

AT RISK SPECIES



State of the Scotian Shelf Report



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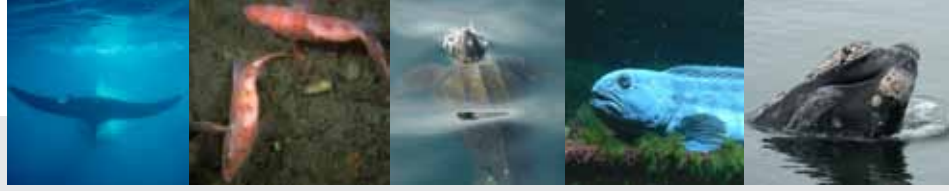
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CONTENTS

1	ISSUE IN BRIEF.....	4
2	DRIVING FORCES AND PRESSURES	6
	2.1 Natural Conditions.....	6
	2.2 Anthropogenic Activities.....	8
3	STATUS AND TRENDS.....	10
4	IMPACTS	16
5	ACTIONS AND RESPONSES.....	18
6	REFERENCES.....	23

1

ISSUE IN BRIEF

Marine ecosystems are experiencing accelerating loss of populations and species, and their recovery potential is decreasing with declining diversity. (Millenium Ecosystem Assessment 2005a). Marine biodiversity loss is increasingly impairing the ocean's capacity to provide food, maintain water quality, and recover from perturbations (Worm et al. 2006). The Scotian Shelf is being subjected to numerous anthropogenic activities that have potentially damaging, and cumulative, impacts on the diversity of resident and migratory marine organisms (Zwanenburg et al. 2006; see Figure 1). Long-term changes in climate may also have implications for the distribution of species on the Scotian Shelf. The Shelf currently has at least 28 resident or migratory species of marine mammals, fish and reptiles that have received designation from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being either, extirpated, endangered, threatened, or of special concern. The designations are based mainly on the degree of observed decline in population size. Anthropogenic activity on the Scotian Shelf is most often cited as the main reason why the populations of each of these species have declined, and an ongoing process of assessment continues to designate additional species (COSEWIC 2009). Further designation of species by COSEWIC, and continued loss of individuals of classified endangered species, has significant potential political, social, economic, legal, and ecological implications. There are numerous international and national legal instruments that currently contribute to the protection of species on the Scotian Shelf, and these have led to the establishment of numerous governance structures, and associated programs focusing on each of the designated species. In particular, the promulgation and implementation of the Canadian *Species at Risk Act (SARA)* has led to mandatory recovery strategies and recovery plans for Schedule 1 species at risk on the Scotian Shelf. There are eleven Scotian Shelf species that have received Schedule 1 designation, thus requiring mandatory recovery planning under *SARA*.

LINKAGES

This theme paper also links to the following theme papers:

- >> Marine Habitats and Communities
- >> Incidental Mortality
- >> Invasive Species
- >> Trophic Structure
- >> Commercial Fisheries
- >> Noise
- >> Climate Change

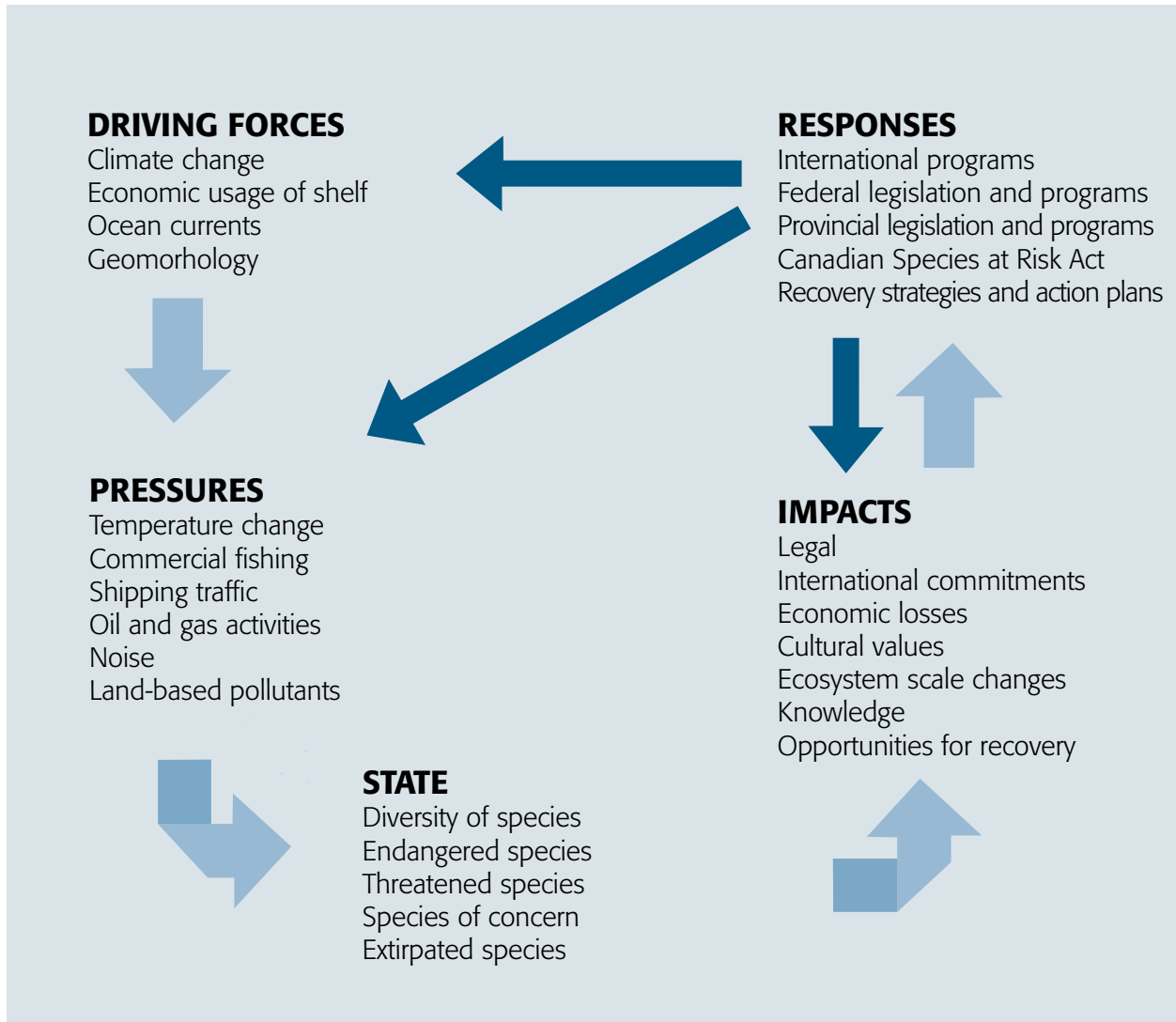
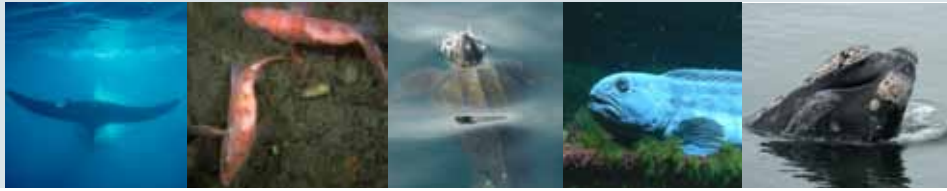


