An Evaluation of Canada's Ability to Protect Leatherback Turtles (*Dermochelys coriacea*), With a Focus on Their Atlantic Ocean Habitats

by

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ABSTRACT

The leatherback turtle (*Dermochelys coriacea)* is a highly migratory, trans-boundary marine species. Canadian waters provide critical foraging habitat for leatherback turtles, and since 2002 leatherbacks have been protected by Canada's federal endangered species legislation, the *Species at Risk Act, 2002*. In order to fully protect such species, national governments must address the protection and recovery of the species at both domestic and international levels. This thesis investigates (*i*) SARA's ability to protect Atlantic leatherback turtles both within Canada and internationally, (*ii*) Canada's involvement in international agreements and documents that aim to provide for the protection of leatherbacks, and (*iii*) the US approach to protecting leatherback turtles via the *Endangered Species Act, 1973.*

This research suggests that SARA has several weaknesses which limit its ability to fully protect leatherbacks within Canada and internationally. Furthermore, the US approach to protecting marine turtles in domestic waters and internationally appears, in some instances, to be more effective than Canada's. If Canada is serious about protecting marine migratory species, the Government of Canada should address SARA's weaknesses through amendments to the legislation, look to the US legislation as a possible example to follow, and take a greater role in protecting species at the international level.

LIST OF ABBREVIATIONS USED

ALT	Atlantic leatherback turtle
ALTRT	Atlantic leatherback turtle recovery team
BC	British Columbia
CBD	Convention on Biological Diversity
CCNSO	Convention for the Conservation of Salmon in the North Atlantic Ocean
CEC	Commission on Environmental Cooperation
CITES	Convention on the International Trade of Endangered Species
CMS	Convention on the Conservation of Migratory Species of Wild Animal
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSTN	Canadian Sea Turtle Network (formerly the Nova Scotia Leatherback Turtle Working Group)
DFO	Fisheries and Oceans Canada
DPS	Distinct Population Segment
EA	Ecosystem Approach
EAF	Ecosystem Approach to Fisheries
EEZ	Exclusive Economic Zone
ESA	*Endangered Species Act, 1973*
ESSIM	Eastern Scotian Shelf Integrated Management Initiative
FAO	Food and Agriculture Organization of the United Nations
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles
ICCAT	International Convention for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
ICJ	International Court of Justice
IPOA	International Plan of Action
IUCN	International Union for Conservation of Nature
MoU	Memorandum of Understanding
MTCA	*Marine Turtle Conservation Act*
NAAEC	North American Agreement on Environmental Cooperation
NAFTA	North American Free Trade Agreement
NASCO	North Atlantic Salmon Conservation Organization

NS	Nova Scotia
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
PLT	Pacific leatherback turtle
PLTRT	Pacific leatherback turtle recovery team
RAP	Regional Advisory Process
RFMO	Regional Fisheries Management Organization
SAR	Species at Risk
SARA	*Species at Risk Act, 2002*
SDS	Sustainable Development Strategy
SPAW	Specially Protected Areas and Wildlife
TED	Turtle Excluder Device
TEWG	Turtle Expert Working Group
TMGC	Transboundary Management Guidance Committee
TRAC	Transboundary Resources Assessment Committee
TSC	Canada-US Transboundary Steering Committee
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
US	United States
USFWS	United States Fish and Wildlife Service
USVI	United States Virgin Islands

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The leatherback turtle (*Dermochelys coriacea)* is a highly migratory marine species with an almost global range. In 1995, after documented declines in several leatherback populations, the species was listed as *Critically Endangered*[1] by the International Union for Conservation of Nature (IUCN) (Martinez, 2000). The leatherback's range crosses political boundaries into areas where nation states have sovereign rights over their resources, and extends into international waters, where no state holds sovereign authority. In addition, the leatherback turtle makes purposeful annual migrations which are necessary for its survival, between critical habitats in these jurisdictions. These factors, characteristic of most highly migratory species, pose unique conservation challenges for the governments trying to legally protect the species (Navid, 1979; Primack, 2004). It is easy to see how national legislation, while a useful tool for protecting leatherback turtles, cannot fully address the unique conservation needs of this migratory species. The IUCN Species Survival Commission, Marine Turtle Specialist Group (1995) has recognised this conservation difficulty, stating that, "within a region, conservation efforts for turtle populations in one country may be jeopardized by activities in another country" (p.16). Thus, it has been recognized that the protection of turtles and other "marine migratory species which pass into and out of areas under national jurisdiction, requires a coordinated international approach" (Navid, 1979, p. 524). Tools that are used to achieve such cooperation are international agreements and documents that nations ratify in order to protect species throughout their ranges. These agreements and documents are initiated

[1] "A taxon is *Critically Endangered* when the best available evidence indicates ... [the species is] facing an extremely high risk of extinction in the wild" (IUCN, 2001).

and carried out in a variety of ways and may deal directly with migratory species or may indirectly protect the species through a series of regulations. In order to fully protect highly migratory species such as the leatherback turtle, however, all range states must address the protection and recovery of the species at both domestic and international levels.

In Canada, the leatherback turtle has been listed as endangered since 2002, under Schedule 1 of the *Species at Risk Act, 2002* (SARA). Thus, it is legally protected in Canadian jurisdictions. The Government of Canada's commitment to protecting this species at the international level, however, is less clear. This thesis examines the status and protection of leatherback turtles from a Canadian perspective, at both domestic and international levels. Like other marine species in Canada, the leatherback turtle is endangered throughout its range and has critical habitats in Canada, other national jurisdictions, and international waters. Thus, the species requires international cooperation between Canada and other range states for complete protection. Additionally, although leatherbacks in Canadian waters are a non-resource species, they are still affected by economic interests and activities in the ocean, such as shipping and fishing. For these reasons, the leatherback turtle is not only a fascinating and majestic species to study, but it may also serve as a good case study for Canada's management of other highly migratory, endangered marine species.

1.2 METHODS

In addition to a thorough review of existing literature on leatherback turtle biology,

federal endangered species policy, and international migratory species management, the data for this research includes information gathered during personal communications and a policy and document analysis.

Personal Communications

Twelve personal communications were carried out with turtle specialists and other research experts (see Appendix A for a list of names and organizations). One was conducted in person with M. James, a turtle biologist at Dalhousie University. Two other communications were conducted over the telephone, one with A. Gutierrez, the United States Focal Point for the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) and one with A. McDonald, an International Fisheries Advisor with Fisheries and Oceans Canada (DFO). All of the remaining exchanges occurred via electronic mail (email) with scientists and academics from Canada, the United States, and the Netherlands. All personal communications are identified as such in the text of this document. The Dalhousie Board of Ethics indicated that an ethics review and approval was not necessary for this research, as all of the communications were with professionals and the questions were within their usual line of work. The author allowed all participants to review their contributions to the thesis for accuracy, and made any necessary changes before the final draft was complete.

Policy and Document Analysis

The policy and document analysis includes two federal/national endangered species

policies and 17 international agreements and documents. The two policies, Canada's *Species at Risk Act* (SARA) and the United States' *Endangered Species Act* (ESA), were selected for analysis as they legally protect leatherback turtles at the national level. Both were assessed for their ability to protect leatherbacks in their marine habitats domestically, as well as for their ability to facilitate the necessary international measures for species recovery. The species recovery documents in each country were also investigated.

Seventeen international agreements and documents were selected for analysis because they met the following criteria:

(i) The documents directly or indirectly affect, or have the potential to affect, the Canadian population of ALTs; and

(ii) Canada is currently, or has the potential to become, party to the documents.

Each of these agreements or documents was classified as one of three categories, global, regional, or bilateral, and analyzed for its ability to protect Canadian ALTs[2] in their marine habitats.

1.2.1 Research Questions

Four research questions and four research objectives guided this research.

Research questions are:

(*i*) How effective is Canada's federal endangered species legislation, SARA, for protecting migratory species, such as the leatherback turtle, within Canada and internationally?

[2] The terms Canadian ALTs or Canadian PLTs are used to identify the population of leatherbacks that are found in Canadian waters at any point in time. While these individuals do not belong to Canada, they are, for at least part of their lifecycle, Canada's responsibility.

(*ii*) How effective are other international instruments, which Canada is or may be party to, that aim to protect ALTs, and how do these instruments relate to SARA, if at all?

(*iii*) How effective is the United States' endangered species legislation, the Endangered Species Act, 1973, and how does it compare to SARA?

(*iv*) What, if anything, should Canada do to better protect migratory species, such as leatherback turtles?

1.3 THESIS STRUCTURE

This research attempts to build upon the existing body of literature on marine turtle conservation by investigating Canada's domestic and international role in the protection and recovery of Atlantic leatherback turtles in their marine habitats. This thesis does so by addressing the research questions in six chapters. Chapter 1 serves as a general introduction to the research, while Chapter 2 introduces the biology and status of leatherback turtles, including current threats to the species. Chapter 3 investigates the ability of SARA to protect at-risk migratory species at domestic and international levels, including a critical examination of the Act's prohibitions, and how they are applicable to leatherback turtles. This chapter also assesses the leatherback recovery documents, examining the relationship between what these documents require for species recovery and what recovery actions SARA will allow. Chapter 4 analyzes the various international agreements and documents that directly or indirectly affect Canadian Atlantic leatherback turtles in their marine habitats. Chapter 5 focuses on the ESA, examining how the US has integrated its domestic legislation and international efforts to protect Atlantic leatherback turtles. This assessment scrutinizes the strengths and weaknesses of the ESA, as an example of more mature legislation from which Canada can learn. Chapter 6 offers

a final discussion of this research and proposes four measures Canada could pursue to better protect Atlantic leatherback turtles.

CHAPTER 2: THE LEATHERBACK TURTLE

2.1 INTRODUCTION TO LEATHERBACK TURTLES (*DERMOCHELYS CORIACEA*)

2.1.1 Population & Status

Because of their highly migratory and almost exclusively marine existence, it is difficult to determine the exact size of the global population of leatherback turtles (TEWG, 2007). A number of rough estimates have been made based on the populations of adult female turtles observed during nesting periods. Using this method, Pritchard (1982) estimates the total global population in 1980 at 115,000 nesting females. Spotila *et al.* (1996) offered a revised estimate of approximately 34,500 females, suggesting that the species had declined by nearly eighty percent in just over a decade.[3] A report by the Turtle Expert Working Group (2007) offers a "population estimate of 34,000-90,000 adult leatherbacks in the North Atlantic" (p. 59). Ultimately, however, all of these figures are estimates and the exact global population of leatherback turtles remains unknown.

In 1982, the leatherback turtle was listed as *Endangered*[4] by the IUCN Red List (Martinez, 2000). Over the next decade populations of nesting females continued to decline, and by 1995 the species status was elevated to *Critically Endangered*[5] (Martinez,

[3] While these figures are frequently cited, as they are the first documented estimates of global leatherbacks populations, it is likely that both Pritchard (1982)'s and Spotila *et al.* (1996)'s estimates are incorrect (B. Wallace, personal communication, December 16, 2008).

[4] "A taxon is *Endangered* when the best available evidence indicates... [the species is] facing a very high risk of extinction in the wild" (IUCN, 2001, p. 411).

[5] "A taxon is *Critically Endangered* when the best available evidence indicates ... [the species is] facing an extremely high risk of extinction in the wild" (IUCN, 2001).

2000).[6] Global declines in nesting female leatherbacks have been more severe in the Pacific and Indian leatherback populations than in the Atlantic populations. Possibly the most extreme case was documented at a nesting beach in Malaysia; in 1968 there were over 3,000 nesting females. By 1994, after decades of monitoring the declining population, only *two* females were present during the nesting season (Chan & Liew, 1995). There have also been marked declines in the number of nesting females on the Pacific side of Costa Rica and Mexico (Eckert, 1997; Spotila, Reina, Steyermark, Plotkin & Paladino, 2000). In Canada, the leatherback turtle is protected by and listed as *endangered*[7] under Schedule 1 of *SARA*.

2.1.2 Distribution & Habitat

The leatherback turtle has the most extensive range of any reptile in the world, extending from 71°N to 27°S (Pritchard & Trebbau, 1984; Boulon, Eckert, & Eckert, 1988), and can be found throughout the Atlantic, Pacific, and Indian Oceans. The species' habitats include: nesting beaches and adjacent coastal waters in tropical climes; migration routes that cover vast stretches of open ocean, including international waters; and foraging grounds along the continental shelf in temperate waters (James, Ottensmeyer & Myers, 2005c). Except for the time females spend nesting and the brief time it takes hatchlings to crawl from their nests to the sea, the leatherback turtle spends its entire life at sea.

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[6] Mrosovsky (2003) argues that the IUCN Red List system for designating threatened species is flawed. Although he does not deny that there are "serious problems" with the status of leatherback turtles, at the very least he argues that there should not be a global listing for a species with a global range, and thus, the Atlantic and Pacific populations of leatherbacks should be listed as *Endangered* and *Critically Endangered* respectively. Mrosovsky also argues that Pritchard (1982) and Spotila (1996) used different methods to collect their data, and thus, claims that the two population estimates are difficult to compare.

[7] The term '*endangered species*' means "a wildlife species that is facing imminent extirpation or extinction" (SARA, 2002).

Although there is currently insufficient data to estimate the exact size of the leatherback population in Canadian waters, adult leatherbacks do occur off both the Atlantic and Pacific coasts (McAlpine, James, Lien & Orchard, 2007). The Pacific leatherback turtle (PLT) has been sighted in the coastal waters off British Columbia (BC), specifically around the Queen Charlotte Islands (PLTRT, 2006) from July to October, with peak sightings during the month of September (Stinson, 1984). Although there are limited sightings of leatherbacks in BC waters[8], it is expected that the species may regularly occur there in low numbers during the summer months (M. James, personal communication, May 8, 2008). By contrast, although there is no official count of individuals in Atlantic Canadian waters, the population is estimated to be in the thousands (M. James, personal communication, August 20, 2008). Atlantic leatherbacks turtles (ALTs) are present in Canadian waters occurs during the summer months, with peak sightings during August and September (McAlpine *et al.*, 2007). ALTs most frequently occur along the Scotian Shelf and the south coast of Newfoundland, but have also been reported in offshore waters (James *et al.*, 2005c).

2.1.3 Biology

Appearance

Leatherback turtles are unique among the world's seven species of marine turtles. In addition to being the most migratory of all marine turtles, they are also the largest. Adult leatherbacks weigh between 400 and 450 kilograms (kg), but have been recorded as weighing as much as 916 kg (Eckert & Luginbuhl, 1988), and as measuring up to 1.8

[8] The BC Cetacean Sightings Network has documented only 137 leatherback sightings in BC waters since 1931. However, this number might be a significant underestimation of the total population due to low observer effort in BC's offshore waters (BC Cetacean Sightings Network Data, 2008).

meters in length (Ruckdeschel & Shoop, 2006). Unlike all other species of marine turtles that have a hard shell, the leatherback is defined by its tough leathery skin that is a speckled bluish black to greyish black color (Ruckdeschel & Shoop, 2006). The leatherback is equipped with massive paddle like flippers, which are proportionately much longer and wider than those of other turtles, allowing them to be strong, long-distance swimmers (Ruckdeschel & Shoop, 2006).

Reproduction & Nesting

Eckert and Eckert (1988) suggest that leatherback copulation occurs away from nesting sites possibly during migration, while other researchers report observations of breeding in tropical latitudes (Carr & Carr, 1986; Godfrey & Barreto, 1998). James, Eckert, and Myers (2005a) used satellite telemetry data to show conclusively for the first time that male leatherbacks made migrations to coastal waters adjacent to nesting beaches, suggesting "that mating does occur near Caribbean nesting colonies" (p. 848). Nesting occurs almost exclusively at night, on sandy open beaches in tropical climates, most of which lie between 30°N and 20°S (Groombridge, 1982). Females nest every two to five years, laying an average of five to seven clutches per nesting season with sixty to ninety eggs per nest (Eckert, 1987; Boulon, Dutton, & McDonald, 1996). Data on nesting site fidelity is inconclusive (Hughes, Luschi, Mencacci & Papi, 1998; Nordmoe, *et al.*, 2004). A nesting female's movements on land are laborious and slow. The entire nesting process takes an average of sixty to ninety minutes, but may take several hours if beach conditions are unfavourable (Eckert, 1991). Observations of leatherback nesting have been recorded in over sixty countries with the largest nesting colonies occurring in

French Guiana, Suriname, Gabon and Trinidad in the Atlantic, and Mexico, Costa Rica, and Indonesia in the Pacific (UNEP, 2003).

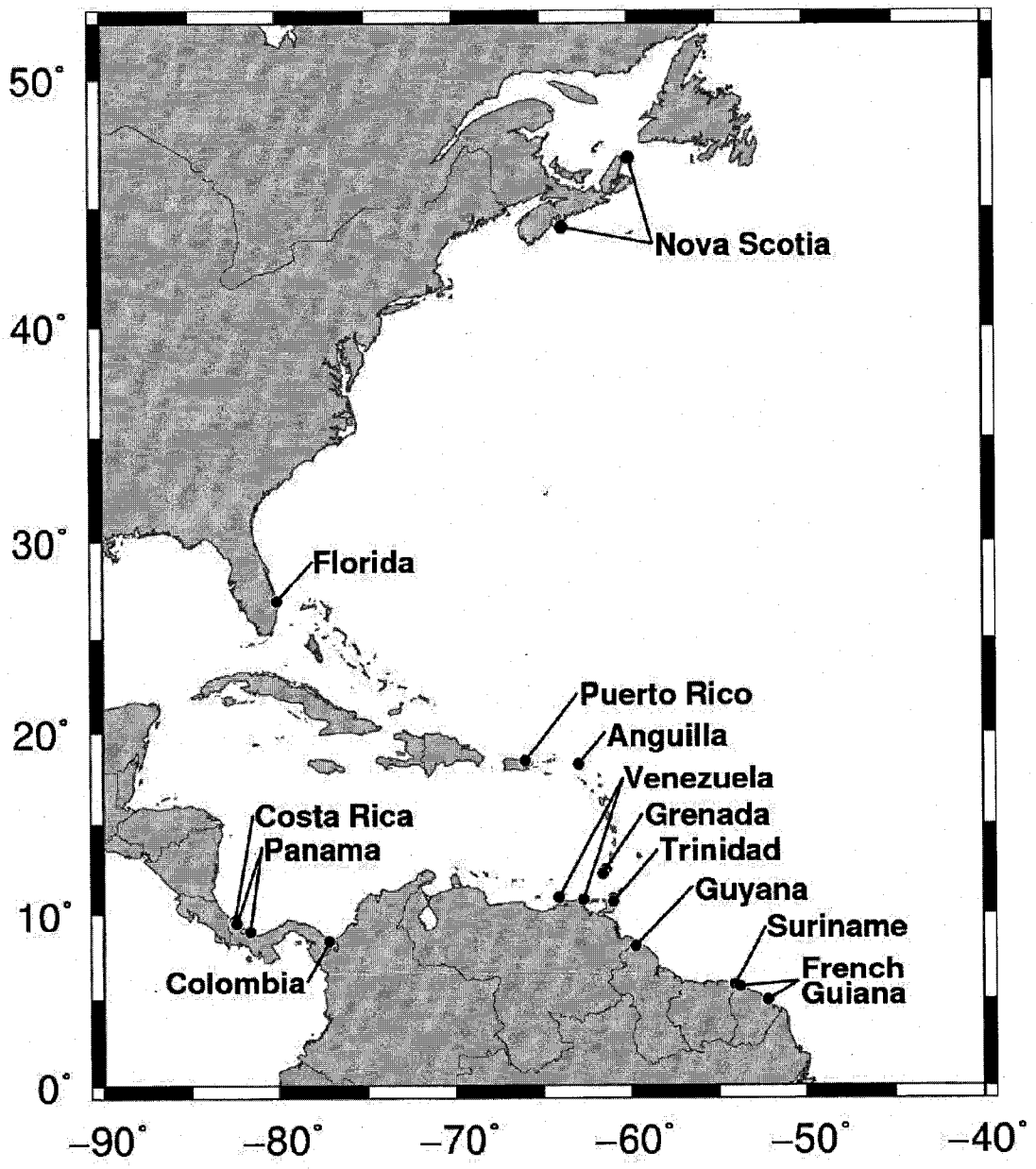
Preliminary research suggests that PLTs in Canada most likely belong to the western Pacific population (Dutton, Bowen, Owens, Barragan & Davis, 1999), with the largest nesting sites for this population in Papua (formerly Irian Jaya), Malaysia, the Solomon Islands and Papua New Guinea (PLTRT, 2006). The Canadian ALT population is part of the western Atlantic population. With the use of conventional flipper and microchip tagging methods, James, Sherrill-Mix & Myers (2007) confirmed that Canadian ALTs were nesting on beaches in Colombia, Costa Rica, Grenada, Guyana, Panama, Puerto Rico, Trinidad, Venezuela, as well as in French Guiana and Suriname, the two largest rookeries in the Atlantic (see Figure 1). In 2007, Florida and Anguilla, were also added to the list (M. James, personal communication, May 8, 2008).

Hatchlings & Juveniles

The incubation period for leatherback eggs is usually between sixty and sixty-five days (Ernst, Barbour & Lovich, 1994). Mature hatchlings, once free of their egg, make their way to the top of the nest where they will wait just below the surface until the sun sets. Once the tiny turtles (about six centimetres long) have emerged from the nest, they immediately make their way to the ocean, oriented by the light of the moon. Although the juvenile development of leatherback turtles largely remains uncertain, Eckert (1999; 2002a) suggests they probably develop in waters warmer than 26°C. However, data is inconclusive about the behaviour of young leatherbacks at sea, including their critical

habitat requirements at this life stage and at what age the turtles reach maturity (Eckert, 1999; Heppell, Snover & Crowder, 2003).

Figure 1: The distribution of confirmed nesting sites (identified through flipper tag and microchip recaptures) for leatherback turtles using Canadian foraging habitat. (Map provided by the Canadian Sea Turtle Network, 2008).



2.1.4 Behaviour

Migration

Recent studies using satellite tagging data have resulted in new observations about turtle migrations. Leatherbacks make the longest migrations, in both time (number of days) and space (area covered), of all marine turtles. Tracking data show that individual leatherbacks can cover a vast area in a relatively short time; one study tracked an adult female for 124 days in which time she covered over 7,000 km (Hughes *et al.*, 1998). The Pacific and Atlantic leatherback populations have similar migration patterns. At the conclusion of the nesting season, an unknown percent of the adult population makes its way to more temperate waters, including habitats in Canada, where the population will stay for the summer months foraging for food. At the end of this period, individual leatherbacks migrate back to their nesting habitats (James *et al.*, 2005b; Luschi *et al.*, 2003).

Research using satellite tagging data suggests that leatherbacks use specific migration corridors (Morreale, Standora, Spotila, & Paladino, 1996). However, more recent data suggest that turtles cover huge spans of ocean during their migrations, in no identifiable pattern or trend (James *et al.*, 2005c). Reports of tagged ALTs show that the western population has a vast range in the Atlantic Ocean that extends across a number of jurisdictions, including the coastal waters off the east coast of Canada and the US (Goff Lien, Stenson & Fretey, 1994; Girondot & Fretey, 1996), countries in the Caribbean and South America (James *et al.*, 2007), and the west coasts of Africa, France, Spain, and Morocco (Girondot & Fretey, 1996). Their habitats extend into international waters as

well. With the use of satellite telemetry data, James *et al.* (2005a) were able to confirm that Canadian ALTs made annual return migrations from foraging areas in Atlantic Canada to southern habitats and nesting beaches in the Caribbean and South America. The western PLT population makes similar migrations to nesting beaches in the Indian Ocean (PLTRT, 2006); however, to date, no comprehensive tagging studies determining their exact nesting locations have been conducted on the Canadian PLT population.

