSIM Area. This relates primarily to the multiple-use and multi-regulated nature of the area, as exemplified by the case of oil and gas where there are overlapping jurisdictions with respect to the roles in environmental protection standards, as well as uncertainties regarding ownership and jurisdictional issues over offshore mineral resources.

Internationally, there are a number of relevant maritime conventions and agreements governing all aspects of marine transportation. The most important of these international instruments are adminstered by the International Maritime Organization (IMO).

An important issue is the question of federal/provincial jurisdiction, as ownership of submerged lands remains unresolved and contentious. There are differing views between federal and provincial governments with respect to ownership of the offshore seabed. The *Oceans Act* states that federal jurisdiction is not shared with the provinces[21], however, this issue remains legally untested and is one of the more important issues for consideration. Meanwhile, Section 4 of the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*, claims precedence over other Acts of Parliament dealing with offshore petroleum resource management and revenue sharing. Although the Accord Act is the lead over more general acts regulating oil and gas activities, it does not exempt oil and gas activities from meeting legal obligations under other applicable acts (*e.g.*, *Fisheries Act, CEPA, CEAA*).

Although the federal government has claimed sovereign rights to the seabed and subsoil to the limits of the juridical continental shelf under the 1982 United Nations Convention on the Law of the Sea[22], the potential jurisdictional overlap is illustrated by Nova Scotia's *Energy and Mineral Resources Conservation Act*, which "applies to all Nova Scotia lands, which means the land mass of Nova Scotia including Sable Island, and includes the seabed and subsoil off the shore of the land mass of Nova Scotia, the seabed and subsoil of the continental shelf and slope and the seabed and subsoil seaward from the continental shelf and slope to the limit of exploitability."[23] Furthermore, the provincial *Crown Lands Act* is used for the permitting of cable easements and rights-of-way to the seabed to 150 nautical miles offshore.

Although the full extent of provincial maritime jurisdiction in inshore areas needs to be determined, Section 7 of the *Oceans Act* states that "the internal waters of Canada and the territorial sea of Canada form part of Canada." However, there are constitutional issues with respect to what Nova Scotia brought into Confederation in terms of property rights. Nova Scotia has exercised spatial jurisdiction over activities in provincial bays and therefore may have some territorial sea rights in inshore areas.

The *Oceans Act* provides for the application of provincial laws through regulations to the internal waters, the territorial sea of Canada that is not within a province, the exclusive economic zone, and the continental shelf.[24] Provincial laws could be applied to the same extent as federal laws to maritime areas, as if those areas were within provincial territory.

Decision-making Processes

Wherever possible, existing management structures and processes will be used and incorporated into the integrated ocean management process. It is not the intent of integrated ocean management to replace existing sectoral processes but rather to provide overall coordination, coherence and balance to the manner in which an ocean or coastal area is managed. This can involve coordination of government policies, regulatory approaches and management actions, the building of vertical and horizontal linkages within and between government departments to achieve more collaborative and balanced decisions, as well as agreed mechanisms for problem solving

[21] Sections 3 and 8, *Oceans Act*.
[22] Section 18, *Oceans Act*.
[23] Section 4, *Energy and Mineral Resources Conservation Act*. R.S., c. 147, s. 1.
[24] Section 9, *Oceans Act*.

in support of consensus-based planning and decision making. As the management plan is developed, the roles and responsibilities of all parties will need to be identified and incorporated in terms of reference for participation. It is envisioned that a form of participatory decision making will evolve under ESSIM, in which those with authority to make a decision and those who will be affected by that decision jointly seek an outcome that accommodates the interests of all concerned to the greatest extent possible. However, shared decision making does not affect the legal authority of participating governments.

A key concern with ESSIM is how the integrated management planning process fits with the existing management processes, structures and plans (*i.e.*, DFO Integrated Fisheries Management Plans, Canada-Nova Scotia Offshore Petroleum Board authorizations). Concerns relate to what integrated management means, how it will affect existing processes, and how decision making within sectoral management lines will be affected. There is an overall perception that "government should get its act together first" before moving forward with ESSIM. Some components of the fishing industry would prefer to see more emphasis placed on "higher level" policy and legislative harmonization/coordination, leaving more detailed decision-making to existing sectoral management structures and arrangements.