Figure 1: Driving forces, pressures, state, impacts and responses (DPSIR) for at-risk species on the Scotian Shelf. The DP-SIR framework provides an overview of the relation between the environment and humans. According to this reporting framework, social and economic developments and natural conditions (driving forces) exert pressures on the environment and, as a consequence, the state of the environment changes. This leads to impacts on human health, ecosystems and materials, which may elicit a societal or government response that feeds back on all the other elements.

2

DRIVING FORCES AND PRESSURES

2.1 NATURAL CONDITIONS

The variety of natural physical and chemical factors that influence the biological productivity, range of habitats and variety of species on the Scotian Shelf has been well described (Davis and Browne 1996; Breeze et al. 2002; Zwanenburg et al. 2006; see also *Offshore Habitats and Communities*). The Shelf is relatively wide, extending from 125-230 km off the coast of Nova Scotia, and has an area of approximately 96 000 km². It can be divided into four main zones: an inner, middle, outer and a continental slope (Davis and Browne 1996). Within these zones there are basins more than 200 m in depth and shallow banks less than 50 m deep. There are also several steep-sided submarine canyons indenting the shelf slope, of which the largest is the Gully with a depth greater than 2 000 m. These features provide for a wide range of habitat, and trophic environments for pelagic, demersal and benthic species, as well as an area which attracts many migratory species.

The temporal and spatial (vertical and horizontal) distribution of most species, resident and migratory, on the Scotian Shelf is highly related to temperature, salinity and ocean currents, which display both a seasonal and long-term variation (Zwanenberg et al. 2002; Pickrill and Kostevlev 2007). The Labrador Current and the Gulf of St Lawrence outflow converge and flow in a southerly direction to form the Nova Scotian Current, which carries relatively cold water over the Shelf. This southerly flow is influenced on its periphery by the warmer Gulf Stream that allows warm water to penetrate the southern part of the Shelf over the continental slope (**Figure 2**). Temporal and spatial variations in water temperature contribute to stratification of the water column and a fairly wide variation in winter (0-4°C) and summer surface water temperatures (0 -17°C; Breeze et al. 2002).

Global climate change is a long-term factor that has implications for biological diversity of the Scotian Shelf (see Climate Change and its Effect on Ecosystems, Habitats and Biota). Sea surface temperature

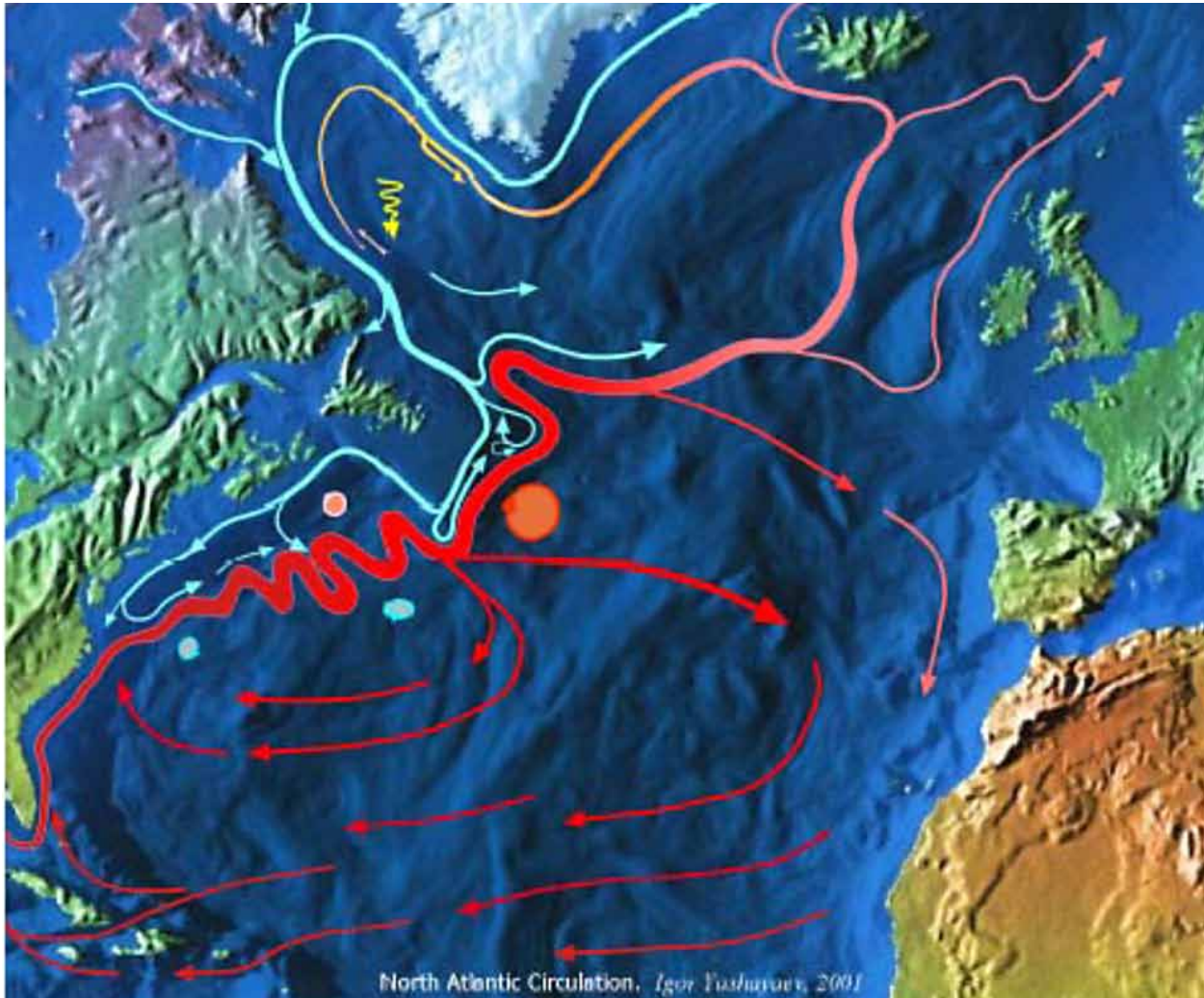
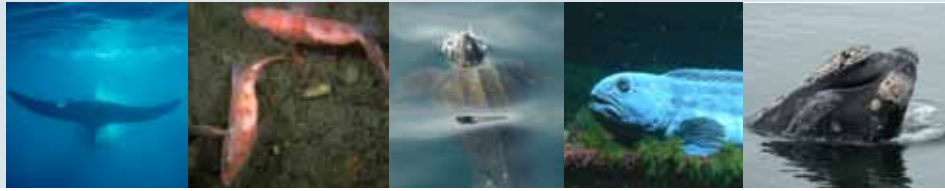