Feeding

Adult leatherback turtles prey on soft bodied invertebrates such as jellyfish (*medusae, cyanea,* and *aurelia*), siphonophores, and salps (Pritchard, 1971; Lutcavage, 1996), but may also incidentally ingest other organisms swimming with these species (Frazier, Meneghel & Achaval, 1985). An increase in observational studies by air and marine vessel has exposed new insight on leatherback feeding patterns. Observations of leatherbacks feeding in the waters off Atlantic Canada show that turtles appear to passively float on the surface and wait for prey to pass by (James & Herman, 2001). In these temperate waters, turtles spend a significant amount of time 'floating' at the surface, which may be a form of basking in order to regulate body temperature (James *et al.*, 2005b). However, in warmer waters individuals may spend very little time basking or resting (Eckert, 2002b). Foraging may also occur at greater depths while the turtles are actively swimming, as leatherbacks have been recorded making deep and regular dives (Eckert, Eckert, Ponganis & Kooyman, 1989; Lutcavage & Lutz, 1997).

As a diet of jellyfish is relatively poor in nutrients, leatherbacks must consume large

amounts of prey (Lutcavage & Lutz, 1986; Lutcavage, 1996). The turtles must, therefore, regularly locate themselves in areas of high productivity where quantities of jellyfish are densest, such as coastal areas or along oceanic frontal systems (James, 2001). Recent studies using satellite telemetry data in the northwest Atlantic show high concentrations of leatherbacks in Canadian waters during the summer months (James, Sherrill-Mix, Martin, & Myers, 2006), and as previously discussed, satellite data have shown that ALTs make annual returns to these areas from nesting beaches thousands of kilometres to the south. Thus, it has been suggested that Canadian waters provide a "critical high-latitude habitat for this species" (James *et al.*, 2006, p. 355), allowing them to consume enough fuel to sustain them through their long journeys south. Although data on the species in Pacific Canada are less conclusive, it is still believed that the areas off the coast of BC are foraging habitats as well (McAlpine *et al.*, 2007).

2.2 THREATS TO LEATHERBACK TURTLE POPULATIONS

2.2.1 Biological Limiting Factors

Given the previous data on leatherback nesting[9] it would seem logical to assume that hundreds of thousands of turtles are hatched each year. However, leatherback hatchling survival is extremely low; possibly as few as one percent of hatchlings survive to adulthood (Eckert, 1991). Natural causes of hatchling mortality include: (*i*) nest destruction by erosion, flooding, or vegetation growth (Bacon, Uong & Ehrhart, 1970; Pritchard, 1971; Eckert, 1987); (*ii*) predation of eggs by wild animals such as ghost crabs, racoons, lizards, foxes, or ants (Pritchard, 1971; Stark, 1993; Girondot, Tucker, Rivalan,

[9] There are an estimated 10,000 to 31,000 nesting females in the North Atlantic (TEWG, 2007), who nest every two to five years, laying an average of five to seven clutches per nesting season, with sixty to ninety eggs per nest.

Godfrey & Chevalier, 2002); and (*iii*) predation of hatchlings by crabs, herons, small mammals, and sharks (Eckert, 1995). Additionally, there are likely a number of natural threats, such as predation, during juvenile development (Eckert, 1995). This high mortality of the young age classes, however, is naturally offset by high survivability as the turtles reach maturity; adult leatherbacks have very few natural predators. In a few rare cases, females have been killed by jaguars on nesting beaches (Troëng, 2000), and adults are occasionally killed by large sharks and orcas in the ocean (Caldwell & Caldwell, 1969; Eckert, 1991).

2.2.2 Anthropogenic Threats

A number of destructive human activities are rapidly threatening the survivability of adult leatherbacks. As Eckert (1991) states, "survival in the later age classes is arguably the most important component in the equation describing the survival of sea turtle species" (p. 86), as it offsets high mortality in the younger age classes. The intentional harvest of gravid females on nesting beaches and unintentional killing of turtles at sea by pollution and by-catch in commercial fisheries is hastening the extinction of this species. Furthermore, human activities are threatening leatherbacks at all stages in their life cycles (i.e. egg, hatchling, juvenile, adult) and throughout their various habitats (i.e. nesting beaches, migration routes, and foraging areas) (Spotila *et al*, 1996; Milton & Lutz, 2003; UNEP, 2003). The following sections discuss the anthropogenic threats to leatherback turtles in their nesting (or terrestrial) habitats and their marine habitats, with a focus on those threats significant to the Canadian population of leatherback turtles.[10]

[10] This paper does not include a discussion of potential threats to leatherback turtles, such as the possible effects of climate change on the population (Davenport, 1997), as these data have yet to be quantified. No

Nesting Habitat

There are a number of threats to gravid females, leatherback eggs, and hatchlings in their nesting habitats, including nesting areas that are significant to Canadian ALTs and PLTs (Table 1 shows a few examples of threats to Canadian turtles in these nesting locations). On land, nesting females are slow moving and defenceless, making them easy prey for poachers (Eckert, 1991). Although leatherbacks are not harvested as often as other turtle species,[11] adult female leatherbacks are still poached in many areas. Leatherback flesh is used for fishing bait or is rendered into oil for lamps, caulking boats, or medicinal uses (UNEP, 2003). Nesting leatherbacks are also killed for traditional or ceremonial purposes, and in a few areas they are harvested for their meat (UNEP, 2003). Poaching of leatherback eggs, however, has been identified as the biggest threat to the species and has occurred, and in many cases still occurs, at almost every nesting location (Campbell, Lagueux, & Mortimer, 1996; Ross, 1995; Troëng, Harrison, Evans, de Haro, & Vargas, 2007). Leatherback nests are easily identified by the large tracks left by the female in the sand as the return to the sea after nesting, and "in some areas egg harvest and illegal poaching have removed more than 95% of the clutches" (UNEP, 2003, p. 19).

Development of coastal areas is another major threat to leatherback populations. Construction along coastlines can alter prime nesting locations or result in erosion, which may wash out existing nests. Attempts to reverse the effects of erosion, however, such as

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doubt, climate change will have a significant negative impact on leatherback populations, possibly altering the species range and sex ratio's. However, this research focuses on the present threats to the species.

[11] Many other species of marine turtles are harvested in great numbers for their edible meat and their hard shell, which is used to make a number of products. Leatherback meat, however, is considered oily and less palatable, and the species lacks a hard shell (Kem, Groombridge, Abreu & Wilson, 2000).

Table 1: Summary of the recorded threats to leatherback turtles on nesting beaches significant to Canadian populations, as represented in published literature.

Population	Nesting Location	Examples of Possible Threats
Atlantic*	Anguilla	light pollution & poaching (eggs)[xi]
	Colombia	coastal development & beach erosion[i]
	Costa Rica	egg collection[iv]; light pollution[v]
	Florida, US	beach cleaning/armouring & coastal development[vi]
	French Guiana	beach erosion & poaching (eggs)[x]
	Grenada	coastal development & poaching (meat & oil)[vii]
	Guyana	poaching (meat)[ii]
	Panama	poaching (medicinal)[iii]
	Puerto Rico	poaching (meat & oil) & egg collection[vi]
	Suriname	poaching & beach erosion (eggs)[ix]
	Trinidad	poaching (meat[ii]; eggs[iii])
	Venezuela	poaching (meat)[viii]
Pacific^	Indonesia	poaching (bait, meat, ceremonial); egg collection[iii]
	Solomon Islands	poaching (ceremonial)[iii]
	Malaysia	egg collection[iii]
	Papua New Guinea	poaching (lamp oil & meat)[iii]

*Canadian ALTs have been confirmed to be nesting on all identified beaches.
^Canadian PLTs most likely nest on the identified beaches.

Sources: [i](Amorocho, Córdoba, & Miklin, 1999); [ii](Pritchard & Trebbau, 1984); [iii](UNEP, 2003); [iv](Lutz, 1997); [v](email communication, cturtle@lists.ufl.edu, December 23, 2007); [vi](NMFS & USFWS, 1992); [vii](Eckert & Eckert, 1990); [viii](Campbell, 2003); [ix](M. Mota, personal communication, June 6, 2008); [x](E. Goverse, personal communication, July 19, 2008); [xi](Dow, Eckert, Palmer & Kramer, 2007).

beach armouring[12] or nourishing,[13] may also have negative consequences, such as preventing females from nesting or destroying existing nests (NMFS & USFWS, 1992). Large scale mechanical cleaning of beach debris, both abiotic and biotic, for human use,

[12] Beach armouring refers to construction of retaining walls or other structures along beaches where coastal development has caused an increase in erosion (NMFS & USFWS, 1992).
[13] Beach nourishing consists of rebuilding a beach by trucking or pumping sand into areas that have been damaged or washed out by erosion (NMFS & USFWS, 1992).

can disrupt or suffocate nests, killing eggs and hatchlings (NMFS & USFWS, 1992). Artificial light from coastal towns and large inland metropolitan areas may discourage females from nesting (Witherington, 1992) or disorient hatchlings, who are attracted to light (NRC, 1990). Movement away from the ocean towards artificial light often has fatal consequences, due to dehydration or increased predation (NMFS & USFWS, 1992). Coastal development also brings an increase in beach users, who may unknowingly harm turtles: (*i*) off-road vehicles may crush nests (Hosier, Kochhar & Thayer, 1981); (*ii*) beach umbrellas may poke into nests killing eggs or hatchlings (Eckert, 1991); and (*iii*) waste and other items left on beaches may prevent females from nesting, prevent hatchlings from exiting the nest, or block a hatching's way to the sea (NRC, 1990; Eckert, 1991).

Marine Habitat

Threats to leatherback turtles in their marine habitats include entanglement in fishing gear, ingestion of marine debris, collisions with marine vessels, disease, and noise pollution (NMFS & USFWS, 1992; Kemf *et al.*, 2007; ALTRT, 2006). Additionally, leatherbacks are threatened by habitat degradation or contamination from oil exploration and extraction, toxic pollutants, and possibly aquaculture (NMFS & USFWS, 1992; PLTRT, 2006). Although all of these threats may be present in Canadian waters (see Table 2), there are little data quantifying their effects on leatherback populations in Canada. Some data do exist on (*i*) rates of incidental capture and (*ii*) ingestion of marine debris in Canadian waters.

Table 2: Summary of the recorded threats to leatherback turtles in Canadian waters, as represented in published literature.

Threats in ocean habitats	Potential in Atlantic Canada	Potential in Pacific Canada
Entanglement in fishing gear (target species):		
longlines (tuna, swordfish)	present [iii]	not present [ii]
longlines (shark)	present [vi]	not present
fixed pot lines (lobster)	present [i]	not present
fixed pot gear (crab)	present [vi]	possible [vii]
driftnets (various species)	present [iv]	
gillnets/troll (hake, salmon, tuna)	present [vi]	present [vii]
trawlers (shrimp)	not present [vi]	possible [vii]
trap nets (cod, tuna, mackerel)	present [vi]	
purse seines (salmon)		present [vii]
buoy anchor lines, ropes, & cables	present [i]	possible [vi]
hook & line (tuna & halibut)		present [vii]
Ingestion of marine debris	present [v]	possible [ii]
Collisions with marine vessels	possible [v]	possible [ii]
Disease		
Habitat degradation/contamination:		
chemical pollutants		
offshore oil exploration	possible [v]	
aquaculture	possible [vi]	possible [ii]

Key:
grey shading — insufficient data

Sources: [i] (James *et al.*, 2005c); [ii] (PLTRT, 2006); [iii] (O'Boyle, 2001); [iv] (ALTRT, 2006); [v] (McAlpine *et al.*, 2007); [vi] (M. James, personal communication, May 8, 2008); [vii] (L. Spaven, personal communication, October 2, 2008).

(i) incidental capture

Commercial fishing often occurs in areas of high productivity, such as along oceanic fonts or in areas of up-welling, and as previously mentioned, it is in these areas that leatherbacks forage for jellyfish (Grant & Malpass, 1996; James & Herman, 2001). Thus, leatherbacks are highly susceptible to incidental capture and entanglement in fishing gear (NMFS & USFWS, 1992; James *et al.*, 2005c). A sample of gear that

leatherbacks have been reported entangled in includes: pelagic longlines used to catch tuna and swordfish (Kemf *et al.*, 2000; Lewison, Freeman, & Crowder, 2004); fixed lines (Brongersma, 1982; James *et al.*, 2005c); gillnets or driftnets used to catch squid, sharks, and other fish (Balazs, 1982; Eckert, 1997); shrimp trawlers (Epperly & Teas, 2002); and buoy anchor lines, ropes, and cables (NMFS & USFWS, 1992).

Moreover, compared to other turtle species, "leatherbacks seem to be the most vulnerable to entanglement in fishing gear such as pelagic longlines, lines associated with fixed pot gear and gillnets, buoy anchor lines, and other ropes and cables" (ALTRT, 2006, p. 11) possibly because of their large size and the width of their front flippers. The rate of mortality caused by entanglement varies depending on the type of gear. For example, fixed gear that is anchored to the bottom poses a great threat to leatherbacks as it can snare turtles below the surface causing them to drown (Shoop, Ruckdeschel, & Wolke, 1990; James *et al.*, 2005c), while other types, such as longlines, may allow turtles to float at the surface until they may be set free. Other gear may impair or entangle turtles to the extent that it causes fatal injuries or infections, or can affect their ability to swim and forage (Balazs, 1985).

Globally, pelagic longlines have been recognised as the biggest threat to leatherback turtles in their marine habitats. Lewison *et al.* (2004)'s analysis of by-catch data from over forty countries estimates that "worldwide pelagic longline fisheries were likely to have caught at least... 50,000 leatherbacks[14] [*sic*] turtles in 2000" (p. 228). Based on

[14] It is important to note that this figure reflects the estimated number of interactions between leatherbacks and longlines, not the number of leatherback mortalities, and is likely an over-estimate of the actual number of interactions (B. Wallace, personal communication, December 16, 2008).

their findings, they estimate that possibly tens of thousands of leatherback turtles die each year from pelagic longline gear alone.

Although data on turtle-fisheries interactions in Canada are limited, by-catch and entanglement is thought to be the biggest threat to leatherback turtles in Canadian waters (James *et al.*, 2005c; PLTRT, 2006; McAlpine *et al.*, 2007). Although there is no pelagic longline fishery in the waters off BC, fixed pot lines, gillnets, and buoy or anchor cables may pose threats to leatherbacks. However, "potential for accidental capture and entanglement in Canadian Pacific waters is currently unknown due to the limited amount of sightings" (PLTRT, 2006, p.14). More data exist on the rates of by-catch in Atlantic Canada. For example, James *et al.* (2005c) looked at 83 records of leatherback interactions with fixed gear in Atlantic Canada, and found that 95 percent of the turtles were entangled in buoy lines and that 18 percent had died, presumably as a result of entanglement, suggesting that "fishing gear anchored to the bottom (fixed gear) in shelf waters may lead to higher mortality per interaction [than pelagic longlines] because turtles entangled at depth or at the surface at low tide will almost certainly drown" (p. 199).

The Canadian Sea Turtle Network (CSTN) also reports that ALTs in Canadian waters have been entangled in: (*i*) gear associated with the snow and rock crab, inshore and offshore lobster, and whelk fisheries; (*ii*) moorings and buoy lines; (*iii*) gill, bait, and pound nets; and (*iv*) vertical lines used in the groundfish longline fishery (ALTRT, 2006). Another study from the Newfoundland Entrapment and Assistance Program found that of

74 reported turtle-fisheries interactions, 42 percent of the turtles were entangled in fishing gear, including gillnets, trawls, cod traps, crabpot moorings, and longlines, and 14 percent of the entangled turtles were dead (McAlpine *et al*, 2007). It has been observed that a large number of turtles entangled in free floating fishing gear in Canada are released alive (O'Boyle, 2001); however, there are no data documenting the post-capture mortality rates of released turtles, and it is possible that many turtles later die from injuries sustained during entanglement (M. James, personal communication, May 8, 2008).

(ii) ingestion of marine debris

In addition to the risks associated with fishing gear, leatherbacks can also be harmed or killed when they accidentally ingest marine debris. James and Herman's (2001) study in the northwest Atlantic found that the same currents that carry jellyfish into areas of upwelling and along oceanic fronts also carry large amounts of buoyant marine debris, resulting in high concentrations of pollution in leatherback foraging areas in Canada. Stomach content analysis of deceased turtles show that they regularly ingest marine pollution, including styrofoam, tar balls, balloons, monofilament, plastics, and other non-degradable and non-digestible waste (Eckert, 1995; James & Herman, 2001; NMFS & USFWS, 1992). Plastic bags and sheeting are particularly harmful, as leatherbacks commonly mistake the floating waste for jellyfish and may actively feed on it. These materials can then become lodged in the turtles' digestive tract or block the entrance to the stomach (Fritts, 1982; Eckert, 1995), leading to starvation and death (Mrosovsky, 1981). There are two documented reports of non-organic materials, including

polypropylene rope, plastic bags, and latex balloons, in the stomach contents of deceased turtles in Canadian waters (McAlpine *et al.*, 2007). However, given that Canadian waters are used as foraging habitat, and the rarity of specimens for examination, this might be a gross underestimation of the actual number of cases.

2.3 LEGAL & INTERNATIONAL CONSERVATION EFFORTS

There are a variety of documents and initiatives around the globe that aim to mitigate threats to leatherback turtles. These conservation efforts not only attempt to protect individual turtles, but may also protect critical habitat for the species, including nesting beaches, coastal foraging areas, and pelagic migration routes. Conservation of sea turtles may occur at three distinct, yet interconnected, levels, including: (*i*) conservation projects led by NGOs, community groups, or research centers, usually carried out in a specific location; (*ii*) legislation implemented by national governments aimed at protecting turtles, usually within their jurisdiction; and (*iii*) international agreements and documents[15] agreed upon and implemented by countries within the turtles' range. Although conservation work at the local level is invaluable to the conservation of marine turtles, in both their marine and terrestrial habitats, it is beyond the scope of this research and will not be discussed. This paper focuses on the later two categories, with attention to those laws, agreements and documents that are most applicable to leatherback turtles.

Many countries throughout the leatherback's range have laws in place to protect the species and its habitats (UNEP, 2003). This legislation, often aimed at endangered

[15] In this thesis, the term *international agreements* is used to describe all legally binding international accords, agreements, protocols, and treaties, while *international documents* refers to informal initiatives, instruments, letters, memorandums of understanding, and codes of conduct.

species in general, signifies a nation's commitment to legally protecting turtles and their habitats. The Government of Canada has demonstrated its federal commitment to protecting leatherback turtles via its endangered species legislation, SARA (see Chapter 3). Domestic legislation is a critical component in the sustained protection of a species. However, as stated earlier, because of the leatherback's transboundary, migratory existence, domestic legislation alone is inadequate to fully protect the species throughout its range.

2.3.1 National Legislation

As noted in a global study by the United Nations Environment Programme (UNEP) (2003), "the Leatherback is nominally protected by legislation in most countries where nesting occurs" (p. 21) as well as in some countries that host marine habitat for the species. Legislation in countries that contain leatherback nesting areas is usually focused on mitigating threats to adult female leatherbacks, nests, eggs and hatchlings, but may also protect habitat critical for the species survival, including nesting beaches and occasionally adjacent coastal waters (James, 2001; UNEP, 2003). National laws protecting nesting turtles, when combined with proper enforcement of regulations, sufficient funding and support of conservation projects, and active protection of nesting habitats, have been successful in several locations (Navid, 1979; NMFS & USFWS, 1992, 2007; UNEP, 2003). In many other instances, however, national laws have not been properly implemented, and nesting turtles remain unprotected (UNEP, 2003; Troëng *et al.*, 2007). Table 3 lists the laws aimed at protecting turtles and their habitats in the nesting countries that are significant to Canadian leatherback turtles.

National legislation also exists in countries that host marine habitats for the species. These laws may directly protect turtles from specific marine threats, such as by-catch, or may attempt to mitigate threats to their marine habitats, such as minimizing marine waste. For example, there are a number of regulations that exist to mitigate turtle by-catch, including the: (*i*) prohibition or reduction of the use of driftnets in certain areas or at certain times when turtles are present (NOAA, 2002; Eckert, 1995); (*ii*) use of Turtle Excluder Devices (TEDs)[16] on shrimp trawling gear in areas frequented by marine turtles (NOAA, 2004); and (*iii*) alteration of fishing gear to increase turtle survival rates. However, protecting species in their marine habitats via national legislation has proven to be more challenging (Ehrenfeld, 1979; VanderZwaag & Hutchings, 2005) and arguably is less successful at protecting individual turtles than are laws aimed at protecting nesting locations.

[16] "A 'Turtle Excluder Device' is a grid of bars with an opening either at the top or the bottom of the trawl net" that allows a turtle to escape while keeping the intended catch in the net (NOAA, n.d.c).

Table 3: Summary of most relevant domestic laws which directly protects turtles and/or their habitats in nesting locations significant to Canadian leatherback turtles, as represented in published literature.

Nesting Location *Atlantic*^	National Legislation (Year in force)	Brief Notes
Anguilla	Fisheries Protection Ordnance No. 4 (1988)	regulates turtle hunting; establishes closed season [i]
Colombia	Resolution No. 391 (2007)	requires TEDs* on shrimp nets in Pacific [ii]
	Resolution No. 1427 (1996)	protects shared nesting habitat [i]
	Resolution No. 157 (1993)	requires TEDs on shrimp nets in Atlantic [i]
	Resolution No. 1.032 (1977)	prohibits capture of turtles [iii]
	Resolution No. 108 (1992)	prohibits use of turtles caught as by-catch [i]
Costa Rica	Law No. 8.325 (2002)	protection & restoration of turtles & habitats [iii]
	Law No. 7317 (1992)	protects turtles [i]
	Decree No. 5680 (1975)	established Tortuguero National Park, prohibits poaching [i]
	Decree No. 29.068 (2000)	established Tamarindo Wildlife National Refuge [iii]
Florida	Marine Turtle Protection Act (1995)	protects turtles, nests & eggs [vi]
	Endangered Species Act (1972)	protects turtles [i]
French Guiana	Decree of July 17 (1991)	protects eggs, nests, turtles/ their parts [iii]
Grenada	Ordinance No. 26 (1956)	prohibits taking turtles & eggs [i]
	Fisheries Regulations (1986)	protects turtles & eggs [ii]
Guyana	Decree of July 17 (1991)	protects eggs, nests, turtles/ their parts [iii]
	Order No. 23 (1994)	requires TEDs on all trawl nets [i]
Panama	Decree No. 82 (2005)	requires TEDs on all trawl boats [ii]
	Decree No. 23 (1967)	prohibits taking eggs in certain months [i]
Puerto Rico	Endangered Species Act (1972)	protects turtles [i]
Suriname	Special Decree (unknown)	protects three nesting beaches [i]
	Hunting Act (1954)	protects turtles [iv]
Trinidad	Fisheries Regulations (1994)	requires TEDs for shrimp nets [iii]
	Protection of Turtle & Egg Regulations (1975)	restricts egg/turtle poaching [iii]
Venezuela	Resolution No. 276 (1970)	regulates turtle hunting [i]
	Wildlife Protection Act (1970)	applies to turtles [i]

(cont. on next page)

(Table 3: cont. from previous page)		
Nesting Location *Pacific^*	**National Legislation (Year in force)**	**Brief Notes**
Indonesia	Act of the Indonesian Government No.10 (1990) Government Reg. No. 7 (1999)	prohibits poaching/trade; protects nests [i] protects turtles [v]
Malaysia	Fauna Conservation Regulations (1964) Fauna Conservation Ordnance No. 11 (1963)	regulates egg collection on turtle farms [v] regulates egg/turtle hunting [v]
Papua New Guinea	Tri-National Leatherback Turtle Conservation Partnership (2006)	protects turtles [vii]
Solomon Islands	Fisheries Regulations Amendment (1993)	regulates turtle by-catch [v]

Notes:
*Turtle Excluder Devices (or TEDs) are defined in Section 2.3.1.
^ Only those nesting locations that have been determined to be significant to the Canadian leatherback population are included in table 3. See Section 2.1.3 for details on Canadian leatherback nesting areas.