Aboriginal Rights

The rights of aboriginal peoples in environmental management and to coastal resource access are a developing area of international discussion. These rights are recognized in Principle 22 of the Rio Declaration[25] and in Article 27 of the UN Universal Declaration on the Rights of Indigenous Peoples.[26]

In Canada, aboriginal peoples have constitutional protection for their rights in section 35 of the 1982 *Constitution Act*. Thus, any legislation enacted by federal and provincial governments is subject to existing treaty and aboriginal rights, although the Supreme Court has not articulated the full scope of these rights. The treaty rights recognized and affirmed by the federal government include rights that now exist by way of land claims agreements or may be so acquired. In the 1990 *Sparrow* decision[27], the Court determined that the government has a responsibility to act in a "fiduciary capacity" with respect to aboriginal peoples and that the relationship between government and aboriginal peoples is trust-like rather than adversarial. The Court also emphasizes the "duty to consult" with aboriginal peoples to determine whether an infringement of rights or title is justified under section 35 of the *Constitution Act*, but the scope of the duty to consult is unclear. Leading Court decisions regarding aboriginal rights and title clarify that any government legislation or program that infringes aboriginal rights will be considered unconstitutional to the extent that the infringement cannot be justified. Hence, in the development of coastal and oceans management plans, aboriginal rights must be taken into consideration and government has a duty to consult with aboriginal peoples in the development of plans where rights may be infringed. Furthermore, the federal government is mandated by the *Oceans Act* to collaborate and cooperate with affected

[25] Rio Declaration on Environment and Development, 13 June 1992. UN Doc. A.CONF 151/5/Rev.1

[26] UN Doc. E/CN.4/Sub.2/1994/2/Add.1 (1994).

[27] R. v. Sparrow [1990] 1 Supreme Court Report 1075.

aboriginal organizations on the development and implementation of an Oceans Strategy and integrated management plans. However, the Act does not provide further guidance on First Nation involvement in marine resource management.

Within DFO, there is recognition of the need to engage aboriginal groups in oceans management institutions and processes to address integration across all ocean sectors, in addition to aboriginal fisheries interests. ESSIM could represent a model for the future integration of broader aboriginal rights within ocean-related governance mechanisms. Some Aboriginal interests have asserted that their involvement in renewable and non-renewable resource development projects in the ESSIM Area is likely to expand in the future.

Institutional Design for Integrated Management

The design, development and eventual establishment of an integrated (*i.e.,* multi-interest) planning process for ESSIM requires the careful balancing of many considerations. The goal is to establish a collaborative process and structures that respect and build on existing jurisdictional authorities and responsibilities of various levels of government and enables/balances multiple oceans use with ecosystem objectives for the management area. The best way to move ESSIM forward is through an open, collaborative and inclusive process for government agencies responsible for managing the area and its activities.

Capacity and Willingness for Engagement

There are varying levels of capacity and/or willingness to engage in the integrated planning and management process. To truly engage the offshore fishing industry, for example, entails 20–30 people sitting at the table. In terms of willingness to participate, certain interests have expressed concern about the degree of influence of the multilateral process over existing management structures and processes. Consequently, some interests may be reluctant to participate in the early stages of the integrated management process. There are various means of persuading parties to come to the table, but since integrated management is a collaborative approach that cannot be forced upon anyone, ultimately parties must make their own decision. Finally, given existing concerns that large, multi-stakeholder meetings could become contentious for competing ocean interests, there appears to be a unanimous preference among all interests to continue to engage with DFO on an informal and bilateral basis. There is value in continuing with bilateral discussions with all ESSIM stakeholders. The risk of not continuing with bilateral processes is that of losing participants should the integrated, multilateral process be perceived as moving too quickly.

SCIENCE, RESEARCH AND DEVELOPMENT

Support to Ecosystem-based Management

There are a number of important issues and opportunities relating to science, research and development in the eastern Scotian Shelf area. The understanding and operationalization of ecosystem-based management and precautionary approaches is essential for the implementation of the *Oceans Act*. This is closely related to the establishment of marine environmental quality (MEQ) objectives in integrated management plans.

Cooperation and coordination of science, research and development is essential and must involve the entire scientific community, including government scientists, university researchers, and private sector research and development. Issues of science policy, particularly interactions among policy makers, managers and scientists must be addressed.

Information Management

Effective oceans and coastal management must be supported and based on systematic mapping and data collection. This must in turn be managed, used, shared and disseminated widely. There are improved information management tools available to do this, such as geographic information systems (GIS) and visualization software. The use of multi-beam mapping in conjunction with other systems holds important potential for improved resource understanding and management. However, with increased knowledge comes increased responsibility, and the use of this data must be carefully managed.

The issues of sharing, access and ownership of data impinge on the capacity and capability for oceans management. The growth in marine databases containing spatial attributes has increased the demand for standardised geographic data and vizualization tools, which are accessible to clients requiring data access for quick display and decision making. Much of the required data is available and accessible, but in many cases, the data is provided in formats that cannot be layered, displayed and compared. Policy coordination with respect to access, sharing and ownership of data holdings may need to be addressed. Various government and industry funding mechanisms can be pursued to address current data gaps.