Figure 2: Surface circulation of the North Atlantic. The red arrows indicate warmer, more saline waters and the blue arrows indicate cooler, fresher waters (from Breeze et al. 2002).

data along the Halifax line from the last 70 years indicate warming and cooling cycles (see *Trophic Structure*). However, Aquarone and Adams (2009) present evidence of a warming trend for waters of the Scotian Shelf of about 2°C over the

last 40 years, and conclude that it is one of the world's fastest warming large marine ecosystems. This warming of the ocean is projected to lead to a progressive northward shift in distribution of many species (Lemmen et al. 2009).

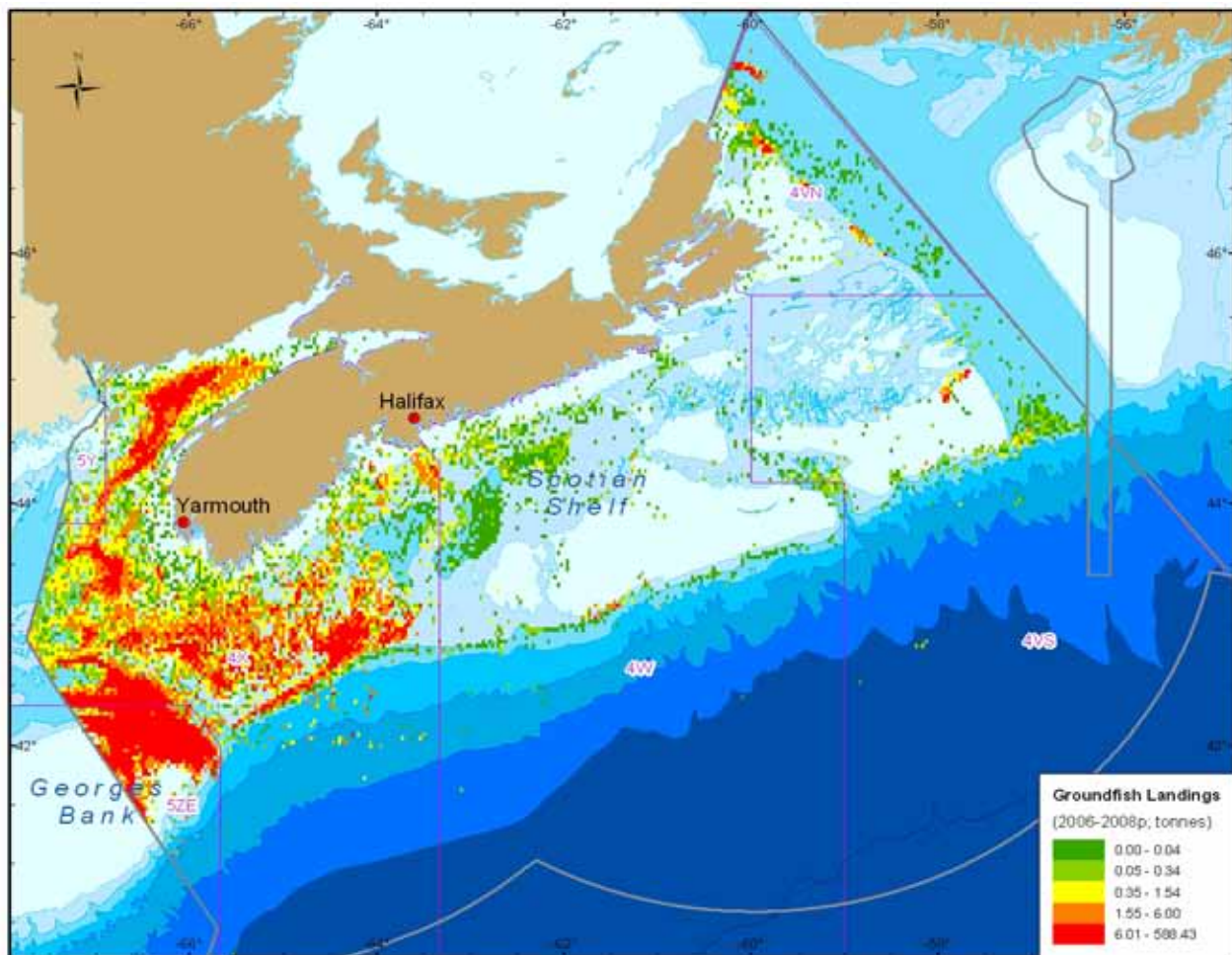


Figure 3: Groundfish landings (2006-2008). Source: DFO 2010

2.2 ANTHROPOGENIC ACTIVITIES

There are numerous economic sectors and trading partners that are dependent on the natural resources of the Scotian Shelf (Gardner Pinfold 2009). It is an economically active area with various sectors making use of its resources (fisheries, oil and gas, communications, shipping etc.; DFO 2007a). As a consequence there are numerous human influences that have an impact on biota and habitats of the Scotian Shelf (Zwanenburg et al. 2006). These impacts have a cumulative effect on habitat, trophic interactions, populations and the status of individual species.

Commercial fishing is extensive over the Shelf

with a variety of species (benthic, demersal and pelagic) being landed using different technologies and methodologies (hydraulic clam dredges, otter trawls, scallop dredges, longlines, gillnets and pots - e.g. **Figure 3**). As well as impacting commercial fish species through over-exploitation, fishing activity affects many non-commercial species through incidental capture and/or entanglement (Van derlaan and Taggart 2009). Parker and Worcester (2010) indicate that catches during trawl fisheries can include between 50 to 400 bycatch species. A high proportion of species such as the right whale (almost 75%) have been observed to have scars indicative of an entanglement at some time in their lives (Knowlton et al. 2005).