Sources: [i] (UNEP, 2003); [ii] (Shirley, King, & Lloyd, 2003); [iii] (ECOLEX, 2008); [iv] (Navid, 1979); [v] (Adnyana, 2006); [vi] (FFWCC, 2008); [vii] (WWF, 2006).

2.3.2 International Agreements

Because the "conservation of Leatherbacks can only be fully achieved through effective international and regional agreements and conventions" (UNEP, 2003, p. 20), this research investigates two types of global, regional, and bi-lateral agreements. First, there are several agreements and documents that aim to address an environmental issue and, in doing so, protect ALTs. Second, there are a number of international agreements and documents that currently, or have the potential to, regulate fishing in an area that contains ALT habitat, and therefore, may affect turtles. These are different from the first group as nations do not ratify these agreements or documents with the intention of protecting turtles, but rather turtles are affected through the documents' regulations or prohibitions.

CHAPTER 3: *SPECIES AT RISK ACT*

3.1 INTRODUCTION

In Canada, the leatherback turtle is an endangered species and legally protected under Schedule 1 of the *Species at Risk Act*, 2002 (SARA). One of the main purposes of the Act is to prevent wildlife species from becoming extinct by providing for their recovery (Government of Canada, 2007). It is not clear, however, whether this legislation is able to address the unique recovery needs of highly migratory species. The leatherback turtle, for example, only spends part of the year in Canadian waters (James *et al,* 2005b), during which time the species is protected by the Act. As previously discussed, however, as a highly migratory species, the leatherback turtle faces a number of threats throughout its range, and thus, protection of this species requires international cooperation.

This chapter examines the ability of Canada's endangered species legislation, SARA, to address the unique conservation needs of the leatherback turtle. Section 3.1 offers an introduction to SARA and its recovery planning process. Section 3.2 examines the legal protection of the species within Canadian jurisdictions, while Section 3.3 investigates the Act's ability to facilitate the necessary international measures for species recovery. This examination includes a look at the Act itself, as well as the SARA Recovery Strategies and Action Plans, documents which are central to the SARA process.

3.2 INTRODUCTION TO THE *SPECIES AT RISK ACT*

In June 2003, the *Species at Risk Act, 2002*, was proclaimed in Canada[17]. The Act, a result of the Canadian Biodiversity Strategy, is part of the country's three-pronged approach[18] to wildlife protection and conservation within Canadian jurisdictions (Government of Canada, 2007). SARA aims to prevent wildlife *species at risk*[19] in Canada from becoming *extirpated*[20] or extinct by implementing the necessary actions for species recovery, including protection of a species' *residence*[21], and, once identified, its *critical habitat*[22] (*Species at Risk Act*, 2002). The federal government recognizes that protecting wildlife is a cooperative effort involving the expertise of agencies at federal and provincial levels, the traditional knowledge of aboriginal peoples, conservation efforts by concerned citizens, and the stewardship efforts of community groups.

The purpose of SARA as identified in the text of the legislation is to "prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened" (*Species at Risk Act*, 2002, s. 6). The Act established the Committee on the

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[17] Two other bills preceded SARA (or Bill C-5), including *Bill C-65, The Canada Endangered Species Protection Act* (CESPA) which died in 1997, and *Bill C-33, The Species at Risk Act*, which died in 2000 (Douglas, 2002).

[18] This three-pronged approach also includes the *Accord for the Protection of Species at Risk* and the *Habitat Stewardship Program for Species at Risk* (Government of Canada, 2007).

[19] *Species at risk,* as defined by SARA, means "an extirpated, endangered or threatened species or a species of special concern" (*Species at Risk Act*, 2002).

[20] *Extirpated,* as defined by SARA, means "a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild" (*Species at Risk Act*, 2002).

[21] *Residence*, as defined by SARA, means "a dwelling place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating" (*Species at Risk Act*, 2002).

[22] *Critical habitat,* as defined by SARA, means "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species" (*Species at Risk Act*, 2002).

Status of Endangered Wildlife in Canada (COSEWIC), responsible for the scientific assessment and identification of species to be listed as at risk (Government of Canada, 2007). The Minister of Environment, under the Department of Environment, is responsible for the overall administration of SARA; however, the recovery and protection of aquatic species in Canadian waters are the responsibility of the Minister of Fisheries and Oceans Canada (Government of Canada, 2007).

The process of protecting a wildlife species under SARA involves a number of steps. First, initial monitoring to assess the population status and trends of species found in Canada is carried out by various agencies and is published in a federal document every five years. Based on this publication, COSEWIC then determines whether a species should be listed as a species at risk.[23] Once listed, the Minister issues an official statement signifying a federal commitment to legally protect the species. Section 32 of SARA lists the g*eneral prohibitions* protecting species, which state that no person shall: (*i*) kill, harm, harass, capture or take a listed species; (*ii*) possess, collect, buy, sell or trade a listed species or any part or derivative of that species; and (*iii*) damage or destroy the *residence* of a listed species (*Species at Risk Act, 2002*, s. 32-33). Eventually, a recovery strategy, detailing the scientific requirements of what should be done for species recovery, is developed for each listed species. A subsequent action plan is then produced, which outlines the specific measures and timeframes to be taken in order to implement the recovery objectives. Finally, the Minister produces annual reports on the administration and implementation of the Act, including an evaluation of the overall

[23] As of 2007 there were 516 listed plant and animal species in Canada (Government of Canada, 2007).

goals and objectives of the recovery strategies and action plans (Government of Canada, 2007).

3.2.1 *Species at Risk Act:* Recovery Strategies & Action Plans

The SARA recovery strategies and action plans are an integral part of the legislation. A recovery strategy is defined as a "planning document that identifies what needs to be done to arrest or reverse the decline of a species" (Government of Canada, 2007, para. 1). Recovery strategies are *required* within one to four years, depending on the date of listing, for all extirpated, endangered, or threatened species in Canada (*Species at Risk Act*, 2002, s. 37, s. 42). A draft of each species recovery strategy is prepared by the relevant individuals and groups who make up the species *Recovery Team*. This team will be responsible for defining the goals and objectives for population recovery, outlining broad approaches to mitigate threats to the species, and if possible, identifying the species' critical habitat (Government of Canada, 2007). SARA recovery strategies include a discussion of: (*i*) the biology of the species; (*ii*) any potential threats to the species, as well as a description of the actions needed to address those threats; (*iii*) the species' critical habitat and any threats to that habitat; (*iv*) the objectives or actions that are needed for the survival of the species, as well as the research and management activities needed to meet these objectives; and (*v*) the lack of any critical information about the species or its habitat (*Species at Risk Act,* 2002, s. 41). The recovery strategy also identifies when the action plan will be completed.

As required by SARA the responsible minister must prepare one or more action plans that

include tangible "measures that are to be taken to implement the recovery strategy," as well as "an indication as to when these measures are to take place" (*Species at Risk Act,* 2002, s. 49). The action plan must, to the extent possible, identify the species' critical habitat, including: (*i*) examples of activities that are likely to harm or destroy this habitat; (*ii*) a statement of measures that are to be taken to protect this habitat; and (*iii*) identifying any areas of the species' critical habitat that have yet to be protected (*Species at Risk Act*, 2002, s. 41). The Action Plan will also evaluate the socio-economic costs and benefits of implementing the proposed measures (Government of Canada, 2007).

3.2.2 *Species at Risk Act*: Status of Leatherbacks

Since 2001 the leatherback turtle has been listed as an *Endangered Species* [24] under Schedule 1 of SARA and thus, is legally protected within Canadian jurisdictions (Government of Canada, 2007). Although only one species is listed under SARA, both the Atlantic and Pacific populations must be identified as recovered before the species may be de-listed from SARA. The recovery of the two distinct populations has been addressed separately by DFO and separate recovery documents exist for each distinct population. The recovery strategies, titled the *Recovery Strategy for Leatherback Turtle (*Dermochelys coriacea*) in Atlantic Canada* and the *Recovery Strategy for Leatherback Turtle (*Dermochelys coriacea*) in Pacific Canadian Waters*, were both drafted in 2003. The *Draft National Recovery Action Plan for the Leatherback Turtle in Pacific Canadian Waters* was released that same year. To date, no action plan for the Atlantic population

[24] *Endangered species*, as defined by *SARA*, means, "a wildlife species that is facing imminent extirpation or extinction" (*Species at Risk Act*, 2002).

has been released. In 2006 the final versions of the two recovery strategies were published.

3.3 ABILITY OF *SPECIES AT RISK ACT* TO PROTECT LEATHERBACK TURTLES

Through SARA, the Government of Canada has, at minimum, demonstrated a *legislative* commitment to protecting species at risk in Canada. Establishing and implementing such legislation is arguably a proper first step towards species protection and the ultimate goal of preserving biodiversity. SARA, however, is not the final step in species recovery and long-term population viability; many uncertainties with this legislation still need to be addressed (VanderZwaag & Hutchings, 2005). One of these uncertainties is the Act's ability to provide for the protection and recovery of transboundary species. The leatherback turtle is both an aquatic and highly-migratory creature. Both of these factors pose unique management challenges and stretch the bounds of SARA's ability to fully protect the species. The following sections explore the implications of SARA for the protection of leatherback turtles in a domestic and an international context. This discussion is not meant to be an exhaustive look at SARA and its strengths and weaknesses, but rather is focused on those aspects of the Act specific to the recovery and protection of leatherback turtles.

3.3.1 *Species at Risk Act*: Domestic

SARA is Canada's primary legislation for the recovery and protection of at risk species within its jurisdiction (Government of Canada, 2007). As previously mentioned, the

leatherback turtle is legally protected under Schedule 1 of SARA and thus a number of prohibitions apply to the species and its residences. Despite this legislative declaration to protect wildlife in Canada and the seemingly strong prohibitions protecting listed species, there remain several weaknesses with SARA's ability to protect leatherbacks within Canadian jurisdictions. These include: (*i*) the applicability of the SARA prohibitions to leatherback turtle populations; (*ii*) the enforcement of these prohibitions; (*iii*) the allowance of certain activities that may be harmful to the species; and (*iv*) the identification and protection of the species' critical habitat in Canada.

(i) The applicability of the SARA prohibitions

As previously mentioned, there are three categories of general prohibitions under SARA, including: (a) the killing or harming of listed wildlife species; (b) the possession or sale of listed wildlife or their parts; and (c) the damaging or destroying of residences of listed wildlife species (*Species at Risk Act*, 2002). Although these prohibitions may have been drafted with the best intentions, their implementation is inconsistent and their applicability to leatherback turtles is weak. For example, category (b) is not applicable to the protection of leatherback turtles in Canada. According to a comprehensive study by the UNEP (2003), unlike many other marine turtle species, there is "virtually no international trade in Leatherback parts or derivatives" (p.19). Marine turtles are usually harvested for their hard shells, meat, or eggs. Turtle shells can be made into a variety of products that are sold on the international market. Leatherbacks, however, with their soft carapace, lack this feature. Additionally, their meat is generally considered unpalatable

and is only consumed on a local scale in a few locations that host nesting beaches. Leatherback eggs, although more widely harvested and consumed, are not known to be sold or traded in Canada (UNEP, 2003).

Second, category (c), against damaging or destroying a listed species *residence,* also does not effectively protect leatherbacks in Canada, as they do not have defined dwelling places, such as nests or dens, in the open ocean nor are their nesting beaches in Canada. The definition of a *residence* in the Act is quite open; such a site could include an area to which the species exudes a strong fidelity, including areas that are inhabited for only part of the year (VanderZwaag & Hutchings, 2005). While ALTs do show strong fidelity to feeding areas in Atlantic Canadian waters (K. Martin, personal communication, November 10, 2008), SARA does not identify how *residence*s in marine locations will be defined and protected. Even if such a dwelling place were to be defined, the prohibition applies to only that specific site, and not the *habitat* surrounding the dwelling place (Douglas, 2002; VanderZwaag & Hutchings, 2005). Some environmental groups have expressed concern with this idea, likening the "protection of residences to protection of a person's bedroom, while the rest of the house and neighbourhood is being demolished" (Douglas, 2002, p. 41). Finally, the prohibition appears to hold no real effectiveness as "the act does not require competent ministers or others to describe residences for any species nor to specifically locate individual residences" (VanderZwaag & Hutchings, 2005, p. 228), making the protection of these residences difficult.

Category (a), the prohibition against harming or killing a listed species, is the most

applicable to the protection of leatherback turtles. When one considers that the species' habitats in Canada are exclusively in marine areas, it is apparent that this prohibition is relevant to a few select groups, mainly the shipping and fishing industries and scientists. While researchers may not intentionally harm turtles, they may cause stress to individuals when fitting them with tags or satellite telemetry gear, although all precautions are taken to prevent any harm (K. Martin, personal communication, March 5, 2008). Commercial ships and fishing boats might harm or kill turtles either directly via collisions or by-catch, or indirectly through the dumping of marine pollution which could be ingested by foraging turtles (ALTRT, 2006; PLTRT, 2006).

To date, there has been only one reported case of a collision between a vessel and a leatherback in the Pacific (PLTRT, 2006) and no reported cases in Atlantic Canadian waters (ALTRT, 2006). While these data could mean that leatherbacks are at a low risk of collisions in Canadian waters, it could also represent improper record keeping or misreporting of incidences (TEWG, 2007). Additionally, little work has been done to quantify the effects of, and mortality rates from, marine pollution or entanglement in fishing gear on leatherbacks in Canadian waters. Data on these threats and on the interactions between turtles and these groups need to be collected and analyzed before inferences can be made about the effectiveness of this prohibition on the leatherback population.

These general prohibitions have also been criticized by VanderZwaag and Hutchings as being vague and unclear. For example, "the Act does not provide definitions for the

prohibited acts, and the meanings of harm, harass and take are particularly open to interpretation" (VanderZwaag & Hutchings, 2005, p. 226), nor does the Act state whether violations must be intentional or may be accidental. Similarly these authors question whether these general prohibitions apply "to direct actions and contacts or also to indirect impacts on individuals of listed species" (VanderZwaag & Hutchings, 2005, p. 226-277). For example, it is unclear whether someone could be held accountable for dumping marine pollution that could potentially be ingested by leatherback turtles.

(ii) The enforcement of the SARA prohibitions

SARA relies heavily upon, and even promotes, voluntary compliance and stewardship activities to protect listed species. For example, funding from the Government of Canada' s *Habitat Stewardship Program for Species at Risk* helped launch a campaign led by the CSTN informing fishers about ALTs, including instructions on how to properly release entangled leatherbacks back into the wild (ALTRT, 2006). Many environmental organizations have criticized this aspect of SARA, claiming that compliance should be strongly enforced rather than voluntary (Douglas, 2002). Enforcing the SARA prohibitions in the fishing industry, albeit with political or bureaucratic considerations, might seem like a logical action to take, given that entanglement in fishing gear is one of the biggest threats to leatherback turtles in their marine habitats, including Canada (NMFS & USWFS, 1992; Kemf *et al.*, 2000), and that promptly releasing entangled turtles greatly increases their chance of survival (Shoop *et al.*, 1990). However, due to the vastness of the Canadian fisheries operations in both the Atlantic and Pacific oceans, proper enforcement would take a substantial commitment of

money and time. In the case of the leatherback turtle, stewardship and voluntary compliance might be the only feasible option. In fact, in some Atlantic Canadian fisheries, seeking voluntary compliance and cooperation with measures for the proper release of incidentally caught turtles is perceived to be more effective than enforcing these measures (A. McMaster, personal communication, October 7, 2008).

(iii) The allowance of certain activities

Another weakness of the SARA legislation is the allowance of incidental harm permits. These permits, licenses, or agreements may be granted to individuals or industries by the responsible authorities, allowing activities that would otherwise violate the terms of the Act. For example, a qualified scientist may gain a permit to conduct "scientific research relating to the conservation of the species" (*Species at Risk Act*, 2002, s. 73). Another potentially more harmful example is the granting of permits where the effect on "the species is incidental to the carrying out of the activity" (*Species at Risk Act*, 2002, s. 73). This includes permits and licenses granted to the fishing industry allowing the by-catch of leatherback turtles (DFO, 2008a). According to DFO (2008), ministers may grant permits only if "these activities will not jeopardize the survival or recovery of species at risk...and that all feasible measures will be taken to minimize the impact" (para. 3) of the activity on the listed species. Ministers must also consider any reasonable alternatives that could be taken to reduce harm to the species at risk. However, as VanderZwaag and Hutchings (2005) point out, the "permitting process under SARA does not provide for public comment or review...[nor does SARA] leave the crucial determination that an activity will not jeopardize the survival/recovery of the species to an independent

scientific assessment" (p. 229) but rather grants authority to the responsible minister. Furthermore, there is no adherence to the precautionary principle. The minister may grant a permit in the absence of scientific data about the harm, or even mortality, inflicted on the species by the activity in question (VanderZwaag & Hutchings, 2005).

While SARA does not require a review process, DFO has established a *Regional Advisory Process* (RAP) intended to review and approve allowable harm assessment permits and licenses, although there is no uniform RAP process (VanderZwaag & Hutchings, 2005). The RAP for the leatherback turtle included representatives from NGOs, the fishing industry, and academia, and resulted in the document, *Allowable Harm Assessment for Leatherback Turtle in Atlantic Canadian Waters, 2004.* This process determined that approximately 170 leatherback turtles are incidentally caught each year in the pelagic longline fishery in Atlantic Canada. Although there were no reported turtle mortalities in this fishery from 2001 to 2003 (DFO, 2004), data from both DFO and NMFS estimate that about 30 ALT mortalities may occur each year in this Canadian fishery (DFO, 2004). The review committee concluded that "the population can sustain human-induced mortality up to about 1%...[and] that there was scope for human-induced mortality without jeopardizing survival or recovery of this species" (DFO, 2004, p.4). Thus, DFO issued seventy 73 incidental harm permits to Canadian longline fishers, allowing the incidental take of leatherback turtles in Atlantic Canadian waters, in 2006 (D. Millar, personal communication, November 20, 2008). Incidental harm permits do include two stipulations requiring fishers to voluntarily take every precaution to release

entangled turtles and to report all turtle interactions to the responsible authorities (A. McMaster, personal communication, November 7, 2008).

The release of the final ALT recovery strategy in 2006 changed DFO's *incidental harm permits* for ALTs. Because the recovery strategy permits the incidental capture of leatherbacks in commercial fisheries, "licensed commercial fishers no longer require separate SARA permits" (D. Millar, personal communication, November 18, 2008). The same two stipulations, requiring proper release methods for captured turtles and accurate reporting of all interactions, are now incorporated into the conditions of fishing licenses (D. Millar, personal communication, November 18, 2008). Additionally, a "scientific review of the estimates of leatherback turtle mortality in Atlantic Canadian waters will be undertaken every 5 years to ensure that the survival or recovery of the species is not jeopardized" (ALTRT, 2006, p. 29).

(iv) The protection of critical habitat

There are a number of uncertainties regarding designation of critical habitat under SARA. SARA states that the responsible minister must identify critical habitat, *to the extent possible,* which leaves room for delay of designation due to lack of scientific data. SARA does not define the process for identifying critical habitat for listed species (VanderZwaag & Hutchings, 2005), and SARA only protects critical habitat once it has been identified in the recovery strategy or action plan (*Species at Risk Act*, 2002, s. 57). Additionally, once critical habitat is defined, there are further uncertainties about how the prohibition against destroying critical habitat will be enforced and monitored (VanderZwaag & Hutchings, 2005). Due to their complex and migratory lifestyle,

defining critical habitat for leatherback turtles is difficult. However, as previously addressed, James *et al.* (2006)'s study scientifically determined that Canadian waters did provide "critical high-latitude habitat" (p. 355) for leatherbacks. A critical habitat designation however, has yet to be officially recognized by SARA and this habitat for ALTs remains unprotected.

3.3.2 *Species at Risk Act*: International

Although domestic legislation can certainly be effective at protecting migratory species for part of their life cycles, the management of highly migratory, transboundary species is inherently complex and must be addressed to some degree at an international level by all range states. Although domestic, SARA is relevant for the international protection of species at risk, as the authorities responsible for the protection and recovery of species in Canada may only operate within the guidelines set out in this legislation. Thus, when addressing the status of migratory species, such as the leatherback turtle, it is important to understand what SARA says, if anything, about the status of species outside of Canada's jurisdictions, and what that means for species protection and recovery. For example, with regards to the leatherback turtle, does SARA provide for the legal protection of the species throughout its range, does it promote or encourage international cooperation, or does the Act ignore the subject altogether?

How the responsible authorities interpret the Act may also be an important factor. For example, does SARA imply a responsibility to protect migratory species, such as the leatherback turtle, beyond Canadian boundaries? No doubt, cooperation at the

international level may occur without federal commitment, for example between two NGOs. Arguably, however, it would be easier for organizations and institutions to initiate international efforts if the federal government were legally committed to these efforts via its endangered species legislation. Additionally, international agreements initiated and ratified at the federal level are likely to be stronger, more influential, and take a more comprehensive approach to involving all of the relevant agencies and governments than would a non-binding agreement between two local organizations.

SARA, despite its weaknesses and limitations, clearly provides the legislative mandate for protecting species at risk within Canadian jurisdictions. The Act's ability to protect these species at the international level, however, is less clearly defined. Several sections of SARA vaguely refer to some international facet, or could be interpreted as such. For example, the preamble states that Canada's "wildlife species and ecosystems are also part of the world's heritage and...the Government of Canada is committed to the principles set out in intergovernmental agreements respecting environmental conservation" (*Species at Risk Act*, 2002). Although this statement recognises that Canadian species are part of the global environment, it appears to reflect past agreements rather than set a precedent for future involvement with international initiatives. The main purpose of SARA, however, to prevent wildlife species from becoming extirpated or extinct by providing for their recovery, may be open for interpretation as it does not specifically state that species must be within Canadian jurisdictions. For example, providing for the recovery of a transboundary species may require some aspect of international cooperation.

The Act also states that when assessing a species, COSEWIC is to indicate whether it migrates across, or has a range that extends across, an international boundary of Canada (*Species at Risk Act* 2002, s. 15). Two other sections of SARA, which pertain to species recovery strategies and action plans, refer to the possibility of international cooperation for species recovery. Section 39 states, "to the extent possible, the recovery strategy must be prepared in consultation with any...persons whom the competent minister considers to be directly affected by the strategy, including the government of any other country in which the species is found" (*Species at Risk Act*, 2002, s. 39). Similarly, Section 48 states, "to the extent possible, an action plan must be prepared in consultation with any...persons whom the competent minister considers to be directly affected by, or interested in, the action plan, including the government of any other country in which the species is found" (*Species at Risk Act*, 2002, s. 48). While these sections do acknowledge that species may cross international boundaries, they only require the appropriate authorities to either comment on the species' migratory behaviour or consult with other countries when developing recovery strategies and action plans. SARA, however, "does not create any new powers or obligations with respect to transboundary species" (Douglas, 2002, p. 8). In other words, SARA does not grant authority to, or require, the responsible ministers to promote international cooperation in the protection of transboundary species.