CULTURAL RESOURCE PROTECTION

Sable Island

Sable Island is a special place warranting continued environmental and cultural resource protection. The governmental and non-governmental organizations with an interest in Sable Island are to be represented in the ESSIM planning process. Submerged cultural resources from shipwrecks are significant around Sable Island and their protection from unscrupulous treasure hunters is important. The protection of underwater cultural heritage will be enhanced through the draft International Convention for the Protection of Underwater Cultural Heritage currently being negotiated under the auspices of UNESCO. The designation of Sable Island as a UNESCO World Heritage Site of outstanding natural beauty within a unique surrounding marine ecosystem would promote public awareness of marine conservation in Canada.

III. BENEFITS AND OPPORTUNITIES

What are the expected benefits of the ESSIM process?

Accomplishing the vision of the *Oceans Act* through the ESSIM planning process will take time and considerable commitment from all involved. This initiative can result in a number of benefits and positive outcomes:

Clarified Management Roles and Jurisdictions

Ocean management and planning will increase understanding and clarification of management roles, responsibilities and jurisdictional issues for all levels of government and for all ocean users and interests.

Improved Service Delivery of Government Programs

Integration of ocean and coastal policies, legislation and management objectives will lead to improved service delivery of government ocean-related programs, as well as clarity, consistency and a level playing field for industry.

EEZ Management and Sovereignty Protection

The effective management of the Exclusive Economic Zone (EEZ) will result in resource protection, enhanced maritime security and the protection of sovereignty.

Agreed Set of Environmental Protection Objectives across Government

An agreed set of comprehensive environmental protection objectives will increase efficiencies and certainty for development and environmental protection. Ocean use areas can be delineated via an ecosystem approach, integrated management and MEQ objectives, and potentially regulated through the application of MEQ standards.

Maintenance of Ecological Services

The oceans are a major component of the global life-support system and have inherent value in terms of the ecological services they provide. Improved environmental health will result in improved resource health and community/social well-being.

Greater Certainty and Transparency for Industry Development

Having integrated management plans in place for estuarine, coastal and marine waters will result in greater certainty and transparency for development and management.

Improved Environmental Assessments

Improved environmental assessment procedures and clear and consistent processes will result in cost and time savings for developers and regulators. The multiple ocean uses in the Eastern Scotian Shelf require that cumulative impact assessments be considered. Cumulative impacts result from the incremental impact of the action under review when added to other past, present, and reasonably foreseeable future actions.

Contribute to Sustainable Coastal Communities

One of the important outcomes of effective oceans management is the creation of a climate for economic diversification and the sustainable generation of wealth for coastal communities.

Improved Linkages among Science, Policy and Management

The expertise for oceans and coastal management in the social sciences, natural sciences, policy development and management spheres will be networked using an integrated approach.

Strategic Direction of Science and Research Needs

Integrated ocean and coastal management will lead to the prioritization of science and research needs to move the management and planning process forward.

Improved Access and Sharing of Information/Data

Oceans management and planning requires effective outreach and sharing of ocean information and data from all sources for the benefit of all users.

Canadian Technology and Knowledge Exports

Building on Canada's leadership position in international ocean affairs, there is substantial export potential for Canadian ocean technology, knowledge and expertise.

IV. ISSUE PRIORITISATION

The issues and challenges outlined above have varying degrees of importance that require a priority ranking determined by the ESSIM partners in order to assess which are dealt with in the short, intermediate and longer-term planning process. Some degree of consensus is needed with respect to the implementation of an intergovernmental workplan for ESSIM. On the basis of written comments received and discussions with stakeholders, issue prioritisation will be developed under the multi-stakeholder ESSIM planning and management process. Please submit your comments to the DFO/OCMD contact in the preface of this document.