Several areas on the Scotian Shelf have been

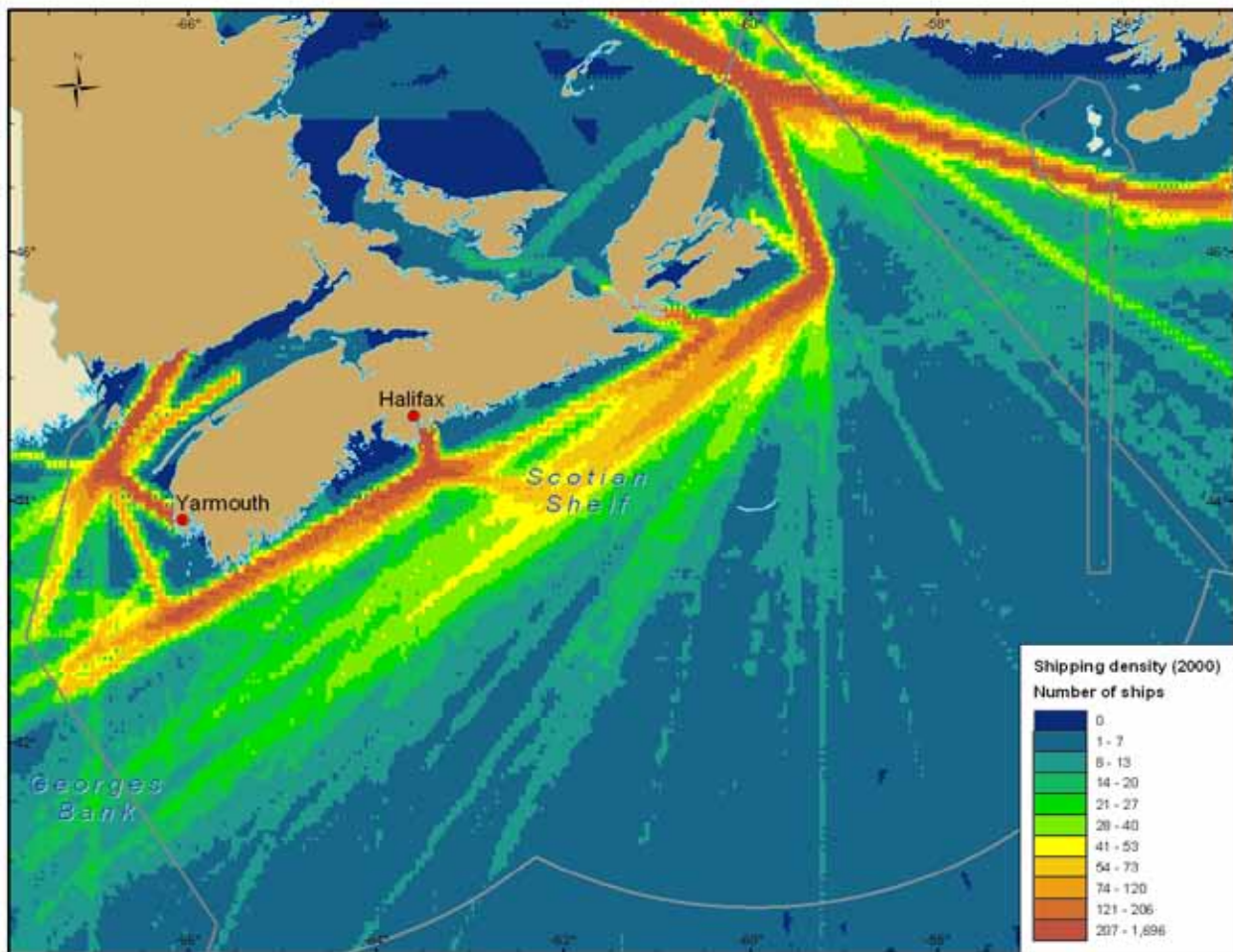


Figure 4: Map showing the density of inbound marine traffic over the Scotian Shelf for 2000 (source: DFO 2005).

licensed for oil and gas exploration and development over the past three decades. These activities have involved seismic exploration, test drilling and site development (particularly in the Sable Island area). There are many potential impacts which have been identified such as: influences of drilling wastes and produced water; accidental spills of hydrocarbons and drilling fluids, and the influence of seabed structures such as platforms and pipes (Zwanenburg et al. 2006).

The Scotian Shelf is subject to significant levels of marine traffic between Canada, the US and Europe (Figure 4). The probability and risk of shipping strikes on large marine animals is fairly high (Vanderlaan and Taggart 2009). Estimates show that there have been 21 ship strike mortalities of the North Atlantic right whale over the period 1991 to 2007 and that this represents

50% of all observed mortalities for this period (Brown et al. 2009).

There is also concern that sources of chemical contaminants (land-based and industry based), which ultimately end up in the sediments and then various levels of the food chain, might also have a longer term influence in the general biodiversity of the Scotian Shelf ecosystem (Stewart and White 2001). Noise from shipping and seismic exploration is also considered to be a factor which vitiates the marine environment, particularly for species that use sound for ecolocation (Breeze et al. 2002; see *Ocean Noise*).

3

STATUS AND TRENDS

COSEWIC Marine Candidate List for the Atlantic Area (September 2010)

HIGH PRIORITY

- » Ocean pout

MEDIUM PRIORITY

- » Alewife
- » Capelin
- » American shad
- » Haddock
- » Spinytail skate
- » Spiny eel
- » Pollock
- » Cuvier's beaked whale

LOW PRIORITY

- » Hooded seal
- » Harp seal
- » Sperm whale
- » Kemp Ridley sea turtle

From an international perspective, the International Union for Conservation of Nature (IUCN 2001) and the United Nations Convention on International Trade of Endangered Species (CITES, <http://www.cites.org/eng/resources/species.html>) provide information and lists of endangered and threatened species which are of concern for respective areas and regions of the world. Some of these species, especially those that are migratory (e.g., the leatherback sea turtle and the North Atlantic right whale) are also found on the Scotian Shelf (IUCN 2001). In Canada, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), under its mandate from the *Species at Risk Act (SARA)*, provides the main mechanism by which species at risk are assessed and designated according to their degree of endangerment. Under *SARA*, using specific criteria and scientific information on populations and habitat, COSEWIC evaluates the status of the country's wildlife and assigns risk categories to species (http://www.cosewic.gc.ca/eng/sct3/index_e.cfm - see also section 5 which deals with responses). The Canadian Species at Risk Public Registry (<http://www.sararegistry.gc.ca/>) provides an ongoing summary of the status of species at risk in Canadian marine waters. Based on the Canadian approach, there are several categories of "at risk" species that have been designated for attention.

Extinct - a species that no longer exists.

Extirpated - a species no longer existing in the wild in Canada, but occurs elsewhere.

Endangered - a species facing imminent extirpation or extinction.

Threatened - a species likely to become endangered if limiting factors are not reversed.

Special concern - a species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.



Examination of the Canadian Species at Risk Public Registry yields the following information for the Atlantic Canada region, which incorporates the geographic area of the open water Scotian Shelf (**Table 1**):

There are 32 species that have COSEWIC status (20 species of fish, 2 reptiles and 10 mammals). There are no molluscs, arthropods or birds listed for the Atlantic region. The Scotian Shelf does have marine birds associated with it (Breeze et al. 2002), and these are listed in the Public Registry under Nova Scotia. Their critical habitat is more associated with land-based areas (mainland Nova Scotia and islands) than the open water offshore area of the Scotian Shelf and, consequently have not been included in this analysis.