3.4 INTERNATIONAL PROTECTION: *SPECIES AT RISK ACT* RECOVERY STRATEGIES & ACTION PLANS

The recovery strategies and action plans for listed species in Canada are granted authority and credibility by SARA, and as such, are only as powerful as the legislation allows them to be. Moreover, the authorities responsible for species recovery in Canada (in the case of the leatherback turtle, DFO) may only operate within the guidelines set out in the Act. With regards to the recovery and protection of transboundary species, however, there appear to be inconsistencies between what the legislation enables the responsible authorities to do, and what these authorities have identified as necessary for species recovery in the recovery strategy and action plan. For example, SARA's requirements for the protection of transboundary species, such as the leatherback turtle, are vague and arguably weak. However, in the recovery strategies and action plan for the species, the responsible authorities have clearly identified the role of international cooperation and management for recovery and long-term viability of the population. Moreover, the recovery documents imply that international coordination is necessary to adequately protect the species. The following sections present the relevant details of the SARA recovery strategy and action plan for the PLT and ALT populations in Canada. Chapter 6 offers a discussion of what these inconsistencies mean for the strength and ability of the Act to protect transboundary species.

3.4.1 Pacific Leatherback Recovery Strategy

The *National Recovery Strategy for the Leatherback Turtle (Dermochelys coriacea) in Pacific Canadian Waters* was drafted in 2003 by DFO and the Pacific Leatherback Turtle

Recovery Team (PLTRT)[25]. In 2006 the final document was published by the PLTRT. The goal of the strategy is "the long-term viability of the leatherback turtle population(s) that frequent Pacific Canadian waters" (PLTRT, 2006, p. 21). The PLT recovery strategy was drafted to complement both the *Recovery Strategy for the Leatherback Turtle in Atlantic Canada* and any existing recovery plans in the US for the Pacific leatherbacks. Little is known about the Pacific leatherback turtle in Canada, including data on the size and distribution of the population and on the specific threats that exist within Canadian jurisdictions. Nor do the author's believe that there currently is sufficient data to officially identify critical habitat for the species in Pacific Canadian waters. The authors acknowledge that these gaps must be dealt with before recovery measures may be acted upon. The report reflects this lack of knowledge and is "focused on obtaining fundamental baseline information on the basic biology and distribution of this species in Pacific Canadian waters, and the threats it faces" (PLTRT, 2006, p. 20).

Despite this lack of data and need for more research on the PLT population in Canada, the report does acknowledge the transboundary lifestyle of the species. For example, the authors recognise that although many of the most imminent threats to the species do not occur within Canada, addressing these threats are still relevant to protecting the Canadian PLT population. "The fact that leatherback recovery will only occur as the result of a concerted international effort means that a Canadian recovery plan cannot ignore threats that occur outside Canadian waters" (PLTRT, 2006, p. 13), and in order to address these

[25] The PLTRT is coordinated by DFO and, at the time of publication, included representatives from DFO, University of British Columbia, Dalhousie University, The Vancouver Aquarium Marine Science Centre, World Fisheries Trust, the Canadian commercial fishers sector, Hubbs Seaworld Research Institute, the National Marine Fisheries Service (US), and the University of Alaska.

threats Canada can collaborate on international research and conventions throughout the turtles' range. Additionally, although there are a limited number of turtles in the waters off BC, the authors acknowledge that protecting these individuals is vital to the survivability of the fragile Pacific leatherback population, as adult leatherbacks "foraging in Canadian waters are the largest, most cold-tolerant and most fecund individuals" (PLTRT, 2006, p. 14) in the population.

As required by SARA, several recovery objectives and supporting strategies are included in the report, which will be implemented to reach the recovery goal (see Appendix B for complete list of these objectives). Here the authors recognise that "Canadians have expertise that will be invaluable not only in the part of the leatherback's range that happens to be in Canada, but also in those parts that are "overseas" for Canadians.... an animal that migrates 15,000 km clearly knows no international boundaries" (PLTRT, 2006, p. 21).

Of the five recovery objectives, one is devoted to international cooperation. *Objective (4): International cooperation*, pointedly states that Canada should, "support the efforts of other countries to promote the recovery of the leatherback turtle population(s) that frequent Pacific Canadian waters" (PLTRT, 2006, p. 22). To achieve this, the authors suggest several, bold and progressive actions. Not only do they recommend that Canada ratify, respect, and contribute to international instruments, such as agreements or conventions that aim to protect leatherback turtle populations, they also state that Canada should initiate such international agreements and research projects with other countries in the Pacific leatherback's range. Additionally, the authors call for Canada to provide

expertise and support to locations trying to protect nesting habitats, females, and their eggs, as well as to facilitate the participation of Canadians in international recovery programs.

Finally, when considering the probability of species recovery, the authors state that in the absence of information indicating otherwise, the recovery of PLTs is 'feasible.' However, it is unclear whether the recovery measures identified in the report will lead to species recovery, as "the fate of the Pacific leatherback turtle rests on much more than its transient life in Canadian waters" (PLTRT, 2006, p. 25), and, though the recovery strategy aims to support international efforts, Canada cannot control the measures that other states put into effect. The authors do recognize that species recovery and long-term viability "demands an international effort... [and] will not be realized without international cooperation" (PLTRT, 2006, p. 25).

3.4.2 Pacific Leatherback Action Plan

The *National Recovery Action Plan for the Leatherback Turtle in Pacific Canadian Waters* was drafted in 2003. To date, no final plan exists; however, the PLT recovery strategy states that the final action plan was to be released two years after the release of the recovery plan. According to DFO, however, the final plan is projected to be released by the end of 2010 (C. Eros, personal communication, November 18, 2008). The draft plan lists the specific measures that shall be taken to implement the recovery objectives. Categories that are addressed in the draft include research, clarification and mitigation of threats, stewardship and awareness, and international cooperation. Due to an ongoing

lack of data, however, critical habitat for PLTs is not defined in the draft action plan (PLTRT, 2003).

There are a number of aspects of the draft action plan that, like the recovery strategy, acknowledge the transboundary nature of the species. For example, the authors call for Canada to collaborate on international research aimed at identifying critical habitat, migratory routes, and other basic biological processes for the population, as well as providing Canadian expertise for these international projects. Additionally, the plan lists the specific international agreements that the Government of Canada should ratify or contribute to including, the *Convention on Migratory Species* (CMS) and the IAC. Moreover, the authors state that Canada's commitment to its existing international agreements should be reviewed to ensure that the government is "meeting its international commitments with respect to leatherback turtles" (PLTRT, 2003, p. 9), including commitments to several fisheries agreements, the Convention on the International Trade of Endangered Species (CITES), and the Convention on Biological Diversity (CBD). As well, they argue that Canada should initiate agreements with other states in the PLT's range, including participating in the CMS *Memoranda of Understanding* operating in the Indian Ocean. The document also indicates when these actions should be implemented. For example, the "use of international instruments promoting protection and recovery" is listed as urgent[26] and was proposed to begin in 2003, while the "initiation of agreements and collaborative projects" is necessary (PLTRT, 2003, p. 13). As is the case with all listed species at risk, implementation of the

[26] "The distinction is one of timing rather than importance: urgent activities must be undertaken immediately to recover leatherback turtles in Pacific Canadian waters, while necessary activities follow logically upon the completion of urgent ones" (PLTRT, 2003, p. 11).

proposed recovery actions is subject to funding constraints, and the ultimate decision-making authority to implement these actions lies with the responsible minister (PLTRT, 2003).

The action plan, as required by SARA, also identifies the socio-economic costs of implementing these measures. The costs of implementing and sustaining the international cooperation component of the plan over the five years, is estimated as requiring an increase in government expenditures of about $0.23 million CAD (PLTRT, 2003, p. 14), while the entire action plan is expected to require an increase in government spending by $2.54 million CAD over five years (PLTRT, 2003, p. 15).

3.4.3 Atlantic Leatherback Recovery Strategy

The *Recovery Strategy for the Leatherback Turtle (Dermochelys coriacea) in Atlantic Canada* was published in 2006 by the Atlantic Leatherback Turtle Recovery Team (ALTRT)[27]. The goal of the strategy is to, "increase the population such that the long-term viability of the leatherback turtles frequenting Atlantic Canadian waters is achieved" (ALTRT, 2006, p. 19). Although there are still several knowledge gaps in the data for Canadian ALTs, there appears to be more information about the Atlantic population than the Pacific population in Canada. One omission is apparent in both documents, however: the lack of designation of critical habitat. Although James *et al.* (2006) found that Canadian waters provide critical foraging habitat for leatherbacks in the Northwest

[27] The ALTRT was formed in 2002, and at the time of publication, included representatives from DFO, Dalhousie University, World Wildlife Fund, NS Leatherback Turtle Working Group, NS Sword-Fishermen's Association, NS Department of Natural Resources, NS Museum of Natural History, NS Agriculture and Fisheries, Ecology Action Centre, Atlantic Shark Association, New Brunswick Museum, US National Marine Fisheries Service, and the commercial fishing industry.

Atlantic, the ALT recovery strategy declares that "it is currently not possible to identify critical habitat for this species" (ALTRT, 2006, p. 17).

The authors of the Atlantic strategy also recognize the transboundary behavior of the leatherback turtle. For example, when identifying threats to the species, they acknowledge that "many of the most serious threats do not occur within Canadian jurisdiction and; [*sic*] therefore, recovery of this species will require international cooperation" (ALTRT, 2006, p. iv). However, they argue this fact should not diminish Canada's commitment to protecting the species in Canadian waters. "Canadian efforts, in conjunction with the efforts of all nations having an impact on leatherbacks, are required for the recovery of Atlantic leatherbacks" (ALTRT, 2006, p. 18), and recovery and long-term viability of the ALT population will depend on significant international coordination. Furthermore, the authors claim that Canada has both a domestic and international role to play in the recovery and protection of ALTs, including collaborating on research throughout the turtles' range and promoting international cooperation (ALTRT, 2006).

The recovery objectives outlined in this document (see Appendix C for a complete list of these objectives) aim to complete the gaps in data, as well as examine ways in which Canada can contribute to species recovery at the international level. One of the six objectives is dedicated to this international component. *Objective Six*: *Promote international initiatives that contribute to the recovery of ALT populations*, includes the following rationale, "Canada has the opportunity to play a role in conservation of

leatherback turtles throughout their range...[and] Canadian organizations and agencies can influence activities in other countries, ultimately contributing to improvements in the conservation status of the species" (ALTRT, 2006, p. 21). The strategies to achieve this objective include collaborating with other nations in the turtles' range on conservation initiatives, and investigating possible international turtle agreements for Canada to participate in (ALTRT, 2006), such as the IAC or CMS. The recovery strategy also outlines several 'performance indicators' for each of the objectives. These indicators act as a critical tool to "gauge the extent that recovery activities are successful in contributing to the stated recovery goal for the species" (ALTRT, 2006, p. 22). The indicator outlined in the proposed plan for *Objective Six* simply reads, "Collaboration with other nations on leatherback turtle conservation initiatives" (ALTRT, 2006, p. 23).

Finally, the authors of the ALTRT state that recovery of the ALT is feasible in the absence of information that would indicate otherwise. It is difficult, however, to predict the potential for recovery of the species in Canada as many factors are still unknown. Furthermore, it is not currently possible to determine whether "implementing recovery efforts under this strategy will lead to the de-listing of leatherback turtles" (ALTRT, 2006, p. 18) in Canada, as the fate of the population will be determined by a number of factors outside of Canada's control. Despite these uncertainties, the authors recognise that the possibility for recovery of the ALT population is more optimistic than that of the PLT population, and that through these recovery measures, Canada can play an active role in protecting the species throughout its range.

3.4.4 Atlantic Leatherback Action Plan

As of November 2008, no action plan for the leatherback turtle in Atlantic Canada has been published. As required by SARA, the recovery strategy for ALTs states that an "action plan for the Atlantic population of leatherback turtle [*sic*] will be developed within three years" (ALTRT, 2006, p. 7) of the approval of the recovery strategy. However, the strategy suggests that in the absence of a formal action plan, the measures and actions outlined in the recovery strategy be acted upon by DFO.

CHAPTER 4: CANADA, ATLANTIC LEATHERBACK TURTLES, & INTERNATIONAL AGREEMENTS & DOCUMENTS

4.1 INTRODUCTION

In an article for the *Journal of International Wildlife Law and Policy*, Frazier (2002) states, "if anything is abundantly clear, it is that international cooperation is fundamental to the conservation of marine turtles. The tools for promoting, structuring, and enforcing such cooperation between States are international instruments" (p.4). It is becoming increasingly common for states to realise that they cannot act alone when protecting the highly migratory leatherback turtle. In recent years there has been an increase in the number of international agreements and documents affecting leatherback turtles and their habitats throughout the world. These agreements and documents vary in scope and exist at global, regional, and bi-lateral levels. Many of the agreements and documents attempt to directly protect turtles and their habitats, while others may indirectly harm the species. For example, a treaty between two states may establish a shared nesting location as a protected area. At the same time, a global convention regarding fishing practices may not address turtle by-catch regulations. Furthermore, some of these agreements and documents have also influenced domestic legislation which may affect marine turtle populations.

Because this research focuses specifically on Canada's role in the international protection of leatherback turtles, it is important to first determine Canada's function in these agreements and documents. The next step is to determine what this involvement, or lack thereof, means for leatherback populations in Atlantic Canada. Thus, for the purpose of

this research, only those international agreements and documents that (i) directly or indirectly affect the Canadian population of ALTs and (ii) Canada currently is, or has the potential to become, party to will be assessed in this chapter.[28] This chapter is divided into three sections. Sections 4.2, 4.3, and 4.4 discuss each of the relevant global, regional, and bi-lateral international agreements or documents, respectively. These sections offer a summary of each agreement or document, a discussion of how they relate to ALTs, and an analysis of the effectiveness of that agreement or document for protecting ALTs.

4.2 GLOBAL INTERNATIONAL AGREEMENTS & DOCUMENTS

Due to the leatherback turtle's almost global range, there are a number of international agreements and documents with a global scope that may impact leatherbacks and their habitats. Nine global agreements and documents (presented in chronological order) meet the identified criteria for this research and are summarized and analyzed in Section 4.2. These include: (*i*) *Ramsar Convention on Wetlands of International Importance, 1971;* (*ii*) *Convention on the International Trade of Endangered Species, 1973;* (*iii*) *Convention on Migratory Species, 1979; (iv) the United Nations Convention on the Law of the Sea, 1982;* (*v*) *Rio Declaration on Environment and Development, 1992*; (*vi*) *Agenda 21, 1992*; (*vii*) *Convention on Biological Diversity, 1993*; (*viii*) *UN Agreement for the*

[28] With regard to international agreements or documents that affect the oceans, this research does not include a discussion of those materials that specifically target the prevention of marine pollution (either land based or direct ocean dumping) or management of vessel traffic. These types of agreements/ documents were omitted, while agreements/documents addressing by-catch were included, for two reasons. First, the link between marine pollution or vessel collisions and turtle mortality in Canada needs further documentation, while incidental catch resulting in harm or mortality of ALTs has been well documented in the Atlantic (see Section 2.2). Second, because these by-catch data exist, research on reducing these turtle-fisheries interactions has been initiated in several areas/fisheries. Thus, we can see the direct correlation between altering fishing practices and turtle mortality, while the relationship between reducing marine pollution or altering vessel traffic and turtle mortality is less clear.

Implementation of the Provisions of the UNCLOS of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks; and (ix) a series of documents by the Food and Agriculture Organization of the United Nations (FAO), 1995-2004.

4.2.1 *Ramsar Convention on Wetlands of International Importance*

Summary

The 1971 *Ramsar Convention on Wetlands of International Importance* (Ramsar Convention) mandates 158 contracting parties to protect 1,763 wetland sites (Ramsar Secretariat, 2008). As the Convention states, the parties have recognized that ecologically significant wetlands are important habitats for site-specific flora and fauna, and thus are committed to protecting the world's wetlands through international cooperation. According to the Secretariat, a wetland should be considered internationally important if: (*i*) it is a representative, rare, or unique type of wetland; (*ii*) it contains vulnerable or endangered species or wildlife important for maintaining the biodiversity of a region; (*iii*) there is habitat for wildlife at a critical stage in their life cycles; (*iv*) it regularly supports significant populations of waterbirds or indigenous fish species; (*v*) it is an important foraging, spawning, nursery, or migration path for fish; and (*vi*) it regularly supports one percent of a population of wetland-dependent non-avian animal species (Ramsar Secretariat, 2006). Wetlands that are determined to meet some of these criteria are included on the official *List of Wetlands,* and the contracting parties are responsible for protecting these sites. Parties must also establish protected areas on all

other non-listed significant wetlands within their jurisdictions (Ramsar Convention, 1971).

Relevance to Canadian ALTs

Canada ratified the Ramsar Convention in 1981 and has thirty-eight Ramsar sites (Ramsar Secretariat, 2008). Although eight of these areas are in Atlantic Canada (Environment Canada, 2003), none of them directly protect ALT habitat in Canadian waters. There are, however, six listed Ramsar Convention wetlands in nesting countries significant to Canadian ALTs that directly protect habitat for marine turtles (Wetlands International, 2007). According to the Ramsar/International Wetlands database there are four sites specifically protecting nesting habitat significant for CanadianALTs. These sites, all located in Venezuela, include the: (*i*) Archipielago Los Roques; (*ii*) Laguna de la Restinga; (*iii*) Laguna de Tacarigua; and (*iv*) Ciénaga de Los Olivitos (Wetlands International, 2007).

Analysis

The Ramsar Convention was originally drafted to protect habitat significant to waterfowl species. Over time, however, the Convention's focus has expanded to include wetlands with both terrestrial and marine habitats for fish, endangered species, and other non-avian wildlife. Thus the Ramsar Convention has provided for the protection of four important nesting habitats for Canadian ALTs. Furthermore, because the criteria for listing sites includes wetlands that support endangered species or that support habitat for a species'

critical life cycle stages, other nesting sites for ALTs could be protected by this convention in the future.

4.2.2 *Convention on the International Trade of Endangered Species*

Summary

The 1973 *Convention on the International Trade of Endangered Species* (CITES) recognizes that wild fauna and flora hold aesthetic, scientific, cultural, and economic value, and that international co-operation is essential for their conservation. The Convention aims to regulate international trade in endangered and threatened species in order to protect the world's wildlife from overexploitation and extinction (CITES, 1979). The parties to CITES are responsible for enforcing the provisions of the Convention, including the establishment of penalties for the illegal trade or possession of listed species, and for returning confiscated species to the state of export (CITES, 1979). CITES operates on a permit system to monitor and control the trade of species at risk, either live or deceased, and their parts or derivatives. Listed species are classified into one of three categories of concern, including:

(i) *Appendix I*, which includes all species that are threatened with extinction and currently are, or may be, affected by trade. Trade of Appendix I species is subject to particularly strict regulations. Permits must be granted to both the importing and exporting countries (Environment Canada, 2005), and are granted only in exceptional circumstances, for example for scientific research. Commercial trade of Appendix I species is prohibited (UNEP, 2002)

(ii) *Appendix II*, which lists all species that are not currently threatened with extinction but may become so if their trade is not regulated. Additionally, a species may be listed on Appendix II if unregulated trade of that species would have an adverse effect on a species already listed in Appendix I or II. Only one permit, held by the exporting country, is needed for trade of these species (Environment Canada, 2005).

(ii) *Appendix III*, which includes any species selected by one of the parties, where that species is under special management and the cooperation of other parties, is needed to control the trade of the species. Permits or less strict certificates are needed for trade in these species (Environment Canada, 2005).

Relevance to Canadian ALTs

Canada became a signatory to CITES in 1979 and the Convention came into force in Canada in 1987. The leatherback turtle is listed on Appendix I of CITES, and as such trade in leatherbacks or their parts is prohibited. The Canadian Wildlife Service is responsible for the overall management of CITES in Canada; however, DFO is partially responsible for controlling the trade of marine species (Environment Canada, 2008a).

Analysis

As a party to CITES, Canada has shown its commitment to controlling the illegal trade of endangered species. Leatherbacks or their parts or derivatives, however, are generally not a desirable commodity on international markets (UNEP, 2003) and are probably not traded at all in Canada (UNEP, 2003). While CITES may do little to protect ALTs in

Canada, Canada's commitment to supporting CITES is valuable as the Convention stands to prohibit the illegal trade of leatherback parts, such as eggs, in many other countries.

4.2.3 *Convention on Migratory Species*

Summary

The 1979 *Convention on the Conservation of Migratory Species of Wild Animal* (CMS, or also known as the Bonn Convention) commits its parties to the international management, protection, and study of migratory species, by taking individual or collective action (UNEP & CMS Secretariat, 2004a). The 109 parties recognise that states "must be the protectors of the migratory species of wild animals that live within or pass through their national jurisdictional boundaries" and that "conservation and effective management of migratory species of wild animals require the concerted action of all States" within their range (CMS, 2003). Species are listed in two appendices and may be listed under both.

(i) Appendix I lists all migratory species that are identfied as endangered by the IUCN. As identified in the Convention, parties within the range of an Appendix I species shall: (*i*) conserve and restore the species' habitats; (*ii*) prevent, remove, or minimize any obstacles to their migration; (*iii*) prevent or control threats to the species; and (*iv*) prohibit taking of the animals, except in exceptional circumstances.

(ii) Appendix II lists all migratory species that have an unfavourable conservation status, or that would benefit from international cooperation. The CMS states

that parties should enter into agreements that will benefit species listed under this appendix.

Additionally, the CMS calls for agreements that cover a species' entire range and that are open to all range states, even if a state is not party to the Convention. The UNEP & CMS Secretariat (2004a) state that the "CMS acts as a framework Convention. The Agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions" (para. 4). As of 2008, seven CMS formal agreements and fourteen less formal Memorandums of Understanding (MoU) were in existence (UNEP & CMS Secretariat, 2004a).

Relevance to Canadian ALTs

The leatherback turtle has been listed on both CMS Appendix I and II since 1979. Although Canada is not party to the CMS, as identified in the Convention, Canada would still be able to participate in any relevant CMS instruments. Two documents currently exist under the CMS that aim to specifically protect marine turtles, including the MoU concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa, 1999 (Africa MoU) and the MoU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia, 2001 (IOSEA MoU) (UNEP & CMS Secretariat, 2004b). Although the Africa MoU is not focused on key habitats for Canadian ALTs (i.e. the waters in the western Atlantic), leatherbacks tagged in waters off the African coast have been tracked migrating to waters in the Caribbean and South America (Billes *et al.*, 2006), which are key nesting areas for ALTs.

Additionally, Canadian PLTs, who most likely belong to the western Pacific population, would have key nesting habitats in the areas covered by the IOSEA MoU (Dutton Bowen, Owens, Barragan & Davis, 1999; PLTRT, 2006). These two MoUs are open indefinitely for participation by non-party states. Canada, however, is not currently a signatory to either.

The CMS has also adopted two resolutions on fisheries by-catch, *Resolution 6.2* and *Resolution 8.14*. While these two resolutions address all forms of fisheries by-catch, including turtles, birds, and sharks, they do encourage CMS parties to adopt the *FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations* (see Section 4.2.9(*iii*)) and the *FAO Technical Guidelines on the Interactions between Sea Turtles and Fisheries* (see Section 4.2.9(*iii*)). The resolutions also call for research into by-catch mitigation technologies and the sharing of this data among parties (UNEP & CMS Secretariat, 2005).

Analysis

The CMS attempts to coordinate the efforts of 109 parties protecting hundreds of migratory species facing vastly different threats in diverse habitats around the world. However, as the UNEP & CMS Secretariat state, the Convention is unique as it allows for the "development of models tailored according to the [species'] conservation needs throughout the migratory range" (2004a, para. 4). States can use the CMS as a guideline for implementing agreements specifically generated to meet the needs of a specific species in a certain region of the world, allowing states to keep the focus on what matters

most for that particular species. It is also encouraging that non-party states can participate in any CMS agreement or MoU. The two existing turtle MoUs have established conservation plans, bringing together a large network of stakeholders to address specific issues, such as minimizing by-catch and illegal harvesting, establishing protected areas, and initiating critical research (UNEP & CMS Secretariat, 2004b). The Government of Canada has the potential to protect leatherbacks internationally by supporting either MoU. The Africa MoU could potentially benefit the Canadian ALT population and the IOSEA MoU would most likely benefit Canadian PLTs. While future regional agreements or MoUs may be established under the CMS, such an agreement specifically targeting ALTs does not seem likely given the current limited participation of states in North and South America (Bache, 2002).