ANNEX – Summary of ESSIM Issues and Challenges

Category	Issue	Key Factors
Multiple Oceans Use	Timelines for Management	Balancing development of IM process vs. ocean development timelines
	Competing Values	Balancing economic, environmental, cultural/traditional and social objectives; Determining priority of ocean use; Address competing values in decision making
	Spatial Conflicts	Seasonal spatial conflicts exist; Inter- and intra-sectoral spatial conflicts exist
	Sensitive Area Identification	Identification of sensitive ecological areas is a priority; Cooperative process needed
	Economic Valuation of Uses/Resources	Relevance of an oceans economics valuation study in decision making
Marine Safety	Prevention and Response Capabilities	Maintenance and modernization of aids to navigation, communications; Interdepartmental coordination; Safety training, planning and auditing programs
Marine Conservation & Environmental Protection	Ecosystem Approaches to Oceans Management	Operationalizing ecosystem management objectives
	Cumulative Ecosystem Effects	Additive and/or synergistic effects in space & time; Operational mechanism to consider cumulative effects required; Need a vehicle with oversight and "gatekeeper" functions; ESRF workshop recommends DFO to lead development of a viable approach to regional CE assessment
	Fishing Industry Impacts	Habitat disturbance/impacts; Ecosystem impacts of fishing
	Marine Invasive Species - *Ballast Water* - *Hull Fouling*	Offshore impacts of invasive species exist?; Voluntary ballast exchange guidelines in place; Development of Alternative Ballast Water Exchange Zone; Phase out of organotin; Marine invasive threat via hull fouling?
	Acoustic Disturbances - *Seismic Survey Effects* - *Other Acoustic Disturbances from Oil and Gas* - *Vessel-related Noise* - *Maritime Defence-related Noise*	Seismic impacts research on marine mammals, fish, sea turtles Noise exists from oil and gas exploration and development activities; Cumulative effects issues Noise from domestic/int'l vessel traffic exists; Cumulative effects issues Noise at-sea from ongoing naval operations, sonar, explosives, etc.; Potential issue of SURTASS low frequency active (LFA) sonar
	Ship/Whale Conflicts	Relatively unknown seasonal/spatial distributions; Costs to shipping to change routing (time /financial); Voluntary measures exist; IMO special/sensitive areas designation?
	Land-based Pollution Sources	Monitoring required of land-based and long-range inputs to the offshore

ANNEX – Summary of ESSIM Issues and Challenges

Category	Issue	Key Factors
	Point-source Pollution Sources - *Ship-source Discharges* - *Oil and Gas Industry Discharges*	Birds oiled at sea issue; Cumulative effects of oil at sea; Compliance and enforcement; Ship waste management and disposal Drilling and production wastes; Produced water / drilling muds etc., cumulative effects of inputs
	Maritime Defence-source Pollution - *Weapons and Equipment*	Accidental discharge of pollutants Misfired ammunition, ordinance, spent equipment
	Marine Protected Areas	Future MPAs -- where?; Coordination required with DFO, EC and Parks Canada; Identification of productive/sensitive/important areas; Developing a system of MPAs
	- *Protecting the Gully*	Minimizing noise, benthic disturbance, interactions with cetaceans, allowing compatible use; Establishing ecosystem boundaries; Determining effects of surrounding activities; Applying the precautionary approach
	Potential Issues - *Offshore Minerals Development*	Benthic habitat disturbance/ lost productive fisheries habitat; Management regime still lacking
	- *Open-ocean Aquaculture*	Offshore aquaculture feasibility uncertain; Emerging issue
	- *Climate Change*	Science and understanding effects
Compliance & Enforcement	Surveillance and Enforcement Capacity	Requires coordinated efforts interdepartmentally; Reduced budgets, competing priorities, limited assets; Incorporating compliance component in enforcement approaches; Penalties are of insufficient deterrence value
	Nature of Illegal Activities	Compliance matters related to fisheries, shipping, drugs, illegal immigration/smuggling, etc.
Jurisdiction & Institutional Arrangements	Management Jurisdiction and Mandates	Overlapping federal/provincial jurisdictions that cannot be resolved by the ESSIM WG.
	Decision-making Processes	Existing management structures to be used; Coordination of policies, regulatory approaches and management actions; IM planning process links to existing processes
	Aboriginal Governance	Aboriginal rights must be considered in integrated ocean management plans; Federal government mandated to collaborate and cooperate with aboriginal organizations on the Oceans Strategy and IM plans

ANNEX – Summary of ESSIM Issues and Challenges

Category	Issue	Key Factors
	Institutional Design for Integrated Management	Shared ownership of the process required to move ESSIM forward
	Capacity and Willingness for Engagement	Varying capacity/willingness to engage in IM planning process; Bilateral and multilateral processes should occur in tandem
Science, Research & Development	Support to Ecosystem-based Management	Operationalization of ecosystem-based management and precautionary approaches; MEQ objectives (and MEQ guidelines and standards, as required); Cooperation and coordination of science community
	Information Management	Systematic mapping and data collection; Policy coordination on sharing, access and ownership of data
Cultural Resource Protection	Sable Island	Sable Island is a special place warranting continued protection; Submerged cultural resources are significant and require protection

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