Of the 32 species, none are extinct, two are extirpated, eleven are endangered, seven are threatened and twelve are of special concern.

Many species in Canada have not yet been assessed by COSEWIC, but are suspected of being at some risk of extinction or extirpation. These species, referred to as 'candidate wildlife species', are listed in terms of their priority for assessment (see p. 10). Assessment of species is an ongoing process and the Public Registry list is continually being updated as more species are brought to the attention of COSEWIC.

Of the 32 species, only 14 have been scheduled under *SARA* (i.e., ~44%).

Table 1: Status of species that have been assessed by COSEWIC for the Atlantic region, and are associated with the Scotian Shelf. List accessed from http://www.sararegistry.gc.ca/sar/index/default_e.cfm in September 2010. It should be noted that the list is continually being up–dated as new species are added, and progress is made on COSEWIC assessments.

COMMON NAME	SCIENTIFIC NAME	TAXON	COSEWIC STATUS	SCHEDULE	SARA STATUS
Acadian Redfish	<i>Sebastes fasciatus</i>	Fishes	Threatened	No schedule	No Status
American Eel	<i>Anguilla rostrata</i>	Fishes	Special Concern	No schedule	No Status
American Plaice	<i>Hippoglossoides platessoides</i>	Fishes	Threatened	No schedule	No Status
Atlantic Cod (southern population; Laurentian South)	<i>Gadus morhua</i>	Fishes	Endangered	No schedule	No Status
Atlantic Salmon (Inner Bay of Fundy)	<i>Salmo salar</i>	Fishes	Endangered	Schedule 1	Endangered
Atlantic Wolffish	<i>Anarhichas lupus</i>	Fishes	Special Concern	Schedule 1	Special Concern
Basking Shark	<i>Cetorhinus maximus</i>	Fishes	Special Concern	No schedule	No Status
Blue Shark	<i>Prionace glauca</i>	Fishes	Special Concern	No schedule	No Status
Cusk	<i>Brosme brosme</i>	Fishes	Threatened	No schedule	No Status
Deepwater Redfish	<i>Sebastes mentella</i>	Fishes	Endangered	No schedule	No Status
Northern Wolffish	<i>Anarhichas denticulatus</i>	Fishes	Threatened	Schedule 1	Threatened
Porbeagle Shark	<i>Lamna nasus</i>	Fishes	Endangered	No schedule	No Status
Roughhead Grenadier	<i>Macrourus berglax</i>	Fishes	Special Concern	No schedule	No Status
Roundnose Grenadier	<i>Coryphaenoides rupestris</i>	Fishes	Endangered	No schedule	No Status
Shortfin Mako Shark	<i>Isurus oxyrinchus</i>	Fishes	Threatened	No schedule	No Status
Spiny Dogfish	<i>Squalus acanthius</i>	Fishes	Special Concern	No schedule	No Status
Spotted Wolffish	<i>Anarhichas minor</i>	Fishes	Threatened	Schedule 1	Threatened
White Shark	<i>Carcharodon carcharias</i>	Fishes	Endangered	No schedule	No Status
Winter Skate (Eastern)	<i>Leucoraja ocellata</i>	Fishes	Threatened	No schedule	No Status
Winter Skate (Western)	<i>Leucoraja ocellata</i>	Fishes	Special Concern	No schedule	No Status
Atlantic Walrus	<i>Odobenus rosmarus rosmarus</i>	Mammals	Non-active	Schedule 1	Extirpated
Blue Whale	<i>Balaenoptera musculus</i>	Mammals	Endangered	Schedule 1	Endangered
Fin Whale	<i>Balaenoptera physalus</i>	Mammals	Special Concern	Schedule 1	Special Concern
Grey Whale	<i>Eschrichtius robustus</i>	Mammals	Extirpated	Schedule 1	Extirpated
Harbour Porpoise	<i>Phocoena phocoena</i>	Mammals	Special Concern	Schedule 2	Threatened
Humpback Whale	<i>Megaptera novaeangliae</i>	Mammals	Not at Risk	Schedule 3	Special Concern
Killer Whale	<i>Orcinus orca</i>	Mammals	Special Concern	No schedule	No Status
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Mammals	Endangered	Schedule 1	Endangered
Northern Bottlenose Whale	<i>Hyperoodon ampullatus</i>	Mammals	Endangered	Schedule 1	Endangered
Sowerby's Beaked Whale	<i>Mesoplodon bidens</i>	Mammals	Special Concern	Schedule 3	Special Concern
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Reptiles	Endangered	No schedule	No Status
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Reptiles	Endangered	Schedule 1	Endangered



Photo: M.James

Species that have Schedule 1 Status (September 2010) include:

Atlantic salmon (inner Bay of Fundy populations) spawn in rivers of Nova Scotia and New Brunswick that drain into the Minas Basin and Chignecto Bay. It is not known where they spend the winter or whether their marine distribution extends on to the Scotian Shelf. Population estimates indicate an adult decline from as high as 40 000 in the mid 1980s to less than 250 in 1999. Reasons for the decline point to as yet unidentified factors (DFO 2010).

Atlantic walrus originally numbered in the tens of thousands, but the Northwest Atlantic population was heavily harvested in the 17th and 18th centuries and hunted to extirpation by the late 18th century. Recovery of this species is considered neither technically nor biologically feasible but this situation will continue to be assessed (DFO 2007b).

Grey whales are understood to have become extirpated from the western North Atlantic before the end of the 1800s as a consequence of commercial whaling activity (DFO 2007c). Recovery of the Atlantic population is considered neither technically nor biologically feasible, but this situation will continue to be assessed.

Leatherback turtle, designated endangered, is migratory, and breeds in tropical or subtropical waters with migration to the Scotian Shelf, which is considered to be critical habitat for species prey, chiefly jellyfish (James et al. 2006; Sherill-Mix et al. 2007). It is estimated that the Atlantic population contains approximately 15 000 females. Because of a lack of offshore aerial survey data and fishery bycatch data on leatherbacks in Atlantic Canada, leatherback population size and trends in this area have yet to be determined (Atlantic Leatherback Turtle Recovery Team 2006). Entanglement in fishing gear throughout the species' range is considered to be a threat factor on the Scotian Shelf.