4.2.4 *United Nations Convention on the Law of the Sea*

Summary

The 1982 *United Nations Convention on the Law of the Sea* (UNCLOS), which entered into force globally in 1994, attempts to "regulate all aspects of the resources of the sea and uses of the ocean" for the entire international maritime community (UN, 2007, The Convention, para. 1). As of November 2008 there were 157 UNCLOS parties (UN, 2008). Among a number of other accomplishments, UNCLOS recognized four major coastal state zones in the ocean (internal waters, territorial sea, contiguous zone, and exclusive economic zone), and defined a state's rights to resources in these four zones. For example, states have exclusive sovereignty over their internal waters. In the territorial sea, which extends twelve nautical miles out from the coastline, states have

authority over conservation or exploitation of their resources but must also allow for the innocent passage of ships. In the contiguous zone, extending twenty-four nautical miles from the baseline of the territorial sea, a state has authority to exercise control to "prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations...[and] punish infringement of the above laws and regulations committed within its territory or territorial sea" (UN, 1982, art. 33). Finally, in the Exclusive Economic Zone (EEZ), which stretches 200 nautical miles from a state's baseline, states have sovereign rights over their resources with an obligation to promote sustainable catch rates. While a state's EEZ is open for navigation by all states, foreign ships must obey any laws or regulations established by the home state adopted in conformity of international legal standards. All remaining waters, known as the high seas, are open to fishing and shipping by all states in accordance with any existing international agreements (UN, 1982).

Relevance to Canadian ALTs

The Government of Canada signed UNCLOS in 1982 and ratified it in 2003. Canada was an integral part in the UNCLOS negotiations and has been an active participant since the Convention was ratified (Foreign Affairs and International Trade Canada, 2008). In addition to establishing jurisdictional rights in the ocean, the Convention also defines a state's obligations to the marine environment in those areas. For example, UNCLOS parties shall take all necessary measures "to prevent, reduce and control pollution of the marine environment from any source" (UN, 1982, art. 194), including developing national laws and regulations. Additionally, while UNCLOS does not specifically protect marine turtles, it does state that the parties shall take measures to "protect and preserve

rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life" (UN, 1982, art. 194).

Analysis

UNCLOS is known as the constitution of the oceans and has greatly influenced, if not defined, maritime policy internationally and in Canada. While UNCLOS may not directly protect endangered marine species, the Convention's influence on national marine policy that does address environmental issues and marine species, such as SARA, should not be underestimated. The Convention includes a number of detailed provisions requiring the contracting parties to protect the marine environments and marine species within their jurisdictions. The extent to which any of these measures are followed, however, is unknown.

4.2.5 *Rio Declaration on Environment and Development*

Summary

The *Rio Declaration on Environment and Development* (or the Rio Declaration), the result of the 1992 UN Conference on Environment and Development, promotes a global agenda aimed at promoting sustainable development for the global community. The Declaration, adopted by almost 200 states, is comprised of twenty-seven principles covering a wide range of topics including: environmental protection; eradicating poverty; quality of life; sustainable development; environmental legislation; women and aboriginal rights; peace and warfare; and cooperation among states (Rio Declaration, 1992). The Rio Declaration is also responsible for initiating the wide application of the

precautionary approach, stating that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (Rio Declaration, 1992, principle 15).

Relevance to Canadian ALTs

The Government of Canada was represented at the UNED conference and signed the Rio Declaration in 1992. In 1997 Canada developed a Sustainable Development Strategy (SDS), as a result of its commitments to the Declaration (Environment Canada, 2006a). Neither the Rio Declaration nor Canada's SDS specifically addresses the protection of marine turtles. However, the Rio Declaration (1992) does call for states to "cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystems" (principle 7) and for states to "enact effective environmental legislation" (principle 11). Similarly, the SDS states that "wildlife [in Canada] will be conserved and protected for the benefit of present and future generations" (Environment Canada, 2006a, p.23). Additionally, the call for states to apply the precautionary approach is also important to the protection of ALTs, as it has the potential to prevent harm to the species or their habitat in lieu of scientific data.

Analysis

The Rio Declaration is significant as it arguably set a global tone for environmental legislation and helped to facilitate regional cooperation and subsequent international treaties. Consideration and use of the precautionary approach, a concept that is

increasingly called for in environmental legislation, is also a significant outcome of the Rio Declaration (O'Riordan & Jordan, 1995; Applegate, 2000). However, because of its overarching scope, covering a plethora of environmentally related topics, the Rio Declaration currently has little direct bearing on the protection of leatherback turtles in Canada.

4.2.6 *Agenda 21*

The UN Conference on Environment and Development resulted in several other soft law documents[29], including Agenda 21. Agenda 21 serves as a global plan of action that includes social, economic, conservation, and management considerations for the global environment. The Agenda is comprised of four sections that address issues such as sustainable development, poverty, human health, deforestation, fragile ecosystems, toxic chemicals, and hazardous wastes. The document also identifies ways to strengthen the role of groups, such as women, indigenous people, and NGOs in sustainable development planning. Finally, a plan of implementation is offered that urges states to consider the role of education, capacity-building, science, international cooperation, and informed decision-making (UN, 2005).

Relevance to Canadian ALTs

Two chapters from Agenda 21, Chapter 15 and Chapter 17, are of some relevance to ALTs. Chapter 15 calls for governments to protect biodiversity through initiating effective social and economic incentives, by developing national strategies, and by

[29] Other documents from the conference included the Statement of Principles for the Sustainable Management of Forests and the United Nations Framework Convention on Climate Change.

cooperating at the international level (UN, 2005). The agenda also calls for the "recovery of threatened and endangered species" (UN, 2005, sec. 15.5(h)) and for the "improved international coordination of measures for the effective conservation and management of endangered/non-pest migratory species" (UN, 2005, sec. 15.7(g)). Chapter 17 discusses the protection of the world's oceans. With regards to marine and coastal areas it calls for integrated management, the application of the precautionary approach, the identification of critical conservation areas, and the prevention or reduction of environmental degradation. The agenda also states that governments should "promote the development and use of selective fishing gear and practices that minimize...by-catch of non-target species" (UN, 2005, sec. 17.46(c)) including the protection of endangered marine species.

Analysis

Agenda 21 is a plan of action meant to be implemented at local, national, and global levels. The Agenda does identify specific goals, such as the protection of endangered marine species and the cooperation of states at the international level, which likely influenced environmental policy in Canada, including SARA. However, Agenda 21 does not have any direct implications for the current protection of ALTs.

4.2.7 *Convention on Biological Diversity*

Summary

The *Convention on Biological Diversity* (CDB) was concluded in 1992. The 168 parties pledge to conserve the world's biological diversity, while addressing the sustainable use of biological resources and the equitable sharing of benefits from these resources (CBD,

1992). The Convention recognises that while states have sovereign rights over their resources, they are responsible for using these in a sustainable manner while conserving biodiversity. Additionally, states must ensure that activities within their jurisdictions do not cause damage to areas outside their jurisdiction (CBD, 1992). Among other things, the Convention recommends that each party should: (*i*) develop national strategies that reflect the measures identified in the CBD; (*ii*) integrate the conservation and sustainable use of biodiversity into these strategies; (*iii*) identify and monitor biological diversity and activities that may harm biodiversity; (*iv*) promote the protection and rehabilitation of natural habitats through management plans; (*v*) develop and maintain legislation that protects threatened species and their habitats; and (*vi*) provide financial support and promote sharing of information to developing countries to aid in the conservation of biodiversity (CBD, 1992).

The parties to the CBD have also endorsed the concept of the ecosystem approach (EA), a strategy for the integrated management of land, water, and all living resources within an area. At the annual Conference of the Parties in 2000, twelve EA principles were identified to be incorporated into management planning. Four of these include: (*i*) the effects that management activities in one locale may have on another; (*ii*) the maintenance of ecosystem functions; (*iii*) the consideration of all forms of information from scientific to indigenous knowledge; and (*iv*) the involvement of all interested stakeholders in the management plan and process (CBD, 2000). Finally, the CBD parties have also committed to achieving "a significant reduction of the current rate of biodiversity loss at the global, regional and national level" by 2010 (CBD, 2008, para. 1).

Relevance to Canadian ALTs

Canada became a signatory to the CBD in 1992 and ratified the agreement later that year. Environment Canada, the agency responsible for facilitating Canada's activities in response to the CBD, created the Canadian Biodiversity Strategy (CBS) in 1995 as a response to the CBD's 2010 biodiversity target (Environment Canada, 2006b). The CBS has five objectives, which include to "maintain or develop incentives and legislation that support the conservation of biodiversity [and to]...work with other countries to conserve biodiversity" (Minister of Supply & Services Canada, 1995, p.3). Another measure taken to achieve the 2010 biodiversity target in Canada included the implementation of SARA in 2003 (CBD, n.d.), which protect ALTs. Additionally, the EA identified by the CBD, could potentially protect highly migratory and endangered species by applying conservation mechanisms to large tracks of their habitat. Environment Canada claims that, "Canada takes an ecosystem approach, considering 100 per cent of the landscape/seascape, and including the role humans play within ecosystems" (2008b, para. 14). In Canada there are several areas that have attempted an EA, including the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative in Atlantic Canada (DFO, 2008b). While there has been some attention to marine species in this area, such as cold water corals, management authorities have not yet addressed ALTs or their habitats within the ESSIM zone.

Analysis

As listed above, the CBD identifies a number of broad recommendations that parties should take into consideration, but offers no mechanism for compliance or monitoring of

these recommendations. However, it appears that the CBD has had significant influence on federal endangered species policy in Canada. For example, the CBS and SARA were a result of Canada's commitments to the CBD and the 2010 target. If put into action, the EA promoted by the CBD would no doubt benefit ALTs and other endangered species in Atlantic Canadian waters, as such an approach takes a number of critical factors into consideration. However, the EA is consequently a highly complex management system, which takes many stages of planning, implementation, and review. Thus, an EA in a complex and large maritime area, such as the ALT's habitat in Canada, could take years to implement and even longer before positive effects were reflected on ALT populations. In the future, the ESSIM Initiative may serve as a potential mechanism for comprehensively protecting marine species and their habitats in Atlantic Canada via its focus on fisheries management and establishing protected areas.

4.2.8 United Nations Agreement for the Implementation of the Provisions of the UNCLOS of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks

Summary

The objective of the 1995 UN Agreement for the Implementation of the Provisions of the UNCLOS of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (or the Fish Stocks Agreement) is to "ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks through effective implementation of the relevant provisions of [UNCLOS]" (UN General Assembly, 1995, art. 2). The seventy-two contracting

parties (UN, 2008) have recognised a number of problems with the management of these fisheries, including resources exploitation, unreliable data reporting, and lack of regulations on fleet size, catch, and gear type. By signing this agreement, the parties have committed themselves to responsible fisheries practices and to improving cooperation between states in order to better address these concerns (UN General Assembly, 1995). The agreement is applicable to straddling and migratory fish stocks in the areas beyond national jurisdictions, and requires parties to work together to determine the appropriate catch rates, gear requirements, and cooperation mechanisms. The agreement also identifies the procedures for reporting violations, which include fishing without a licence, fishing with prohibited gear, or not reporting accurate records (UN General Assembly, 1995).

Relevance to Canadian ALTs

Canada signed the Fish Stocks Agreement in 1999. Although turtles, or any other species, are not listed as a specific type of by-catch, several sections of the agreement do state the importance of monitoring, managing, and controlling the catch of non-target species in the same ecosystems as target stocks. For example, parties are responsible for collecting and assessing data, and where necessary, adopting the proper conservation measures to reduce the amount of by-catch and ensure the conservation of non-target and endangered species. In addition to reducing by-catch, the parties must also minimize the amount of pollution, including lost or abandoned gear, by using "selective, environmentally safe and cost-effective fishing gear and techniques" (UN General Assembly, 1995, art. 5(f)). Other duties of the flag state include reporting catch of non-

target species and verifying these reports through national observer and other monitoring programs. Contracting parties also have a duty to enforce the regulations and investigate any violations, which include: (*i*) inaccurate catch records for target and non-target species; (*ii*) the use of prohibited fishing gear; (*iii*) fishing without a permit; or (*iv*) fishing in a closed area (UN General Assembly, 1995). The agreement also calls for the application of the precautionary approach in order to protect the marine environment and its resources. Finally, as party to the Fish Stocks Agreement, states have a "duty to cooperate by becoming members of [RFMOs]...or by agreeing to apply the conservation and management measures established by such organization[s]" (UN General Assembly, 1995, art. 8) and to cooperate to establish RFMOs where no such organization exists.

Analysis

The objective of the Fish Stocks Agreement is to ensure the long term sustainable use of fish stocks in areas beyond national jurisdictions, but the scope of the Agreement goes beyond managing fisheries. The Agreement states the importance of reducing the catch of non-target species and protecting the greater marine environment. Moreover, the Fish Stocks Agreement addresses fisheries on the high seas, which allows for States to potentially provide protection to non-target species, via by-catch regulations and gear modifications, in areas beyond national jurisdictions.

4.2.9 Food and Agriculture Organization of the United Nations Documents

The FAO has published several documents that are of relevance to this research. These include: (*i*) the *FAO Code of Conduct for Responsible Fisheries (1995)*; (*ii*) the *FAO*

Guidelines on the Ecosystem Approach (2003); and (*iii*) a series of FAO sea turtle conservation reports. Each of these documents is discussed separately in the sections below, with one final analysis, discussing all of these documents, offered at the conclusion of Section 4.2.9.

(i) FAO Code of Conduct for Responsible Fisheries

Summary

The *FAO Code of Conduct for Responsible Fisheries* (or the FAO Code of Conduct), adopted in 1995, provides a global framework for "national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment" (FAO, 1995, p. vi). The code is global in scope and is applicable to all States, international instruments, and regional fisheries organizations; its implementation, however, is non-binding. The objectives of the code include: (*i*) establishing principles for responsible fisheries and national policies for the conservation of fish resources; (*ii*) establishing a framework for states to improve fishing practices; (*iii*) facilitating and promoting cooperation among states and other organizations; and (*iv*) promoting the protection and study of living resources and their ecosystems (FAO, 1995).

Relevance to Canadian ALTs

In 1998, Canada implemented its own code of responsible fishing based on the *FAO Code of Conduct*. Regarding by-catch, the FAO Code urges States to collect and share accurate data on by-catch rates, and to conduct studies on the environmental impacts of different fishing gear on non-target species. The code also calls for the implementation of the precautionary approach in all aspects of fisheries and ecosystems management. It

furthermore requires that the appropriate authorities take measures to minimize catch of non-target species, both fish and non-fish, as well as endangered species (FAO, 1995).

(ii) FAO Guidelines on the Ecosystem Approach to Fisheries

Summary

The *FAO Guidelines on the Ecosystem Approach to Fisheries* (or the FAO EAF) were drafted in 2003 as one way to implement the provisions of the FAO Code of Conduct. Like the FAO Code, the guidelines are global in scope, but are implemented on a voluntary basis (FAO Fisheries Department, 2003). These guidelines suggest that authorities using an EAF should: (*i*) recognize the value of the ecosystem within which fisheries exist; (*ii*) incorporate the precautionary approach; (*iii*) recognize the broader uses of the marine environment; (*iv*) provide for better consultation with stakeholders; (*v*) take into account all components of fisheries interactions, including those with ecosystems and non-fish species; and (*vi*) limit fisheries impacts on oceans (FAO Fisheries Department, 2003). The guide also recommends that states develop management plans for these recommendations and evaluate their EAF efforts on a regular basis.

Relevance to Canadian ALTs

It is unclear if Canada has adopted all of the principles outlined in the FAO EAF. However, many aspects of ocean and fisheries management in Canada have included some aspects of the EA. The guide does specifically address by-catch of non-target species, stating that "most fishing gear affects marine life" (FAO Fisheries Department,

003, p.29), and that an EAF would attempt to minimize by-catch using tools such as TEDs, sorting grids, circle hooks, acoustic noises, closed or protected areas, and "blue dye baits that reduce incidental capture of turtles" (FAO Fisheries Department, 2003, p.30). Additionally, states should also provide for the protection and conservation of marine biodiversity and endangered species. The FAO EAF also recognizes the need for ongoing research and monitoring to ensure the best available data is being used.

(iii) FAO Sea Turtle Conservation Documents

Summary

The FAO and its Committee on Fisheries provide a forum for FAO parties and non-parties to discuss fisheries management issues. These consultations and meetings have resulted in several documents relating directly to sea turtle-fisheries interactions, including the *Report of the Expert Consultation on Interactions between Sea Turtles and Fisheries within an Ecosystem Context* and the *Report of the Technical Consultation on Sea Turtles Conservation and Fisheries.* Both of these documents are global in scope, applying to all states, international organizations, and Regional Fisheries Management Organisations (RFMOs)[30], however their application is voluntary. The *Report of the Expert Consultation on Interactions between Sea Turtles and Fisheries within an Ecosystem Context*, the result of a 2004 meeting of eleven experts from seven countries, attempts to identify the interactions and role of fisheries in sea turtle conservation (FAO, 2004). The report summarizes existing threats, both terrestrial and marine, including the different types of fishing gear, ranking them from lowest to highest threat. The

[30] RFMOs are responsible for coordinating the management of a particular fish stock(s) which migrate through the waters of more than one jurisdiction, including the high seas.

conclusions from this analysis suggest that while not all major threats to turtles are fishing related, significant threats can be reduced by changing fishing practices. For example, certain measures could be tested for their effectiveness, including: (*i*) using TEDs on trawlers; (*ii*) changing the depth at which longlines are set; (*iii*) using different types of bait; (*iv*) establishing proper live release practices; and (*v*) restricting or closing fisheries when large numbers of turtles are present (FAO, 2004).

Although the report appears to be more of a compilation of existing data than a framework for action, it does suggest several recommendations for fisheries managers. Those recommendations include: (*i*) focusing research and conservation efforts on the most threatened turtle populations; (*ii*) implementing gear modification measures that have proven to minimize by-catch; (*iii*) cooperating with RFMOs and other international instruments; and (*iv*) conducting further research on turtle habitats and gear modifications (FAO, 2004).

The 2004 *Report of the Technical Consultation on Sea Turtles Conservation and Fisheries* summarizes the threats and measures that have been taken since the previous consultation and provides recommendations for future actions. For example, the report begins by identifying the range of measures that have been implemented to reduce turtle by-catch. While studies have shown that the use of TEDs on trawlers, circle hooks on longlines, and proper live-release methods have been successful, there is still a need to conduct similar studies in gillnet and other fisheries (FAO, 2005). Interestingly, the report states that the incidental catch of marine turtles "decreases the economic

performance of fisheries and therefore fishers generally are willing to collaborate in reduction of bycatch of sea turtles" (FAO, 2005, p. 4).

Most importantly the report suggests the development of guidelines to help reduce sea turtle mortality in fishing operations. Two draft proposals, one by Japan and one by the US, were used as the basis for the final document, *Guidelines to Reduce Sea Turtle Mortality in Fishing Operations* (FAO Turtle Guidelines). These guidelines by the FAO, are meant to be "globally applicable, practical and pragmatic, but also flexible so that they can be implemented by all States based on reliable scientific data that is specific to a geographic region and fishery" (FAO, 2005, p.5). The guidelines (found in Appendix E) of the report, suggest a number of voluntary measures that are directed towards RFMOs, international organizations, and individual states. These include provisions such as: (*i*) assessing the causes of sea turtle mortality; (*ii*) standardizing the handling of incidentally caught turtles in order to improve survival; (*iii*) modifying gear and fishing practices to reduce by-catch; (*iv*) using time/area fisheries closures to reduce interactions with sea turtle populations; (*v*) improving data on turtle-fishery interactions; (*vi*) protecting terrestrial and marine habitats; (*vii*) improving education and awareness; and (*viii*) reviewing the role of RFMOs in sea turtle conservation (FAO, 2005). The guidelines also suggest that participants engage in continuous assessment of the measures taken. Other guidelines include education and training for fishers, capacity building, resource sharing, and incorporating social, cultural, and economic considerations into fisheries management. Conservation of turtles beyond fisheries interactions, such as the

promotion of regional conservation measures throughout the species' lifecycle, is also given consideration (FAO, 2005).

Finally, the *Report of the Technical Consultation* outlines future actions that the FAO, RFMOs, and FAO member countries shall take. The FAO is responsible for conducting workshops, reporting sea turtle and fisheries trends, and creating technical documents for the parties. The FAO must also coordinate research and observer programmes, and facilitate the harmonization of national legislation relevant to sea turtle conservation (FAO, 2005). Future actions by RFMOs include collecting detailed and accurate information on turtle-fisheries interactions, including how the adoption of mitigation measures affects these interactions. These organizations must also facilitate the sharing of this data. FAO member states are to give consideration to the implementation of the FAO Turtle Guidelines, cooperate with RFMOs to reduce the impacts of fishing on sea turtles, and collect and share data on turtle-fisheries interactions (FAO, 2005).

Relevance to Canadian ALTs

The Government of Canada has not officially adopted the FAO Turtle Guidelines, but DFO was an active participant in the *Technical Consultation on Sea Turtles Conservation and Fisheries* (A. McMaster, personal communication, November 7th, 2008). If, however, the FAO were to implement a more formal International Plan of Action (IPOA) for Sea Turtles[31], DFO would participate in both drafting and implementing such a plan (A. McMaster, personal communication, November 7th, 2008). Additionally, the CMS,

[31] The FAO usually drafts a more formal IPOA following the implementation of a specific set of guidelines. For example, the FAO has drafted IPOAs to address illegal fishing, sea bird by-catch and shark by-catch (Lugten, 2006).

ICCAT, NAFO, and the IAC, which have the potential to protect Canadian ALTs, have all officially adopted the guidelines. While this is encouraging, it must be noted that these guidelines are relatively recent developments. As expected, the "formal commitment to and actual implementation of the FAO guidelines is not yet a standard in the fisheries commissions for which turtles bycatch may be an issue" (FAO, 2007).

Analysis

These FAO documents, although implemented on a voluntary basis and are not legally binding, are still a valuable tool for changing fisheries management practices on a global scale. Moreover, Lugten (2006) suggests that "the strength of soft law instruments is that they are able to focus on specific problems in environmental management" (p. 172). Not only do the documents address a comprehensive approach to managing fisheries within the greater marine environment, they also have identified specific and detailed ways to reduce sea turtle by-catch. Thus, when implemented they have the power to significantly reduce turtle-fisheries interactions. Implementation and enforcement however can limit the effectiveness of such provisions, as has been the case with the FAO Code of Conduct (Lugten, 2006). The FAO Fisheries Department does hold regular meetings and consultations, which allows participants from the global fisheries community to assess measures that have been implemented, and develop new recommendations as necessary. At the very least, the provisions of the FAO Code of Conduct and the FAO EAF have called attention to the concept of sustainable and responsible fishing, and may have altered the management of some fisheries. Moreover, the FAO Turtle Guidelines call attention to global reductions in sea turtle mortality and identifies specific ways in which

fisheries managers can achieve this goal. If adopted and properly implemented by states or other entities, these guidelines have great potential to directly reduce turtle mortality.