Photo: K.Smedbol

North Atlantic right whale is a migratory species that frequents coastal waters along the east coast of the United States and Canada. In Canadian waters, individuals are known to congregate in the summer and fall in the lower Bay of Fundy, mainly east of Grand Manan Island, and in the vicinity of the Roseway Basin. A database maintained by the North Atlantic Right Whale Consortium contains record of 438 known individuals, of which 402 (92%) have been seen in Canadian waters at least once (Brown et al. 2009). Movement and distribution of right whales overlaps many fishing and shipping areas (Figure 5). Analyses of documented right whale deaths between 1986 and 2005 show that 38% of mortalities were a result of vessel strikes, 12% were due to entanglement in fishing gear and the remaining 50% were attributed to unknown causes or neonatal mortality (Kraus and Rolland 2007). Based on scarring from fishing gear it is estimated that at least 72% of the right whale population have been involved in an entanglement event at some point in their lives, and that 10-30% of the population is entangled each year (Clapham 2005). Risk and probability of entanglement is high (Vanderlaan and Taggart 2009).

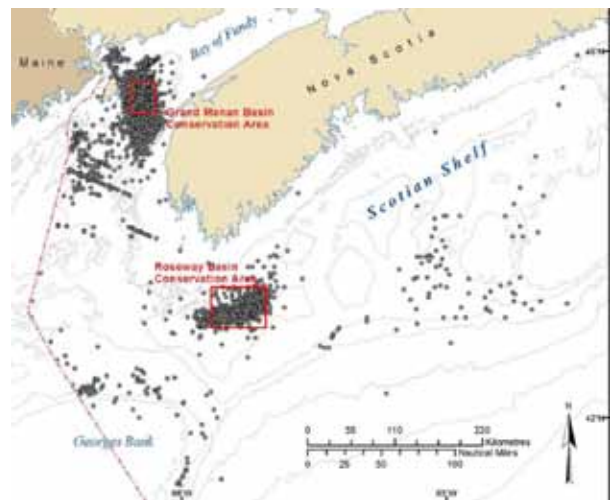


Figure 5: Canadian range and observed sightings of the North Atlantic right whale: 1951-2005 (from Brown et al. 2009).

Blue whales frequent waters off the Gulf of St. Lawrence and eastern Nova Scotia. Currently, the size of the Northwest Atlantic population is unknown, but it is unlikely that the number of mature animals exceeds 250 individuals according to experts' estimates (Beauchamp et al. 2009). At least 11 000 blue whales were harvested in the North Atlantic before 1960. Approximately 1 500 of these were harvested in eastern Canadian waters from 1898 to 1951. Since the end

of commercial whaling, the high-risk anthropogenic threats have been cited as noise and the increased harvesting of krill. Collisions with ships, disturbance from increasing whale-watching activity, entanglement in fishing gear, and pollution (especially oil pollution) are considered to be medium risk (Beauchamp et al. 2009).



Northern bottlenose whale (Scotian Shelf population) is found mainly in and around the Gully, which is the southernmost area where the northern bottlenose whale is routinely found. Whaling was a factor in reducing global populations of the northern bottlenose whale with over 80 000 whales caught over the entire whaling period. The current Scotian Shelf population is estimated to be approximately 163 individuals (DFO 2009a). Three canyons along the edge of Scotian Shelf that appear to contain critical habitat for northern bottlenose whales (The Gully, Haldimand Canyon, and Shortland Canyon). Commercial shipping, fishing activity, and petrochemical exploration and exploitation, threaten this population as these activities result in acoustic and chemical pollution, entanglement in fishing gear, floating debris, and interactions between whales and vessels.

Fin whale is widely distributed along the east coast the US and Canada and makes up 46% of all large whale sightings and 24% of all cetacean sightings in the Scotian Shelf (COSEWIC 2005). Population estimates made in 1999 give an Atlantic population of 2 814 in the area between Georges Bank and the mouth of the Gulf of St. Lawrence. The main reason behind their popula-

tion decline has been commercial whaling as precommercial population estimates for the Atlantic were 30 000- 50 000. At least 13 337 fin whales were taken in Atlantic Canada between 1903 and 1945, the vast majority (11 815) of which were from Newfoundland-Labrador. The Nova Scotia stock was whaled only from 1964 to 1971. The population appears to be fairly mobile with a general seasonal population migration between US (summer) and Canadian waters (winter). Current threats include fishing entanglement, ship strikes, noise, and chemical pollution.



Spotted wolffish, Northern wolffish and Atlantic wolffish are bottom living species whose populations have been shown to have declined markedly over the last 30 years (Kulka et al. 2007). Although the Wolffish are not targeted by the fishing industry, they are taken as by-catch by offshore trawlers. Bottom trawling for fish and dredging for scallops and clams also damages spawning habitat by disturbing rocks and boulders used for shelter and nesting. In addition, the bottom sediments are resuspended, smothering spawning areas and damaging gills. Although commonly found on the Grand Banks, spotted wolffish are also found on the Scotian Shelf. Northern wolffish, however are rare on the Scotian Shelf (Kulka et al. 2007). For the Atlantic wolffish, which has a wider southerly distribution the number of locations where the species occurs has declined and the range where the species is abundant may be shrinking. Available data indicate that the number of Atlantic wolffish in Canadian waters also declined by 87% from the late 1970s to the mid 1990s.

4

IMPACTS



Loss of species, or a reduction in the populations of existing endangered species, may have numerous political social, legal, economic and ecological ramifications (**Table 2**), all of which require management attention.

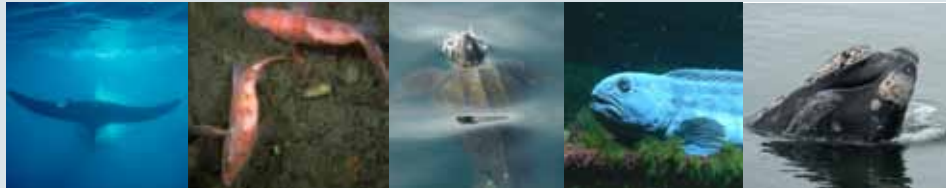


Table 2: Some potential impacts associated with loss of diversity and/or protection of species on the Scotian Shelf

(derived from Millenium Assessment Report 2005b, and Zwanenburg et al. 2006).

ASPECT	POSSIBLE IMPACT
Political	An increase in criticism from the international community for failure to meet international obligations to which Canada is signatory.
Legal	An increase in litigation from parties involved in utilizing natural resources, as well as parties opposed to use of natural resources.
Social	Increasing conflict between sectors that make use of resources on the Scotian Shelf. Increased need for negotiation on natural resource utilization.
Ecological	Loss of species might be linked to changes in ecosystem structure, which extends beyond just the loss of a single species. Loss of species existence value.
Economic	Increased costs of implementing recovery plans for specific species. Increased cost of resources from the area. Loss of livelihoods. Increases in cases for subsidy and/or compensation.
Technological	Changes to technologies and methods used in natural resource utilization e.g. fishing gear, methods, timing, areas, speed and routes of ships.
Knowledge and information	Increase in resources for monitoring and research on species. Increase in the need to educate and inform parties about species and their significance.

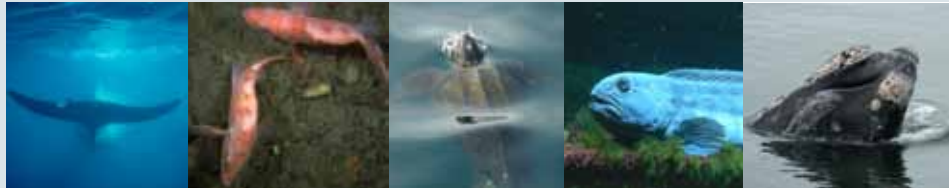
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ACTIONS AND RESPONSES

Canada has initiated, and participated, in numerous response activities that relate to the management and conservation of marine resources, of which diversity and species at risk are a key consideration. Much of this relates to international conventions and legislation that ensure the protection of resources, habitats and individual species (**Table 3**). This has involved the development and implementation of international, federal, provincial legislation, and associated supportive programs. Because many species at risk are migratory and continuously moving out the country's provincial and national boundaries, it necessitates considerable interaction between parties.

TABLE 3: KEY LEGISLATION APPLICABLE TO MANAGING SPECIES AT RISK ON THE SCOTIAN SHELF.

LEGISLATIVE INSTRUMENT	PURPOSE	COMMENTS
INTERNATIONAL		
<i>The United Nations Law of the Sea</i> , 1982 (UNCLOS)	Defines the rights and responsibilities of nations in their use of the world's oceans, provides guidelines for businesses, the environment, and the management of marine natural resources.	Canada ratified UNCLOS in 2003. http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPB-dP/BP/bp322-e.htm
<i>The United Nations Convention on Biological Diversity</i> , 1992 (CBD)	Deals with international conservation of biological diversity, sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources	There is a Canadian Biodiversity Convention Office in Environment Canada that oversees the implementation of a national biodiversity strategy. http://www.cbin.ec.gc.ca/index.cfm?lang=e#
<i>The United Nations Convention on International Trade in Endangered Species of Wild Fauna and Flora</i> , 1975 (CITES)	Ensuring that international trade in specimens of wild animals and plants does not threaten their survival. CITES provides guidelines and lists of endangered species to which signatory countries are obligated to respond.	Lead agency in Canada is Environment Canada http://www.cites.ec.gc.ca/eng/sct5/index_e.cfm



LEGISLATIVE INSTRUMENT	PURPOSE	COMMENTS
INTERNATIONAL (CONTINUED)		
<i>International Convention for the Regulation of Whaling, 1946 (ICRW)</i>	Provides for the conservation of whale stocks and the orderly development of the whaling industry.	Managed through the International Whaling Commission. Canada is not a participant. http://www.iwcoffice.org/commission/iwcmmain.htm
<i>International Convention for the Safety of Life at Sea, 1974</i>	Protects the safety of marine ships in international waters particularly spills of chemicals and oil	Managed through the International Maritime Organization. Canada has been a member since 1948. http://www.imo.org/
FEDERAL		
<i>Fisheries Act, 1985</i>	Provides fishing regulations for management of commercial species and also habitat protection.	Managed by Fisheries and Oceans Canada. http://laws.justice.gc.ca/en/F-14/index.html
<i>Species at Risk Act, 2002</i>	Provides for the recovery and protection of species that are endangered or at risk.	Coordinated by Environment Canada in collaboration with Fisheries and Oceans Canada, and Parks Canada. Activities include a Species at Risk Public Registry and Habitat Stewardship Program. DFO is responsible for aquatic species. http://www.dfo-mpo.gc.ca/species-especies/index-eng.htm
<i>Oceans Act, 1996</i>	Provides for the management and conservation of marine areas including the establishment of marine protected areas.	Managed by Fisheries and Oceans Canada. http://www.dfo-mpo.gc.ca/oceans/oceans-eng.htm
<i>Canada National Marine Conservation Areas Act, 2002</i>	Allows for the establishment of marine conservation areas within the exclusive economic zone	Managed by Parks Canada http://www.pc.gc.ca/eng/progs/amnc-nmca/pr-sp/index.aspx
<i>Coastal Fisheries Protection Act, 1985</i>	Protects coastal fisheries and migratory fish stocks in Canadian ocean waters.	Managed by Fisheries and Oceans Canada http://laws.justice.gc.ca/eng/C-33/page-1.html
<i>Fisheries Development Act, 1985</i>	Provides for the efficient exploitation of fishery resources and for the exploration for and development of new fishery resources and technology.	Managed by Fisheries and Oceans Canada http://www.dfo-mpo.gc.ca/reports-rapports/fda/fda2001-eng.htm

TABLE 3 (continued)

LEGISLATIVE INSTRUMENT	PURPOSE	COMMENTS
PROVINCIAL		
Nova Scotia Endangered Species Act, 1998	The Act applies to all species at risk in the province of Nova Scotia.	Managed by the Wildlife Division of the NS Department of Natural Resources. There is considerable interaction between province and federal programs on species at risk, including marine species. http://www.speciesatrisk.ca/municipalities/sar_ns.htm

The Species at Risk Act is the main instrument by which Canada assesses and manages species that are at risk. Promulgated in 2002, the Act has put in place a system of governance, and a process by which identified species are assessed and managed. Accordingly, the key governance structures that are in place include:

- COSEWIC, acting under the auspices of the Canadian Endangered Species Conservation Council, is mandated to continually monitor and review information on species that are potentially under threat (COSEWIC 2009; see also Section 3 and Table 1).
- Fisheries and Oceans Canada (DFO), as the lead federal government department, is responsible for managing aquatic species (marine and freshwater). DFO is involved in: further assessing species listed by COSEWIC, making recommendations on which species should be listed as Schedule 1 under *SARA*; and managing recovery programs (strategies and action plans) for species that are designated as Schedule 1 under *SARA*. DFO has a Species at Risk Maritimes Division, which deals with species relevant to the Scotian

Shelf (<http://www.dfo-mpo.gc.ca/species-especies/regions/Maritimes/maritimes-index-eng.htm>).

- Federal cabinet decision-making, through the Governor in Council, which makes the decision as to whether a species should be listed as Schedule 1 under *SARA*, thereby giving such species legal protection, with associated mandatory recovery programs.