4.3 REGIONAL INTERNATIONAL AGREEMENTS & DOCUMENTS

There are a number of regional agreements and documents that may directly or indirectly impact ALTs in Canada; five of these meet the criteria identified for this research, and thus are addressed in Section 4.3. These agreements and documents, presented chronologically, include: (*i*) the *International Convention for the Conservation of Atlantic Tunas, 1969*; (*ii*) the *Convention on Future Multilateral Co-operation in the Northwest Atlantic Fisheries, 1978*; (*iii*) the *Convention for the Conservation of Salmon in the North Atlantic Ocean, 1983*; (*iv*) the *North American Agreement on Environmental Cooperation, 1993;* and (*v*) the *InterAmerican Convention for the Conservation and Protection of Sea Turtles, 2001.*

4.3.1 *International Convention for the Conservation of Atlantic Tunas*

Summary

The *International Convention for the Conservation of Atlantic Tunas* (ICCAT) was signed by seventeen countries at Rio de Janeiro, Brazil in 1966 and came into force internationally in 1969. ICCAT continues to promote cooperation among its now forty-six contracting parties (ICCAT, 2008) to maintain populations of tuna and tuna-like species in the Atlantic Ocean "at levels which will permit the maximum sustainable catch for food and other purposes" (ICCAT, 1966, annex I, para. 1). The Convention area covers the entire Atlantic Ocean and Mediterranean Sea and Black Sea (ICCAT, 2006).

ICCAT established the International Commission for the Conservation of Atlantic Tunas (ICCAT Commission), with representatives from each party, to carry out specific functions, including: (*i*) studying Atlantic tuna populations, their habitats, and human interactions with the species; (*ii*) establishing panels to monitor tuna populations and specific marine habitats; and (*iii*) making recommendations for the highest possible catch of tunas in certain locations. The parties have agreed to collaborate by setting "up a system of international enforcement to be applied to the Convention area," excluding waters under state jurisdictions (ICCAT, 1966, art. IX). Since the establishment of the ICCAT Commission, a number of committees have been formed, such as the *Standing Committee on Research and Statistics* and the *Sub-Committee on the Environment.* The *Sub-Committee on the Environment* is responsible for drafting annual reports based on observer data and makes recommendations to the parties on possible conservation measures within the Convention area. Part of the group's responsibilities include addressing matters related to by-catch of non-target species including turtles, sea birds, sharks, and juvenile tuna species (Meltzer, 2005). While ICCAT does not legally prohibit or control the by-catch of non-target species, it does encourage the contracting parties to submit by-catch and interaction data to its various committees.

Relevance to Canadian ALTs

The Government of Canada was one of the original parties to ICCAT in 1966 and has been an active member since that time. The Convention is relevant to ALTs for two reasons. First, the Convention area covers the entire range of leatherbacks in the Atlantic. Second, longlines, one of the two major types of gear used in the Convention

area (Meltzer, 2005), have been documented as a threat to turtles (Kemf *et al.*, 2000; Lewison *et al.*, 2004). ICCAT Commission documents show that leatherbacks in the Convention area have been reported as a by-catch species in longlines, gillnets, purse seines, and harpoons, although no catch numbers or mortality rates are publically available (ICCAT, 2007a). In a presentation at the *28th Annual Symposium on Sea Turtle Biology and Conservation* the director of the Caribbean Conservation Corporation stated that, of all the regional fisheries agreements, "fishing regulated by [ICCAT] has the greatest impact on sea turtles" (Donnelly, 2008, para. 2). In 2003, the Commission adopted the *Resolution by ICCAT on Sea Turtles*, which encourages parties to collect and submit data on all interactions with sea turtles, including incidental captures, deterioration of nesting sites, and interactions with marine debris. Additionally the resolution calls for the parties to promote the live release of caught turtles, share information on release techniques to reduce mortality, and develop standardized collection and reporting methods for turtle interaction data (ICCAT, 2003).

The *ICCAT Sub-Committee on Ecosystems* has also attempted to address the issue of turtle by-catch. For example, a 2007 report by the sub-committee covers several issues pertaining to by-catch in the ICCAT commission area. Although the report is focused on reviewing progress made in reducing sea bird by-catch, it does briefly address issues concerning other non-target species including turtles (ICCAT, 2007b). Although no definitive conclusions were made in the report, some research, for example on the rates of turtle by-catch in various types of fishing gear, has been initiated. The sub-committee also makes several recommendations for future actions, including: (*i*) the need for

observer data to include catch rates of all non-target species; (*ii*) the suggestion that the ICCAT Commission hire a by-catch coordinator to address specific issues; and (*iii*) the development and distribution of materials to ICCAT fishermen on the conservation of non-target species, including measures to reduce incidental catch and mortality. Finally, the report also suggests a number of fields to be added to the ICCAT database, including one on the catch of non-target species (ICCAT, 2007b).

Analysis

Since the Convention was signed in 1966, a number of problems with ICCAT have been brought to light by various groups and governments. For example, ICCAT states that the parties are required to record and submit data on catch rates and to establish an international enforcement program. A report posted on a DFO website[32], however, stated that many of the ICCAT commitments have not yet been met (Meltzer, 2005). For example, "partial, late (or no) data are often submitted (without penalty), compromising stock assessments and scientific advice" (Meltzer, 2005, line 4). The same report also claimed that there was no regional observer program among the ICCAT parties, and that individual observer coverage ranges from zero to 100 percent depending on the party (Meltzer, 2005; ICCAT, 2007). In a separate report, DFO (2005) has also commented that "compiling relevant catch and scientific data ... is one of ICCAT's challenges. Without proper data, scientists are unable to conduct the necessary stock assessments" (para. 3).

[32] The report was part of the Conference on the Governance of the High Seas and the UN Fish Agreement in May 2005 held in St. John's Newfoundland.

While the *ICCAT Resolution on Sea Turtles* may sound promising, it is important to note that the provisions of the resolution are voluntary (Gilman, Moth-Poulsen & Bianchi, 2007). Moreover, the measures being asked of the parties are only a first step in addressing by-catch and turtle mortality, as they call for the development of data collection and reporting methods. A news release in 2003 by NOAA states that ICCAT was going to develop a standardized way of recording data, however this has yet to materialize (NOAA, 2003b). If there is no standard method of collecting data on by-catch and observer programs are not enforced, it could be assumed that the commission has no reliable data on the rates of turtle-fisheries interactions in the Convention area.

4.3.2 *Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries*

Summary

The *Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries* (NAFO Convention) was signed by seven parties in 1978 and came into force the following year (NAFO, 2004). The parties are committed to promoting the conservation and optimum use of all fishery resources within the Northwest Atlantic Ocean, except for salmon, tuna, marlins, sedentary species, and whales. The Convention established the Northwest Atlantic Fisheries Organization (NAFO), which includes a General Council, a Scientific Council, a Fisheries Commission, and a Secretariat. The functions of the General Council include coordinating the affairs of NAFO, holding annual meetings, and establishing subcommittees as appropriate. As identified in the Convention, the Scientific Council will provide a forum for consultation and cooperation among the

parties, and will provide scientific advice, including data on environmental and ecological factors affecting the fisheries. The functions of the Fisheries Commission include the management and conservation of resources in the Convention area, as well as the responsibility of adopting "proposals for international measures of control and enforcement" (NAFO, 2004, p. 7) in order to ensure that the measures of the Convention are met.

The *2007 Amendment to the Convention on Future Multilateral Cooperation* in the Northwest Atlantic Fisheries proposes a number of modifications to the NAFO Convention. This amendment represents "the first formal step towards a reformed Convention" (NAFO, 2007, para. 1). For example, under the new Convention parties are to promote the sustainable use and long term conservation of fisheries resources, by: (*i*) applying the EA and the precautionary approach; (*ii*) adopting measures to minimize the harmful effects of fishing on marine species, including endangered species; (*iii*) considering the need to preserve marine biodiversity; (*iv*) minimizing pollution, discarded gear, and catch of non-target species; (*v*) facilitating international cooperation for the exchange of scientific, technical, and statistical data; and (*vi*) collecting accurate data and investigating all violations (NAFO, 2007). The objectives of the Convention are to "ensure the long term conservation and sustainable use of the fishery resources in the Convention Area and, in so doing, to safeguard the marine ecosystems in which these resources are found" (NAFO, 2007, art. II, para. 1). Finally, the Commission's duties will include assessing the impacts of fishing activities on marine species and ecosystems and adopting conservation and management measures to minimize these impacts.

Relevance to Canadian ALTs

Canada was one of the original seven parties of NAFO and ratified the Convention in 1978. In addition to the proposed amendment that takes a more holistic management approach, NAFO adopted the *Resolution to Reduce Sea Turtle Mortality in NAFO Fishing Operations* in 2006 (Gilman, Moth-Poulsen, Bianchi, 2007). The contracting parties, recognising that the northwest Atlantic is a critical foraging area for marine turtles, have agreed under this resolution to collectively and individually implement the FAO Turtle Guidelines (see Section 4.2.9(*iii*)). Additionally the resolution calls for parties to continue to mitigate threats to marine turtles and to collect data on turtle-fisheries interactions. The NAFO commission is responsible for monitoring the parties to ensure implementation and compliance with the new resolution (NAFO, 2006).

Analysis

The initial text of the NAFO Convention did not address ecosystem management or species other than fisheries resources. However, the 2007 amendment changed the tone of the Convention considerably. If adopted, the NAFO Convention would implement an EA to fisheries, considering biodiversity, minimizing by-catch, and controlling pollution. All of these measures will benefit ALTs. Additionally, the resolution to reduce sea turtle mortality adopted by the NAFO parties directly promotes the protection of ALTs in the Northwest Atlantic. However, it has been suggested that although the NAFO Convention covers a large area, the potential for fisheries-turtle interactions may not be too great as "the majority of NAFO's international fisheries operate near or north of Newfoundland... [and] a number of overexploited fisheries are shut down" (Donnelly, 2006, para. 3).

ALTs, however, might not be exempt from fisheries interactions in the NAFO area, as they "forage well into northern waters and thus are further exposed to potential capture" (Donnelly, 2006, para. 3).

4.3.3 Convention for the Conservation of Salmon in the North Atlantic Ocean

Summary

The 1982 *Convention for the Conservation of Salmon in the North Atlantic Ocean* (CCSNAO) promotes the conservation, enhancement, study, and rational management of salmon stocks in the North Atlantic Ocean. CCSNAO applies to salmon that "migrate beyond areas of fisheries jurisdiction of coastal states of the Atlantic Ocean north of 36 degrees latitude throughout their migratory range" (CCSNAO, 1982). Under the Convention, fishing of salmon is only allowed within a coastal state's territorial sea and two designated sites, the North-East Atlantic Commission area and the Greenland Commission area. The parties are also required to submit annual reports to the council on catch statistics from both river and marine fisheries within their jurisdictions. CCSNAO established the North Atlantic Salmon Conservation Organization (NASCO), which consists of: (*i*) three regional commissions, which provide a forum for cooperation on catch rates between the parties' jurisdictions; (*ii*) a Council, whose functions include making recommendations to the parties and coordinating the commissions; and (*iii*) a Secretariat, whose functions include compiling statistics and reports on salmon stocks. All NASCO information and recommendations are to be based on the best available scientific data (CCSNAO, 1982).

Relevance to Canadian ALTs

Canada signed CCSNAO in 1982 and ratified it a year later. DFO is the lead department responsible for implementing the measures of the Convention. The NASCO Council has to some degree addressed issues of by-catch; however, their focus appears to be on salmon by-catch in other pelagic fisheries. The Council has made some recommendations for altering fishing gear and methods to minimize this type of by-catch (NASCO, 2007b). A few reports on the NASCO website allude to the Council compiling data from the International Council for the Exploration of the Sea (ICES) on the by-catch of non-target species in salmon fisheries. However, there appears to be no further information on this topic (NASCO, 2008).

Analysis

It appears that aside from attempting to collect data from ICES on the by-catch of non-target species, NASCO requires its parties to do very little with regard to reporting, addressing, or minimizing non-salmon by-catch. Thus, it appears that within the NASCO fisheries the rate of turtle-fisheries interactions or turtle mortality is neither recorded nor regulated.

4.3.4 North American Agreement on Environmental Cooperation

The *North American Agreement on Environmental Cooperation* (NAAEC), signed by Canada, Mexico, and the US in 1993, is a side agreement of the North American Free Trade Agreement (NAFTA). The agreement states that parties have a right to resources within their jurisdictions, while ensuring that the use of these resources does not harm the

interests of other parties. In addition to protecting and improving the environment, the parties are to cooperate to strengthen the development and improvement of environmental goals, laws, regulations, procedures, policies, and practices (NAAEC, 1993). Each party is responsible for enforcing environmental laws within their own territory (NAAEC, 1993). The NAAEC established a Council, Secretariat, and a Joint Public Advisory Committee. The Council is responsible for promoting cooperation between the parties and may develop recommendations regarding "the conservation and protection of wild flora and fauna and their habitat... [and] the protection of endangered and threatened species" (NAAEC, 1993, art. 10(2)). The compliance mechanism for the NAAEC is a bit unique; citizens in each country can make submissions to the Secretariat if they think their government is not effectively enforcing its environmental laws (Government of Canada, 2005). The Joint Public Advisory Committee is made up of members from each state and gives advice to the council on various matters. The agreement also establishes the right for parties to request an investigation of another party suspected of not enforcing their environmental laws (NAAEC, 1993). The *Commission on Environmental Cooperation* (CEC) was established by the NAAEC to help oversee the implementation of the agreement and to address a variety of regional environmental concerns (CEC, n.d.). There are four main areas where the CEC has focused it efforts: (*i*) law and policy; (*ii*) pollutants and health; (*iii*) environment, economy, and trade; and (*iv*) the conservation of biodiversity.

Relevance to Canadian ALTs

As previously stated, Canada has been a member of the NAAEC since 1993. One of the

study areas of the CEC, the conservation of biodiversity, is relevant to this research. Currently, there are seven biodiversity projects, including one titled, *Marine Species of Common Conservation Concern*. The Pacific leatherback turtle is one of the focal species of this study, which has resulted in the *North American Conservation Action Plan for Pacific Leatherback Sea Turtles* (CEC, 2005). The action plan addresses the status of the turtles in the Pacific, and identifies threats in both their marine and terrestrial habitats in the NAAEC area. Also included in this plan is a list of current actions that need to be taken in each country to help protect the species (CEC, 2005). In Canada there is a need to obtain more information about the PLT population and the CEC recommends that Canada initiate recovery objectives consistent with the existing criteria in the US Pacific leatherback recovery plans. The CEC also recognises that there are other international instruments at work in the Pacific that may affect PLTs, such as the CMS, the IOSEA MoU, and several RFMOs. Finally, the CEC has several proposed tri-national priorities for the conservation of PLTs, which include: (*i*) protecting nesting beaches; (*ii*) reducing by-catch, via gear modification and time/area closures; (*iii*) reducing land based pollution and eliminating sea dumping; (*iv*) creating a fund for research and education; and (*v*) strengthening existing international instruments and creating new ones (CEC, 2005). Although the CEC has yet to develop an action plan for leatherbacks in the Atlantic, there has been talk of among the parties of addressing ALT conservation in the future (A. McMaster, personal communication, November 7, 2008).

Analysis

The NAAEC is a very broad agreement that covers a wide range of environmental related

topics. The CEC, although more specialized, still attempts to address an extensive list of initiatives and projects, although it is encouraging that a plan has been developed for PLTs. Because PLTs and ALTs are considered one species by SARA, and because the populations are facing similar threats, a positive outcome resulting from the PLT action plan could also result in positive actions for the ALT population. Unfortunately, however, like other planning documents, the PLT action plan does not include a timeline for the identified goals and objectives, nor does it recommend how to implement such broad measures.

4.3.5 *Inter-American Agreement for the Conservation and Protection of Sea Turtles*

Summary

The *Inter-American Agreement for the Conservation and Protection of Sea Turtles* (IAC), which entered into force in 2001, has ten contracting parties and two additional signatories. The objective of the agreement is to "promote the protection, conservation and recovery of sea turtle populations and of the habitats on which they depend, based on the best available scientific evidence, taking into account the environmental, socioeconomic and cultural characteristics of the Parties" (IAC, 2001, art. II). The Convention applies to the parties' terrestrial and marine areas, as well as to any vessels flying a party's flag on the high seas. The IAC called for the parties to establish three bodies to aid in implementing the Convention, including a consultative committee, a scientific committee, and a secretariat. The consultative committee, made up of scientific, private sector, and NGO representatives from each party, is responsible for reviewing and analysing reports and evaluating proposed conservation measures. The

scientific committee's roles include conducting research, evaluating the environmental impacts of fishing on turtles and their habitats, and recommending remedial measures. The secretariat is responsible for the organization of meetings and dissemination of information (IAC, 2001).

The parties are responsible for taking the appropriate measures for the protection and recovery of sea turtle populations and their habitats, and are required to account for these activities in annual reports. The measures include: (*i*) prohibiting intentional capture, killing, or trade; (*ii*) complying with CITES; (*iii*) restricting human activities that are destructive to turtles; (*iv*) protecting and restoring habitats, including the regulated use of nesting beaches; and (*v*) promoting scientific research (IAC, 2001). The IAC does note that the traditional, or subsistence, harvest of turtles may be permitted under certain circumstances. However, these practices must be regulated and managed by the state in which they occur, and included in the annual report.

The IAC parties must also establish a monitoring program to ensure compliance with the measures set out in the Convention. Additionally, the Convention calls for parties to investigate and assess measures that may protect turtles in their marine habitats. Such measures may include: (*i*) the establishment of protected areas; (*ii*) the use of time/area closures in fisheries; (*iii*) the modification of fishing gear; and (*iv*) the reduction of vessel traffic. To the extent possible, parties must also reduce "the incidental capture, retention, harm or mortality of sea turtles in the course of fishing activities" (IAC, 2001, art. IV(h)). The use of TEDs on shrimp trawlers is also explicitly required, except when turtle-

fisheries interactions are unlikely. The IAC also includes an entire section on international cooperation, stating that the parties shall promote bilateral and multilateral activities to further the objectives of the Convention. Parties should also cooperate in order to promote the sharing of data and information, the development of improved fishing gear and techniques, and to ensure the protection, conservation, and recovery of marine turtles. The IAC calls for implementation at the national level, stating that each party should adopt the measures outlined in the Convention in its national legislation and policies (IAC, 2001).

Relevance to Canadian ALTs

Because marine turtles are the sole focus of the IAC (specifically it applies to all six of the marine turtle species found in the Americas) every section of the Convention is aimed at addressing the conservation and protection of marine turtles. The IAC provides a number of measures for protecting ALTs in both their terrestrial and marine habitats. The parties have also signed several resolutions to reduce sea turtle interactions. Specifically, the *Resolution for the Conservation of Leatherback Turtles,* 2004, urges parties to adopt fishing practices that reduce incidental capture and mortality of leatherbacks and establish agreements protecting leatherbacks with non-party states. The *Resolution for the Reduction of the Adverse Impacts of Fisheries on Sea Turtles*, 2006, urges parties to incorporate the FAO Turtle Guidelines (see Section 4.2.9(*iii*)) and to develop understandings with RFMOs (Gilman, Moth-Poulsen, Bianchi, 2007).

While Canada is not a party to the IAC, it has been an observer since 2006;

representatives from DFO attended the IAC Annual Conference of the Parties in 2006 and plan to attend the 2008 meeting as well (A. McMaster, personal communication, November 7, 2008). DFO may also consider implementing any feasible conservation goals and objectives decided by the IAC parties at future meetings. Canada's current position, however, is that the possible financial obligations involved with ratifying an agreement like the IAC are too great to become a contracting party to the IAC in the near future (A. McMaster, personal communication, November 7, 2008).

Analysis

As the only international agreement focused solely on protecting marine turtles, the IAC has a great potential to protect ALTs throughout their range. The agreement urges parties to address all aspects of sea turtle conservation, from nesting beaches to foraging areas, and to cooperate with RFMOs and conservation organizations to mitigate threats to turtles. Since 2005, annual reports from most of the parties have been submitted and are available on the IAC's website. These standardized reports contain a plethora of information, including: (*i*) identification of foraging areas, nesting sites, and migratory routes; (*ii*) a description of conservation efforts; (*iii*) a record of institutions involved with turtle conservation; (*iv*) a list of existing and proposed legal instruments affecting turtles; and (*v*) an inventory of relevant domestic and international initiatives. Additionally, the reports also contain a detailed table identifying specific threats to marine turtles and the actions taken within that state to mitigate those threats.

One challenge for the IAC is that it lacks formal leadership, having yet to establish a permanent secretariat (K. Eckert, personal communication, September 23, 2008). The IAC has also been criticised for its over concentration on TEDs in shrimp fisheries, while ignoring threats from other types of fishing gear (Bache, 2002). In recent years, however, the parties have come to address a broad range of issues. For example, the resolution on leatherbacks brings attention to the specific conservation measures that should be addressed in their marine habitats. If Canada were to participate in the IAC, it would help protect ALTs in their northern foraging habitats. Canada's support would also help to strengthen the agreement "both in terms of expertise and resources" (K. Eckert, personal communication, September 23, 2008). Additionally, if Canada were to become a contracting party, an annual report would be required, forcing DFO to take a closer look at the threats present, and mitigation measures implemented, in Canadian waters.

4.4 BI-LATERAL AGREEMENTS & DOCUMENTS

Canada is involved with a number of bi-lateral agreements and documents,[33] many of which apply to areas in the Atlantic where ALTs are found. However, most of these agreements and documents have a very narrow scope and do not address issues related to turtles, such as endangered species protection, the conservation of marine biodiversity, or by-catch of non-target species. Thus, for the purpose of this research they have been

[33] These include various fishing agreements and documents, such as: *Agreement between Canada and Norway on their Mutual Fishery Relations*; *Agreement in the form of Exchanges of Letters between the European Community and the Government of Canada concerning fisheries relations*; *Exchange of Notes Between Canada And Norway Constituting An Agreement With Respect To Norwegian Fishing Practices off the Atlantic Coast of Canada*; *MoU between the Government of Canada and the Government of Lithuania on Mutual Fisheries Relations*; and *US and Canada Agreement on reciprocal fishing privileges in certain areas off their coasts* (ECOLEX, 2008). While many more agreements or documents exist, this list displays a sample of the types of bi-lateral fisheries agreements that Canada is involved with.

omitted. There is, however, one informal set of documents between the US and Canada, relating to the management of the Gulf of Maine, that has the potential to impact the Canadian ALT population. Because there is not one official international document, but rather a series of events and initiatives, this section will offer a summary of these events and actions leading up to the current situation, and discuss how the management of the Gulf of Maine is relevant to Canadian ALTs.

4.4.1 United States & Canada in the Gulf of Maine

Summary

When the US and Canada extended their EEZ to the 200 nautical limit following the UNCLOS trend, the two countries' jurisdictions overlapped in a 30,000km² area in the Gulf of Maine along George's Bank. Because the area was a popular fishing zone for both countries, conflicts over resource access and use ensued. In 1984, this dispute was settled when the International Court of Justice (ICJ) established an international boundary in the Gulf of Maine (Pudden & VanderZwaag, 2007). The ruling divided the George's Bank fishery, however, and in the years following the settlement increased fishing activity resulted in the over-exploitation of fish stocks. In order to address these concerns, the US and Canada launched a number of joint initiatives, including the *Canada-US Transboundary Steering Committee* (TSC) in 1995 (Pudden & VanderZwaag, 2007). The committee acts as an umbrella organization, responsible for coordinating the efforts of the *Transboundary Resources Assessment Committee* (TRAC), the *Transboundary Management Guidance Committee* (TMGC), and a number of working groups. TRAC serves as the major scientific body, and is responsible for

reviewing fishery and biological data, evaluating the status of fish stocks, and submitting annual stock assessments to the TMGC. TMGC is then responsible for advising fisheries managers in the two countries on catch rates and sharing of resources. For example, TMGC has created a sharing allocation formula, which divides a total allowable catch between the two countries for the shared fishing area on George's Bank. This information, as well as recommendations for fisheries managers in each country, is published in an annual guidance document. These recommendations are voluntary, however, and must be implemented and enforced by each county. In the years following the ICJs settlement, over-fishing and illegal fishing continued to be a major problem. Additionally, the two countries also had very different penalties for violations, which made joint enforcement of laws and prosecution of violations difficult (Pudden & VanderZwaag, 2007).

In an effort to deal with illegal fishing, the US and Canada signed the *Agreement on Fisheries Enforcement* in 1990 (UN, 1995). The agreement recognizes that Canada and the US have sovereignty over marine resources found within their internal waters and territorial seas, however, each party is responsible for ensuring enforcement of their national fisheries laws and regulations (UN, 1995). Since its implementation, the agreement has resulted in new national laws and standardized penalties for fisheries violations. Consequently, there has been a sharp decline in violations and illegal fishing along George's Bank. In an article on the management of the Gulf of Maine, Pudden and VanderZwaag (2007) comment that "the forging of informal cooperative fisheries management arrangements for the Gulf of Maine region is positive on many fronts" (p.

41) and that the two parties "have established 'good neighbourly relations' in the place of previous conflicts and tensions over the allocation of shared ground fish stocks" (p. 41).

Relevance to Canadian ALTs

While there are limited sightings of leatherbacks in the Gulf of Maine, the region is within the range of ALTs (M. James, personal communication, November, 20, 2008). Thus, fisheries operations in the gulf may have an effect on turtles when they are present in the area. Despite the Canada-US cooperative accomplishments in the Gulf of Maine, Pudden and VanderZwaag (2007) suggest that the management of the shared fishing area is still "falling short of modernization trends in ocean governance driven by sustainable development principles" (p.42). Specifically, they identify a lack of consideration for an ecosystem or precautionary approach, the role of public participation in the planning process, or the use of an integrated planning framework (Pudden & VanderZwaag, 2007).

A 2006 overview of the current governance of the Gulf of Maine reported that, with respect to species at risk, "collaboration between Canada and the US in research and recovery is important in order to conserve the species and their habitat" (ACZISC Secretariat & Marine and Environmental Law Institute of Dalhousie University, 2006, p.22). The report, which lists leatherbacks as a species of concern, identifies current threats to leatherbacks in the Gulf of Maine, including incidental capture, marine pollution, and vessel collisions. It is suggested that the US and Canada cooperate to identify and mitigate threats to ALTs in the management area (ACZISC Secretariat & Marine & Environmental Law Institute of Dalhousie University, 2006).

Since these critiques were published, the operations of the TSC appear to have slightly progressed. In particular, the Species at Risk (SAR) Working Group, established in 2003, has focused on how the ESA and SARA will work together to manage species in the Gulf of Maine. At the 2006 TSC biannual meeting, it was noted that the working group should have members individually evaluate each species at risk (Kurkul & Scattolon, 2007a). Some work has already been made to address the status of the endangered right whale, including the possibility of developing a ship strike strategy and addressing whale-fisheries gear interactions in the future (Kurkul & Scattolon, 2007a). By the 2007 meeting there was talk of adding the northern bottlenose whale and sea turtles to the list of species evaluated by the working group (Kurkul & Scattolon, 2007b). In the spring of 2008, through efforts by the SAR working group, representatives from DFO were invited to participate in a US workshop on sea turtle management (D. Millar, personal communication, October 23, 2008). However, this group appears to be in the preliminary stages of evaluation and planning, and "the working group has not yet had in-depth discussions specifically about sea turtles" (D. Millar, personal communication, October 23, 2008).

Analysis

Despite recent efforts within the Gulf of Maine management area, it still "remains to be seen how fisheries interests and marine biodiversity values are handled in practice" (Pudden & VanderZwaag, 2007, p. 43). However, because a cooperative management system already exists, implementing conservation measures for endangered species would arguably be relatively easy to achieve. Moreover, the SAR working group

certainly has the capacity to identify measures to reduce turtle-fisheries interaction in the Gulf of Maine, as demonstrated by their achievements with whale species in the management area.

CHAPTER 5: *THE ENDANGERED SPECIES ACT*

5.1 INTRODUCTION

The Endangered Species Act of 1973 (ESA), the US's primary federal legislation for protecting endangered or threatened species, aims to provide for the protection and recovery of these species and the ecosystems on which they depend. The leatherback turtle has been legally protected in both the Pacific and the Atlantic by the ESA since the Act came into force in 1973. Within US jurisdictions, the leatherback's habitat includes both terrestrial and marine areas. However, critical habitats for the species also lie outside of US jurisdictions. Because two distinct populations are recognized in the US, their protection and recovery has largely been addressed independently of one another.

This chapter serves two purposes: (*i*) to investigate the ESA and the US's actions at the national level to protect ALTs, both domestically and internationally; and (*ii*) to identify instances where the US approach to protecting ALTs in their marine habitats may serve as a possible example of actions that Canada could take to better protect ALTs. This discussion of the ESA and US actions to protect leatherbacks is relevant to this thesis in so far as it is relevant to Canadian actions to protect ALTs.[34] A comparison of the approaches taken in each country to legally protect ALTs, both domestically and internationally, is offered in Chapter 6. That comparison determines if the US approach to protecting ALTs does have, in certain instances, a greater potential to provide for the

[34] The US, unlike Canada, contains nesting beaches for ALTs. This discussion, however, will not address efforts to protect turtles in terrestrial areas in the US, as these actions are not, and will never be, comparable to actions taken in Canada. This discussion will, however, address US actions to protect ALTs at the international level, as did the discussion of SARA, which may include the protection of terrestrial areas outside US jurisdictions.

protection and recovery of ALTs in their marine habitats. For this reason and for the sake of easy comparison with SARA, this chapter will use the same framework as Chapter 3 on SARA.

This chapter investigates the ability of the ESA, to provide for the legal protection of ALTs within US jurisdictions, as well as the Act's ability to facilitate the necessary international measures for species recovery. Section 5.2 introduces the ESA and the ESA recovery documents. Section 5.3 investigates the strengths and weaknesses of the Act itself, as well as any subsequent documents or actions taken by the US relevant to the protection and recovery of ALTs. These documents or actions include: (i) the *Recovery Plan for Leatherback Turtles in the US Caribbean, Atlantic and Gulf of Mexico*, 1992; (ii) the *Marine Turtle Conservation Act of 2004*; (iii) the *Leatherback Sea Turtle (*Dermochelys coriacea*) 5-year Review*, 2007; and (iv) the regulations pertaining to ALTs. Finally, Section 5.4 identifies the US's participation in those international agreements and documents relevant to this research.

5.2 INTRODUCTION TO THE *ENDANGERED SPECIES ACT*

In 1973, the United States Congress passed the *Endangered Species Act* (ESA) with the goal of strengthening two previous national commitments to protecting endangered species: the *Endangered Species Conservation Act* of 1969 and the signing of CITES in 1973. The purposes of the ESA are to "provide a means whereby the ecosystems upon which endangered species[35] and threatened species[36] depend may be conserved, to

[35] *Endangered species*, as defined by the ESA, means "any species which is in danger of extinction throughout all or a significant portion of its range" (*Endangered Species Act*, 1973, sec. 3).

provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the [relevant international] treaties and conventions" (*Endangered Species Act*, 1973, s. 2(5b)). A few of the ESA's progressive measures include: (*i*) combining US and international endangered species lists and applying uniform provisions to the resulting list; (*ii*) allowing for the protection of endangered plants and invertebrates; (*iii*) requiring that all federal agencies engage in conservation programs for species and their critical habitats; (*iv*) providing funding for state agencies involved with species conservation; and (*v*) providing authority to acquire lands to protect endangered species (USFWS, 1996).

While the overall framework of the Act has essentially remained the same, significant amendments were implemented in 1978, 1982, 1988, and 2004. These amendments include provisions requiring authorities to determine the status of all species within one year of their listing, to monitor all candidate and recovered species, and to monitor species for five years following full recovery (USFWS, 1996). Another amendment of the ESA requires authorities to designate *critical habitat*[37] for all listed species, while taking into account economic and all other considerations (*Endangered Species Act*, 1973).

The US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service

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[36] *Threatened species*, as defined by the ESA, means "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (*Endangered Species Act*, 1973, sec. 3).

[37] *Critical habitat,* as defined by the ESA, means "the specific areas within the geographical area occupied by the species...on which are found those physical or biological features essential to the conservation of the species" and "specific areas outside the geographical area occupied by the species...[that] are essential for the conservation of the species" (*Endangered Species Act*, 1973, sec. 3).

(NMFS) share the responsibility for administering the ESA (USFWS, 2008b).[38] The ESA states that these departments are responsible for defining the regulations to protect each of listed species; however, they are to cooperate with the relevant state and local agencies.[39]

The process of protecting species under the ESA involves a number of steps. First, using the best scientific data, the USFWS assesses the status of the proposed species, known as the candidate species. A species may also be listed as a candidate if there is concern that it might be endangered but the necessary scientific data needed for an official listing is not available (*Endangered Species Act*, 1973). The list of possible candidates is published in the Federal Registrar, which is open for public consultation. Species are then added to the official *List of Threatened and Endangered Wildlife* if the population is determined to be at risk of extinction. Reasons for listing a species as endangered or threatened include: (*i*) existing or possible present destruction or modification of its habitat or range; (*ii*) overexploitation because of commercial, recreational, scientific, or educational purposes; (*iii*) disease or predation; or (*iv*) other natural or manmade factors affecting its survival (USFWS, 2008b). The ESA establishes the specific actions that are prohibited, including the import, export, take[40], possession, sale, delivery, carry, or transport of any listed endangered species within US jurisdictions, including within the territorial seas and on the high seas (*Endangered Species Act,* 1973). Once a species has

[38] The USFWS is part of the Department of the Interior, while the NFMS is part of the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce.
[39] Specifically, the Secretary of the Interior is responsibility for regulations pertaining to species managed by the USFWS, while the Secretary of Commerce deals with the regulations for NOAA Fisheries species (USFWS, 2008b).
[40] *Take,* as defined by the ESA, means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (*Endangered Species Act*, 1973, sec. 3).

been officially listed as either threatened or endangered, the species and its habitat will be legally protected within US jurisdictions.

5.2.1 *Endangered Species Act:* Recovery Plans

Under the ESA, recovery plans are required for all listed species, unless the responsible authorities believe that such a plan "will not promote the conservation of the species" (*Endangered Species Act*, 1973, sec. 4(f)). The relevant Secretary is responsible for coordinating a recovery team, comprised of the appropriate state or tribal agencies, federal departments, academic institutions, NGOs, commercial enterprises, and other relevant individuals, to develop a recovery plan. Priority is given to those species that will most likely benefit from a recovery strategy, such as species currently threatened by development activities that can be altered to protect the species. Each plan will include a discussion of: (*i*) the current status of the species; (*ii*) specific management actions needed to protect the species and its habitat; (*iii*) specific objective criteria (i.e. ideal population size) by which to measure the actual recovery of the species; and (*iv*) the proposed timeline and funding requirements to complete these actions (*Endangered Species Act*, 1973). Recovery planning for species in the US has utilized a number of different methods, such as species reintroduction, critical habitat restoration, protection, or acquisition, and public education (Endangered Species Coalition, 2002). Several amendments to the ESA have addressed the recovery plans, including the requirements that: (*i*) the plans undergo public review; (*ii*) the species are monitored for five years following their initial listing; and (*iii*) biennial reports on the implementation of recovery plans and the status of the species are produced (USFWS, 1996).

5.2.2 Status of Atlantic Leatherback Turtles

ALT habitats in the US include migration and foraging areas ranging from Maine to the Gulf of Mexico, as well as nesting habitats primarily concentrated in Florida, Puerto Rico, and the US Virgin Islands (USVI)[41] (UNEP, 2003; TEWG, 2007). Threats to leatherbacks in the US occur in both marine and terrestrial areas. Marine threats include pollution and ingestion of plastics, boat collisions, and fisheries interactions consisting mainly of pelagic longlines, shrimp trawlers, and crab/lobster trap lines (TEWG, 2007). The main threats on US nesting beaches include those related to coastal development, such as beach armoring, cleaning, nourishment, light pollution, and beach overuse (NMFS & USFWS, 1992). Since 1970, the leatherback turtle has been listed as 'endangered' in the US (NMFS & USFWS, 1992) and thus, the take, possession, sale, or transport of the species within US jurisdictions, or by US vessels on the high seas, is prohibited by law. Because the US contains both terrestrial and marine habitats for ALTs, conservation of the species is the joint responsibility of the NMFS and the USFWS, responsible for protecting the species in its marine habitats and nesting beaches, respectively. In 1992, the two departments drafted the *Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico,* which identifies specific measures for ALT recovery.

[41] The US also hosts migration and foraging areas for leatherbacks in the Pacific Ocean (UNEP, 2003) and a *Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (Dermochelys coriacea)* was drafted in 1998.

5.3 ABILITY OF THE *ENDANGERED SPECIES ACT* TO PROTECT LEATHERBACK TURTLES

Through the ESA, the US Government has, at minimum, demonstrated a legislative commitment to protecting endangered species within the US. Establishing and implementing such legislation in 1973 was arguably a proper first step towards endangered species conservation, and ultimately, species recovery. The recovery of transboundary migratory species, such as ALTs, has been addressed by NMFS and the USFWS from both domestic and international perspectives. Because the actions of these departments are defined and bound by the ESA, it is important to understand what the legislation says about the domestic and international protection of the species. Additionally, in the US, regulations, special initiatives, and other documents have played a role in the protection and recovery of ALTs. Section 5.3.1 explores how the ESA provides for the protection of ALTs from a domestic context, while Section 5.3.2 discusses what the ESA says, if anything, about the international protection of migratory species. This discussion is not meant to be a comprehensive analysis of the ESA, but rather is focused on those aspects specific to the recovery and protection of ALTs in their marine habitats only. Finally, Section 5.3.3 offers a brief discussion of the most relevant documents and actions by the US that are important to the protection and recovery of ALTs.

5.3.1 *Endangered Species Act*: Domestic

The ESA is the US's most important, comprehensive, and powerful legal tool for providing protection to endangered or threatened species within its jurisdictions (Rohlf,

1991; Orians, 1993; Tear, Scott, Hayward & Griffiths, 1995; Hoekstra, Clark, Fagan & Boersma, 2002a). As previously mentioned, the leatherback turtle is legally protected by the ESA, and thus, a number of prohibitions are in place to protect the species. As stated in the Act, the US is committed to conserving, "to the extent practicable the various species of fish or wildlife and plants facing extinction," and to developing and maintaining conservation programs for these species (*Endangered Species Act*, 1973, sec. 2).

Although there is no doubt that the ESA provides a legislative basis for legally protecting endangered species in the US, many aspects of the Act have been criticized over the past 35 years. In an article discussing the shortcomings of the legislation, Rohlf (1991) recognises that although the ESA is the US's strongest legal tool for protecting at-risk species, it has had "very limited success in achieving its stated goal of halting and reversing the trend toward species extinctions" (p.274). The ESA recovery plans, which define the specific delisting criteria for each species, are central to the perceived success of the ESA (Gerber & Hatch, 2002) and have also come under scrutiny. Common criticisms in the extensive literature on the ESA and its recovery plans include: (*i*) an overemphasis on saving individual species, rather than using an ecosystem approach to protect biodiversity as a whole (Rohlf, 1991; Orians, 1993; Carroll *et al*, 1996; Lundquist, Diehl, Harvey & Botsford, 2002); (*ii*) a retroactive approach to save endangered species rather than a proactive approach to maintain healthy populations (Orians, 1993; Carroll *et al.*, 1996); (*iii*) an unnecessary time lag between listing species and planning and implementing recovery objectives (Carroll *et al.*, 1996; Lundquist *et al.*,

2002); and *(iv)* a lack of necessary funding for the implementation of recovery measures, which can directly impact the success of the recovery plan (Orians, 1993; Tear *et al.*, 1995; Hoekstra *et al.*, 2002a). Another alarming problem is the decreasing use of reliable scientific data in administrative decision-making, such as the listing of species or recovery planning, and an increasing use of political or economic factors in these decisions (Rohlf, 1991; Carroll *et al.*, 1996). The consideration of political or economic factors over biological ones has resulted in funding and protection for certain high-profile species (i.e. charismatic mega fauna, birds, and mammals), while other equally endangered species (i.e. plants and invertebrates) are ignored (Tear *et al.*, 1995; Lundquist *et al.*, 2002). It has been suggested by the authors cited above that the NMFS and USFWS make it a priority to address these issues and to improve recovery planning in order to better achieve the goals of the ESA.

While the direct impacts of these criticisms on ALT populations have not been documented, it can be assumed that these weaknesses indirectly affect all listed species. Additionally, there are a few specific facets of the legislation that may directly affect, or be relevant to, ALT populations in US waters. These facets, discussed below, include: (*i*) the applicability of the ESA prohibitions; (*ii*) the enforcement of the ESA prohibitions; (*iii*) the allowance of certain activities; and (*iv*) the identification and protection of critical habitat.[42]

(i) The applicability of the ESA prohibitions

[42] These four aspects were also presented in the discussion of SARA in chapter 3, and thus are presented here as to provide for a comparison of SARA and the ESA in chapter 6.

As previously mentioned, Section 4 of the ESA includes general prohibitions that legally protect listed wildlife from certain actions. These prohibited actions, which can be thought of in four sections, include: (a) the import into or export from the US of any listed species; (b) the take (harm, harass, kill, etc.) of any listed species within US jurisdictions; (c) the possession, sale, or transport of any listed species within the US or abroad; and (d) the violation of any regulations pertaining to listed species, set forth by the responsible Secretaries (*Endangered Species Act*, 1973, sec. 9). Although these prohibitions aim to protect all listed species, their applicability to the protection of ALTs in their marine habitats is poor. For example, Sections (a) and (c) are not applicable to the protection of leatherback turtles in the US for two reasons. Not only is the US party to CITES, which would prohibit international trade in ALTs, there is also virtually no international trade in leatherbacks or their parts (UNEP, 2003).[43] Also, Section (b) does not provide much protection for ALTs in US waters as the prohibition would only be relevant to a few select groups consisting mainly of the shipping or fishing industries and research scientists. While researchers may not intend to cause harm to the species, they do interact with the species, and thus, need to obtain permits from NMFS for any research with ALTs (discussed later in this section). Commercial ships might also harm or kill turtles either directly via collisions or indirectly through the dumping of marine pollution; however, data on both of these threats have yet to be quantified (TEWG, 2007; NMFS & USFWS, 1992).

[43] Details of the UNEP report can be found in Section 3.2.1.

Data do exist on the interactions between fisheries and sea turtles. Although Section (b) does legally prohibit the incidental capture of marine turtles, the by-catch of sea turtles in fishing gear, specifically longlines, trawlers, fixed gear, and nets, is still the biggest threat to ALTs (TEWG, 2007). The ability of prohibition (b) to protect ALTs is further eroded by the fact that there are several exceptions issued by NMFS that allow for the incidental take of ALTs (the details of which are discussed below).

Section (d) is an important prohibition as it grants authority to the various regulations created by the NMFS and the USFWS. These "regulations and official interpretations play an important role in shaping the law" (Rohlf, 1991, p. 274), and set forth the specific procedures for implementing the provisions of the legislation. There are two types of regulations pertaining to ALTs: those relating to the establishment of critical habitat and those relating to turtle-fisheries interactions (both discussed in later sections). These regulations are critical to the protection of leatherbacks in the Atlantic and thus, prohibition (d), although futile on its own, is actually quite a powerful tool for protecting ALTs.

(ii) The enforcement of the ESA prohibitions

Section 11 of the ESA grants authority to the relevant Secretary to enforce "any regulations or permits issued pursuant thereto" (*Endangered Species Act*, 1930, s.11(1)). The ESA also grants the Secretary considerable power to enforce these regulations, such as allowing them to make arrests for any violations without first obtaining a warrant (*Endangered Species Act*, 1973). The ESA outlines the various types of civil and

criminal penalties, including monetary fines or jail time, which may be issued for violations of the Act. While this authority is promising, it is reasonable to assume that actually catching violations of the Section (b) prohibitions on fishing vessels in the Atlantic would be a difficult, costly, and time-consuming task. There is, however, evidence of NMFS devoting such resources to the protection of ALTs. In 1990, during the peak of the battle between fisheries and NMFS over the use of TEDs, the US Coast Guard boarded shrimping vessels in the Gulf of Mexico and arrested dozens of fishers for violating sections of the ESA (McDonald, 1990).

Section 7 of the ESA might also offer some promise for protecting ALTs. This section requires all federal agencies or departments to protect endangered species by ensuring that their activities do not jeopardize the survival of listed species or adversely affect their habitats. If an activity they wish to carry out is perceived to potentially cause harm, the agency must first obtain a *biological opinion* from NMFS or USFWS (*Endangered Species Act*, 1973). This opinion will determine the effect that the activity may have on the species and their habitats. Although the recommendations in a *biological opinion* are not legally binding, "agencies seldom go forward with a project if the *biological opinion* reports a likelihood of jeopardy to the species or adverse modifications of its critical habitat" (Rohlf, 1999, p. 274). Thus if NMFS issues strict opinions, these documents may serve as an important compliance tool for US fisheries in the Atlantic.

(iii) The allowance of certain activities

In addition to the lack of applicability of the ESA prohibitions to the protection of ALTs, the ESA also allows for certain activities that would otherwise violate the terms of the Act. For example, exceptions are allowed under Section 7 and Section 10 of the ESA, which grant authority for NMFS and USFWS to issue *biological opinions* or *incidental take permits,* respectively. Although biological opinions have the potential to act as an enforcement measure, a weak opinion by NMFS also has the potential to allow for harmful activities to ALTs. While *biological opinions* are issued only to government agencies, *incidental take permits* may be issued to states, local governments, or private landowners. The process of obtaining a permit includes submitting a Conservation Plan to the relevant Secretary that includes: (*i*) a description of the likely impacts of the activity on the species; (*ii*) the steps that will be taken to minimize these impacts; (*iii*) and why alternative methods to carry out the activity are not being used (*Endangered Species Act*, 1973). The Secretary may approve a Conservation Plan and issue an incidental take permit, as the office sees appropriate, for any activities that are known to cause harm to a listed species, as long as the 'take' of the species is not the purpose of the activity. This ensures harm to the species is *incidental* to the activity being carried out. Some of these permits are issued for "scientific purposes or to enhance the propagation or survival of the affected species" (*Endangered Species Act*, 1973, s.10(a)), while other permits allow for more harmful actions, such as the by-catch of ALTs in fishing gear. Another exception to the ESA prohibitions relating to ALTs occurs with the summer flounder and shrimp fisheries in the Atlantic and the Gulf of Mexico. These two fisheries are "not subject to civil penalties under the Act for incidental captures of endangered sea turtles" (NMFS, 1999, p. 14067) and can *'take'* ALTs without applying for a permit. These

fisheries must, however, comply with the NMFS regulations requiring approved TEDs on all fishing gear (NMFS, 1999).

(iv) The protection of critical habitat

Although the ESA calls for the Secretary to designate critical habitat for all listed species, the implementation of this provision has come under scrutiny. Prior to the 1978 amendment to the ESA, large areas of critical habitat were designated and protected. However, because of fierce opposition from landowners, the US Congress changed the ESA so that critical habitat would be established only to the extent 'prudent'[44] and 'determinable.'[45] Additionally, the amendment allows that certain areas may be excluded from a species' critical habitat for economic or other reasons (Rohlf, 1991). This amendment "marked a significant departure from the Act's emphasis on biologically based decision-making" (Rohlf, 1991, p.278) and only allowed the Secretaries to designate critical habitat if it was vital to both the survival and the recovery of a listed species (Rohlf, 1991). This change resulted in fewer critical habitat designations. In 2002, fewer than twelve percent of listed species had critical habitat designations. For many other species, it was found undeterminable or imprudent to designate critical habitat (Hoekstra, Fagan, & Bradley, 2002b).