For each species, a project cycle approach is being taken (Figure 6), with publicly-available documentation on the *SARA* Public Registry that provides an indication of progress being made for each species. (http://www.sararegistry.gc.ca/sar/index/default_e.cfm)

Of the 28 species that have been identified by COSEWIC for the offshore marine environment in Atlantic Canada (see **Table 1**), 11 species have been listed as Schedule 1, one species as Schedule 2, two species are Schedule 3, and 14 species have no designated schedule. Schedules 2 and 3 are categories that require re-assessment by COSEWIC. The *SARA* program is an extremely dynamic one with a continually

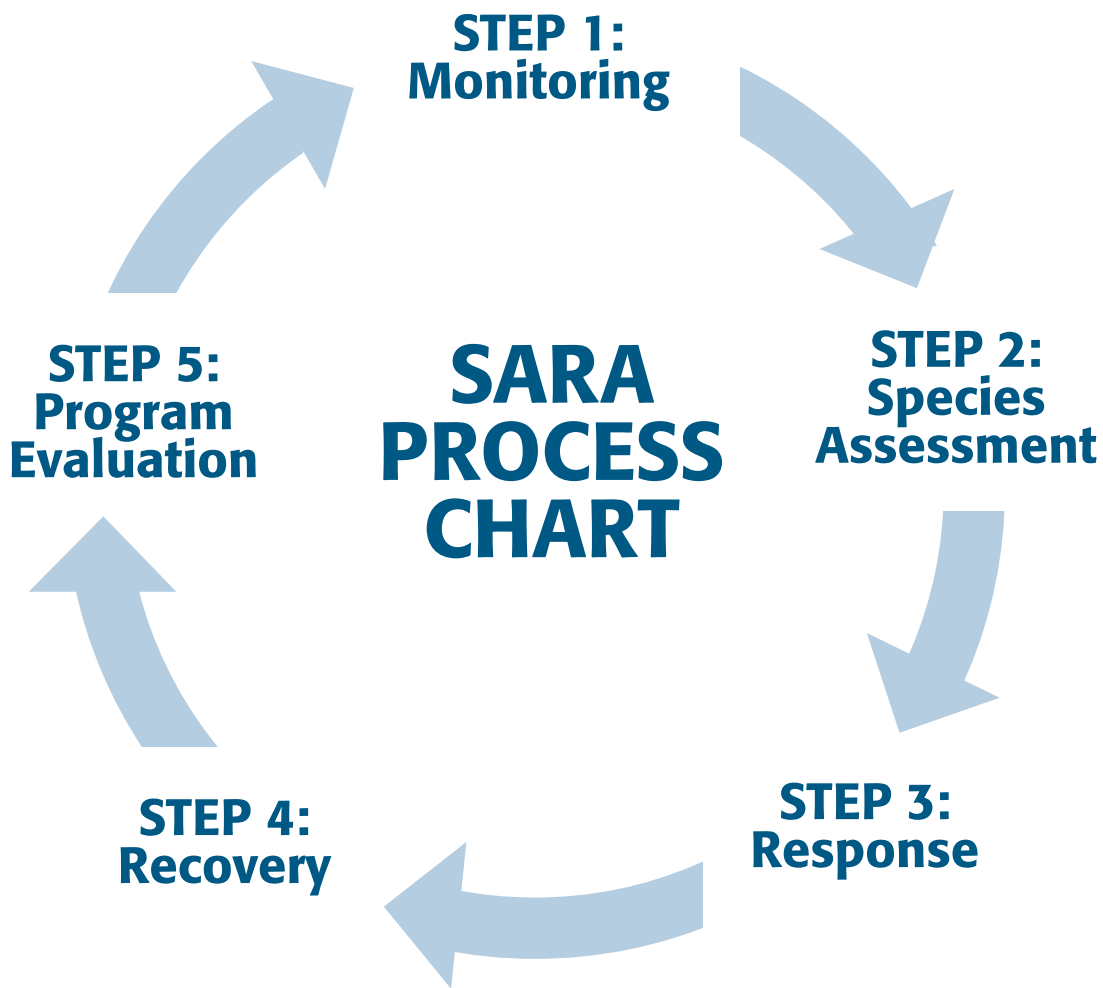


Figure 6: The SARA program cycle

changing status on the progress for each species, and these statistics provide a snapshot of the information provided by the Public Registry on March 10th 2010.

There are also a numerous supportive activities all aimed at conserving biodiversity of species on the Scotian Shelf. Amongst others, some of these include:

- The development, and implementation, of an integrated management plan for the Scotian Shelf which includes numerous ecological, social and economic objectives, and involves the inputs of multiple stakeholders from government, industry and non-government

partners (DFO 2007).

- An Atlantic Zone Monitoring Program, which provides baseline information on the ecological conditions and general biodiversity of the Scotian Shelf (<http://www.bio-iob.gc.ca/monitoring-monitorage/azmp-pmza/index-eng.htm>).
- The involvement of NGOs, academics and focus groups in networks to provide resources that can be mobilized to contribute to monitoring and management specific species. Such networks organize conferences, recovery groups, webpages, databases, publications and information transfer.

- The development of a network of marine protected and conservation areas on the Scotian Shelf. Areas that already receive some form of protection include: Roseway Basin (Area to be Avoided), Sable Island (Migratory Bird Sanctuary/future National Park), The Gully (*Oceans Act* MPA), and Northeast Channel and Lophelia Coral Conservation Areas. A public consultation process was recently completed for the identification of the next Area of Interest on the Scotian Shelf for MPA designation under the *Oceans Act* and a longer-term process to plan and establish a network of MPAs in the Scotian Shelf-Bay of Fundy region will begin in

the next year or so (DFO 2009b).

- Numerous research activities all of which contribute to a growing understanding of the large marine ecosystem and the species which inhabit it (DFO Maritimes Region and Natural Resources Canada 2008).
- The establishment of the Habitat Stewardship Program (HSP) for Species at Risk. Which allocates funding for projects that conserve and protect species at risk and their habitats (<http://www.cws-scf.ec.gc.ca/hsp-pih/default.asp?lang=En&n=2D1DA0C5-1>).

INDICATOR SUMMARY				
INDICATOR	POLICY ISSUE	DPSIR	ASSESSMENT	TREND
Temperature change	Climate change	Pressure	Fair	/
Commercial Fishing	Pressure from anthropogenic activities	Pressure	Fair	/
Shipping	Pressure from anthropogenic activities	Pressure	Poor	/
COSEWIC list of at-risk species	Evaluation of current status	State	Poor	-
COSEWIC listed species that have SARA status	Evaluation of regional response - only 44% have SARA status	Response	Poor	/
Recovery strategies	Resource management	Response	Poor	/

Notes:

Negative trend: -

Unclear or neutral trend: /

Positive trend: +

No assessment due to lack of data:?

- see more about the DPSIR framework at <http://coinatlantic.ca/index.php/state-of-the-scotian-shelf/217>

Data Confidence

- Species registry provides up- to-date information on the current status of all listed species
- Databases are available on anthropogenic activities, species population studies

Data Gaps

- Knowledge on total diversity of the Scotian Shelf is incomplete.

6

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