Despite these criticisms, critical habitat for ALTs has been established. In the summer of 1977, researchers on the island of St. Croix, USVI discovered a significant population of

[44] To the extent prudent means that such a critical habitat designation would prove to offer additional protection to the species (Hoekstra, Fagan, & Bradley, 2002b)

[45] To the extent determinable means that enough data have been collected and analyzed about the species specific habitat requirements to determine that the area is critical to its survival Hoekstra, Fagan, & Bradley, 2002b).

nesting females on Sandy Point Beach that were threatened by poaching and potential coastal development. They commented that the area was the "only known beach under US jurisdiction used extensively for nesting by the endangered leatherback" (NMFS, 1978a, p. 12050). In 1979, NMFS designated approximately two miles of Sandy Point Beach as critical habitat, legally protecting this nesting habitat for ALTs (NMFS, 1978b). In 1979, the critical habitat area was expanded to include the waters immediately adjacent to the beach, an area totalling 327 acres (USFWS, 1984), in order "to provide protection to sea turtles using these waters for courting, breeding, and as access to and from their nesting area on Sandy Point Beach" (NMFS, 1979, p. 17710). Although this designation no doubt benefits the ALT population in the US, there is some confusion over how NMFS has interpreted the term 'critical habitat' in this area. In many cases critical habitat is not the same as a traditional protected area and there are "many kinds of actions which can be carried out within the Critical Habitat of a species" (NMFS, 1978a, p. 12050). For example, recreational boating and fishing are still permitted within the critical habitat waters adjacent to Sandy Point Beach. NMFS claims that although these activities are allowed, ALTs are still protected by the ESA in these waters (USFWS, 1979). Arguably, if NMFS were to prohibit boating and fishing in this critical habitat area, it would guarantee the protection of ALTs rather than relying on individuals to voluntarily comply with the prohibitions of the ESA.

5.3.2 *Endangered Species Act*: International

The ESA certainly provides for the legal protection of ALTs within US jurisdictions. However, because of their highly migratory existence, ALTs are only present in US

waters for part of their life cycle; important nesting, foraging, and migratory habitats exist outside of US boundaries. As discussed throughout this paper, migratory species should be protected throughout their range, which is best achieved through international cooperation of all range states. Although a domestic law, the ESA is relevant for the international protection of ALTs as it defines what the responsible Secretaries may or may not do for species recovery both domestically and internationally. Thus, when addressing the status of migratory species, such as the leatherback turtle, it is important to understand what the ESA says about the protection of such species outside of US jurisdictions. For example, does the ESA provide for the legal protection of ALTs throughout their range and does it promote or encourage international cooperation? Or does the Act ignore the subject of international management altogether? Additionally, the manner in which the responsible Secretaries interpret the Act may also be an important factor.

The ESA does state the importance of international cooperation. For example, the Act outlines the US's position in the international community, stating that development and maintenance of "conservation programs which meet national and international standards is key to meeting the Nation's international commitments" (*Endangered Species Act,* 1973, sec. 2(5)). Moreover, one section of the Act is devoted entirely to international cooperation. Section 8 states that to demonstrate US commitment to the global protection of endangered species, the US may provide funding to any foreign country for the "development and management of programs in that country which the Secretary determines to be necessary or useful for the conservation of any endangered species"

(*Endangered Species Act,* 1973, sec. 8(a)). These funds may be used for the purchase of terrestrial or marine areas that will lead to habitat and species protection, or may be used to fund professional or educational training of foreign personnel in wildlife management, research, or law enforcement (*Endangered Species Act,* 1973). Section 8 also allows for the Secretary to conduct law enforcement investigations and research in foreign jurisdictions. It is evident from these statements that the ESA allows for the Secretaries to provide funding and other support to foreign countries that host habitats for endangered species. While these measures are encouraging, they do not indicate anything about the comprehensive protection of migratory species throughout their range. The ESA does, however, include one statement relating to such protection when it calls for the relevant Secretary to encourage "the entering into of bilateral or multilateral agreements with foreign countries" to provide for the conservation of endangered species (*Endangered Species Act,* 1973, sec. 8(b)). This final statement, albeit brief, does grant the relevant authorities the power to enter into international agreements to protect leatherback turtles.

5.3.3 Other Documents Relevant to Atlantic Leatherback Turtles in the United States

There are a number of documents that relate to, or are a result of, the ESA that pertain to the recovery and protection of ALTs by the US. These documents include measures for the protection of ALTs within US jurisdictions and address the US's involvement in the international protection of the species. The most relevant documents include: *(i)* the *Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of*

Mexico, 1992; (ii) the *Marine Turtle Conservation Act of 2004; (iii)* the *Leatherback Sea Turtle (Dermochelys Coriacea) 5-year Review, 2007*; and *(iv)* the *Regulations Pertaining to ALTs.*

(i) The Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico

The ESA Recovery Plans are a central part of the legislation as they define how the authorities will apply the Act to the conservation of individual species (Hoekstra *et al.*, 2002a). The recovery plans for listed species are granted authority and credibility by the ESA, and as such, are only as powerful as the legislation allows them to be. Moreover, the Secretaries who are responsible for implementation of the recovery objectives may only operate within the guidelines set out in the Act. As previously discussed, the ESA defines how the relevant authorities shall engage in international cooperation for the recovery of migratory species, specifically by providing funding and training, purchasing habitats, and by entering into international agreements. The *Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico* (hereafter known as the US ALT recovery plan) drafted by the NMFS and the USFWS in 1992, identifies three recovery measures that must be met for ALTs to be delisted. These measures include: (*i*) the nesting population in the US increasing over the next twenty-five years; (*ii*) the public ownership of at least seventy-five percent of US nesting habitat; and (*iii*) the successful implementation of all priority one tasks (see Appendix D for a list of these tasks) (NMFS & USFWS, 1992). The plan also details four general categories of objectives for species recovery; these initiatives, however, do not seem to be directly

related to the three recovery measures. The first three categories of objectives include: (*i*) protecting and managing terrestrial and marine habitats; (*ii*) protecting and managing populations in those habitats; and (*iii*) the dissemination of public information and education. A number of detailed initiatives to achieve each of these objectives are listed in the text of the plan as well as in the accompanying *Implementation Schedule* (see Appendix D).

The fourth and final objective identified in the recovery plan is international cooperation, which is to be achieved with only two initiatives. First, the US is to develop international agreements protecting all ALT life stages that occur outside of the US (NMFS & USFWS, 1992). The plan states that because "the long-term preservation of the [US] nesting populations will require more than protection within US jurisdiction" (NMFS & USFWS, 1992, p. 36), the NMFS and USFWS will work to develop a comprehensive ALT conservation plan, encompassing all essential habitats outside US jurisdictions. Moreover the document states that NMFS and USFWS should develop international agreements and other programs with the governments within the ALTs' range. Second, the US should ratify the *Protocol to the Cartagena Convention concerning Specially Protected Areas and Wildlife*[46], which aims to protect endangered species, including all six species of marine turtles and their habitats in the wider Caribbean region (NMFS & USFWS, 1992). Both of the two international cooperation initiatives are ranked as priority 2 tasks (out of a 1-3 ranking) on the recovery plan's *Implementation Schedule.* This means they are actions that "must be taken to prevent a significant decline in species

[46] Section 5.4.2 discusses the Cartagena Convention and the protocol in more detail.

population/habitat quality or some other significant negative impact short of extinction" (NMFS & USFWS, 1992, p. 52).

(ii) The Marine Turtle Conservation Act of 2004

The US passed the *Marine Turtle Conservation Act of 2004* (MTCA) in order to assist foreign countries with the conservation of marine turtles. The Act works by providing financial support from the marine turtle conservation fund to foreign conservation projects. In 2005, a bill was passed in the US for the allocation of "$5 million a year over the 2005-2009 period for the Secretary to convene an advisory panel and provide financial assistance" to approved projects (Sunshine, 2004, p. 1). Any person or group may submit a proposal for funding if their project, as defined by the Act, aims to "conserve the nesting habitats, conserve marine turtles in those habitats, and address other threats to the survival of marine turtles" (MTCA, 2004, sec. 2(b)). To date the MTCA has only funded projects for nesting habitats. Funding for projects in marine areas could be granted in the future, however, as the Act states that any project that "will help recover and sustain viable populations of marine turtles in the wild" may be approved (MTCA, 2004, sec. 4(d)). Sea turtle specialists note that the Act has promise "to make an enormous difference for global sea turtle conservation and regionally imperilled turtle populations" (Donnelly & Possardt, 2004, p. 23).

(iii) The Leatherback Sea Turtle (Dermochelys Coriacea) 5-year Review

The ESA requires that the NMFS and USFWS report on the status of species every five years following the release of the species' recovery plan. The most recent report on ALTs, the *Leatherback Sea Turtle (Dermochelys Coriacea) 5-year Review,* was released

in 2007. This document summarizes recent data and offers an updated report on the status of ALTs and PLTs. The 2007 review indicates that while none of the three recovery criteria identified in the 1992 ALT recovery plan have been met, progress has been made with each measure; these accomplishments are identified in the review (NMFS & USFWS, 2007). However, not enough progress was made with these criteria to warrant a change in the species' status. As the authors' state, "based on the best available information, we do not believe the leatherback turtle should be delisted or reclassified" (NMFS & USFWS, 2007, p. 39). The only significant change noted in the review is the suggestion that, in light of recent research on leatherback genetics in the two oceans, the *Distinct Population Segment (DPS)* policy[47] should be applied to leatherbacks. If the two populations are recognized as distinct segments, NMFS would be able to better concentrate their conservation efforts and address the distinct conservation needs of each population (Fay & Nammack, 2008). Finally, the review states that "incidental bycatch in artisanal and commercial fishing operations, including longline, gillnet, and trawl fisheries, is a major impact that is far from being resolved" (NMFS & USFWS, 2007, p. 39), and that a future initiative should be to investigate the impacts of fishing, including the threat of by-catch, in leatherback foraging areas.

(iv) Regulations pertaining to ALTs

As previously stated, regulations issued by USFWS and NMFS play an important role in

[47] In 1978, the ESA was amended so that DPS was included in the definition of 'species.' In 1996, a joint policy released by the NMFS and USWFS attempted to clarify this idea, stating that to be considered a DPS "a population must exhibit (i) '*discreteness*' in relation to the remainder of the species and (ii) '*significance*' to the species to which it belongs" (Rosen, 2008). '*Discreteness*' implies that a population is geographically, ecologically, or behaviourally separated from other populations of the same taxon or is separated by a jurisdictional boundary resulting in regulatory differences in management (Rosen, 2008).

the implementation of the ESA (Rohlf, 1991). Despite the previous criticisms about exceptions to the ESA prohibitions, the NMFS has implemented regulations that specifically address turtle-fisheries interactions since the 1980s. In the Atlantic and Gulf of Mexico, regulations and other measures exist to reduce sea turtle by-catch including gear modifications and time/area closures. NMFS has focused substantive attention on the use of TEDs, which have been required intermittently on most shrimp vessels operating in the Atlantic and Gulf of Mexico since 1987 (Epperly & Teas, 2002). By 1994, NMFS finalized regulations requiring the use of TEDs in shrimp fisheries at all times (NMFS & USFWS, 2007). The new regulations were "expected to reduce shrimp trawling capture of sea turtles by 97%" (Epperly & Teas, 2002, p. 465); however, this proved to be a false assumption. There was concern that the escape openings were not swide enough to let larger turtles, such as leatherbacks, escape (Epperly & Teas, 2002). A 2002 NMFS biological opinion estimated that 2,300 leatherbacks were killed annually from trawl interactions in the Southeast US shrimp fisheries (NOAA, 2003a). Consequently, in 2003, NMFS released a *final rule*[48] stating that "some current approved TED designs do not adequately exclude leatherback turtles" [and that] "amendments are necessary to protect endangered and threatened sea turtles in the Atlantic area" (NOAA, 2003a, p. 8456). The final amendments, which require specific sized, larger escape openings, apply to all trawl fisheries in inshore and offshore waters in the Southeast US (NOAA, 2004).

[48] The term 'final rule' is used by NMFS in the publication of their official rules and regulations. While these rules and regulations are constantly revised and are not final *per se*, this term implies that in this instance, the action taken by NMFS, as identified in the document, is completed, rather than proposed.

In addition to regulations on TEDs, NMFS is also working to reduce sea turtle by-catch in the pelagic longline fisheries, the sea scallop dredge fishery, the pound net fishery, and the non-shrimp trawl fisheries in the Atlantic and Gulf of Mexico (NMFS, n.d.). In 2001, NMFS released a biological opinion, finding "that operation of the pelagic longline fishery jeopardizes the continued existence of threatened loggerhead and endangered leatherback sea turtles" (NMFS, 2001, p. 17371). As a result, NMFS released a final rule requiring specific methods for handling, resuscitating, and releasing incidentally caught sea turtles in pelagic longline fisheries in order to minimize turtle injury and mortality (NMFS, 2001). Regulations have also been implemented in the longline fishery requiring circle hooks, a type of gear that may reduce turtle by-catch (Possardt, 2007). In 2003, NMFS launched the *Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic and Gulf of Mexico Fisheries*, which seeks to evaluate and address sea turtle by-catch on a gear by gear basis (NMFS, n.d.). It is unclear what data have been collected or what progress has been made with this initiative.

5.4 THE UNITED STATES & INTERNATIONAL AGREEMENTS & DOCUMENTS

As discussed throughout this thesis, international agreements and documents play a critical role in coordinating the efforts of countries attempting to protect highly migratory species. The ESA provides the legislative basis for the US to enter into international agreements with foreign countries, and to provide financial or technical support to these countries for the conservation of endangered species (*Endangered Species Act,* 1973). The US has demonstrated their commitment to the international protection of ALTs by

their involvement in a number of the agreements and documents identified in Chapter 4 of this thesis. Additionally, the US is involved with a number of other international agreements or documents that may be relevant to this discussion.

5.4.1 International Agreements & Documents: Chapter 4

Regarding the global agreements and documents that were identified as relevant to this research in Chapter 4, the US is party to the Ramsar Convention, 1987[49] (Ramsar Secretariat, 2008), CITES, 1975 (USFWS, 2008a), and the Fish Stocks Agreement, 1996. The US also participated in the conference that created the Rio Declaration and Agenda 21, and has also implemented the FAO EAF, FAO Turtle Guidelines, and the FAO Code of Conduct, 1997 (FAO, 2008). The US is not a party to UNCLOS (UN, 2008), the CBD (CBD, n.d.), or the CMS, although the US is a participant in the IOSEA MoU (UNEP & CMS Secretariat, 2008a). Regarding the regional agreements and documents discussed in Chapter 4, the US is party to all five, including: ICCAT, 1967 (ICCAT, 2008); NAFO Convention, 1996 (NOAA, n.d.a); CCSNA, 1983 (NASCO, 2007a); NAAEC, 1994 (NAAEC, 2006); and the IAC, 1996 (IAC, 2003). Finally, the US is also actively involved with Canada regarding their bi-lateral cooperative actions in the Gulf of Maine.

Table 4 displays the participation of Canada and the US in the various agreements and documents identified as relevant for this research. Three observations can be made from the data presented in columns 5 and 6. First, the two countries can take the same action. There are thirteen instances where Canada and the US have either both participated in the agreement or document, or both have not participated. Second, the two countries can

[49] Dates given represent the date that the US became party to, or involved with, the agreement or document.

take different actions where Canada is a participant in the agreement or documents and the US is not. This occurs with UNCLOS and the CBD. The third trend is where the two countries again take different actions, but where the US is a participant and Canada is not. This occurs with the FAO Guidelines and the IAC.

Table 4: US and Canadian participation in international agreements and documents significant to the Canadian population of ALTs.

#	1. Type	2. Agreement/ Document Title	3. Area of Interest	4. Canada	5. USA
1	GE	Ramsar Convention	wetlands	P	P
2	GE	CITES	endangered species trade	P	P
3	GE	CMS	migratory species	X	X
4	GE	UNCLOS	marine law	P	X
5	GE	Rio Declaration	general environment	P	P
6	GE	Agenda 21	general environment	P	P
7	GE	CBD	biodiversity	P	X
8	GF	Fish Stocks Agreement	high-seas fish stocks	P	P
9	GF	FAO Code of Conduct	fisheries/ecosystems	P	P
10	GF	FAO EAF	fisheries/ecosystems	P	P
11	GF	FAO Turtle Guidelines	marine turtle by-catch	X	P
12	RF	ICCAT	Atlantic tuna fisheries	P	P
13	RF	NAFO Convention	NW Atlantic fisheries	P	P
14	RF	CCSNA	NW Atlantic salmon	P	P
15	RE	NAAEC	N. American environment	P	P
16	RE	IAC	sea turtle conservation	X	P
17	BE	Gulf of Maine	George's Bank fisheries	P	P

Key:

G global
R regional
B bi-lateral
E environment
F fisheries
P party/participant
X non-party/non-participant

Shading:

light grey — instances where the two countries take different actions: *Canada is a participant in the agreement/documents and the US is not*

dark grey — instances where the two countries take different actions: *the US is a participant in the agreement or document and Canada is not*

If we refer to the purpose of this chapter, to identify instances where the US approach may serve as a possible example of actions that Canada could take, we can see that only the third trend is relevant to this discussion. US participation in the FAO Guidelines and the IAC display instances where there is potential for the US approach to provide greater protection to ALTs than the Canadian approach. The following sections will briefly address US involvement with FAO Guidelines and the IAC. A comparison of US and Canadian actions, however, is offered in Chapter 6.

(i) The FAO Turtle Guidelines

The FAO Turtle Guidelines were drafted as a result of the Technical Consultation on Sea Turtles Conservation and Fisheries, held in Thailand in 2004. Twenty-eight members of FAO were in attendance, including the US. As discussed in Chapter 4, the Consultation addressed the conservation of sea turtles via fisheries management, including factors affecting the mortality of sea turtles and techniques to reduce sea turtle mortality (FAO, 2005). Most notably, the Consultation included a discussion of two proposed draft guidelines to reduce sea turtle mortality: one from Japan and one from the US. The US proposal included recommendations that fishers are included in the drafting and implementation of the guidelines, and that the guidelines address threats to turtles in both their marine and terrestrial habitats. Additionally, they noted the need for financial and technical support to implement such guidelines and that States, RFMOs, and other organizations can play a role in sharing information. Finally, the US proposal highlighted recent developments in gear technologies, such as the use of circle hooks and changes to bait types, which reduce sea turtle by-catch and mortality. The members at

the FAO Consultation agreed that the US proposal, combined with the Japanese proposal, "formed a good starting point for discussion" (FAO, 2005, p. 5). Eventually the final FAO guidelines were based on these two drafts by Japan and the US. As evident by their involvement in the 2004 meeting, the US was strong proponent of the FAO Turtle Guidelines. Since their completion, the US claims it has demonstrated its continuing commitment to the guidelines by working to see their adoption by several RFMOs and other international agreements (A. Gutierrez, personal communication, November 11, 2008).

(ii) The IAC

The US was one of the original signatories to the IAC in 2001 and has been involved with the treaty since its early stages. Negotiations of the IAC began in 1994 and early drafts of the Convention were criticized for the over emphasis placed on the use of TEDs, largely a result of US influence (Bache, 2000; Campbell, Godfrey, & Drif, 2002). Consequently, the convention was perceived by many "sea turtle conservationists to be a poorly-veiled attempt to support the [US] commercial shrimp industry, under the guise of protecting sea turtles" (Frazier, 1997, para. 3). At the time there was "little participation by marine turtle conservationists and scientists... [and] a general lack of enthusiasm for the planned treaty" (Campbell *et al.*, 2002, p. 124). A turning point occurred, however, during two symposiums in 1996 where sea turtle specialists, including representatives from the US, were able to collectively discuss the relative strengths and weaknesses of the IAC. It was decided that despite its weaknesses, the IAC "represented a potentially valuable instrument for strengthening and coordinating sea turtle conservation, both

nationally and internationally" (Frazier, 1997, para. 6). A series of recommendations were then developed that included the role of industry, NGO and sea turtle specialists in the planning of the final draft of the IAC. The final draft of the Convention reflects these changes; the IAC "has evolved considerably beyond its narrow TED origins, to now offer a more comprehensive sea turtle protection and management instrument" (Bache, 2000, p. 122). As discussed in Chapter 4, the IAC aims to protect all six species of marine turtles found in the Americas by promoting the protection and recovery of the species and their habitats. The parties to the agreement have also drafted the *Resolution for the Conservation of Leatherback Turtles*, which calls for parties to adopt specific measures to protect that species. As part of its commitments to the IAC, the US submits annual reports to the Secretariat. These reports detail the US's actions to protect marine turtles on nesting beaches and in their marine habitats. A partial summary of the actions indentified in the latest report, 2007, is displayed in Table 5.

Table 5: Actions taken by the United States to reduce threats to leatherback turtles in Atlantic fisheries, as identified in the 2007 Annual Status Report to the IAC Secretariat. (Adapted from Table 3.2 in Possardt, 2007, p. 9-10.)

Threat in Atlantic Fisheries	Degree of Impact	Type of Regulation in Place	Research/Evaluation
Trawlers	high		
bottom		require TEDs in shrimp & flounder fishery	
mid-water & skimmer			underway; use of TEDs considered
Gillnets	high		
large mesh		selective time/area closures	
other			underway
Longlines	high	proper handling of caught turtles; selective use of circle hooks & selective time/area closures	underway
Pots & Traps	med - high		recently initiated

5.4.2 Other International Actions by the United States

In addition to the agreements and documents identified in Chapter 4, NMFS and the USWFS have led, and been involved with, a number of international actions that are relevant to ALTs. For example, since 1989, the US has placed an embargo on all foreign shrimp that is caught in a manner that adversely affects sea turtles (Eckert, 1995). Only those states that have adopted regulations similar to those in the US requiring the use of TEDs are exempt from the ban (NMFS, n.d.). The US has also collaborated with foreign governments to conduct research relevant to international fisheries. From 2001 until 2003, under the *Northeast Distant Fishery Experiment*, NMFS tested bait and gear types to determine "which combinations worked best to minimize sea turtle encounters in pelagic longline fisheries" (NOAA, n.d.b, para. 1). This experiment claims to have achieved a 90 percent reduction in turtle-fisheries interactions and also led to the development of new gear that allows for the safe release of incidentally caught turtles (NOAA, n.d.b). NMFS has also provided funding and technical support for fisheries-turtle research and projects in countries that host critical habitat for Canadian ALTs, including Costa Rica, Panama, Trinidad & Tobago, and Canada.

Finally, the US signed the *Protocol of the Cartagena Convention*[50] *Concerning Specially Protected Areas and Wildlife* (SPAW Protocol) in 2003, an initiative identified in the 1992 ALT recovery plan as important for species recovery. Other parties to the protocol that host critical habitats for ALTs include Colombia, Cuba, France, Panama, Trinidad &

[50] The Cartagena Convention, or more formally the *Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region,* came into force in 1986, with the goal of mitigating marine pollution in the wider Caribbean area. There are currently 20 parties to the convention, including the US.

Tobago, and Venezuela (ECOLEX, 2008). The SPAW protocol was drafted by the Parties of the Cartagena Convention in 1990 in order to protect the habitat and species of the wider Caribbean region[51], which includes the "marine environment of the Gulf of Mexico, the Caribbean Sea, and the areas of the Atlantic Ocean adjacent there to" (Cartagena Convention, 1983, art. 2). All six species of marine turtles are listed under Annex II of the protocol. Thus the parties are to prohibit: (*i*) the direct or incidental take, possession, or kill of the species; (*ii*) the trade in the species or their parts; and (*iii*) the disturbance of the species during critical life processes such as nesting or migration (Hykle, 2002). Moreover, the SPAW protocol calls for the parties to protect coastal and marine habitats critical to the recovery of endangered species (SPAW Protocol, 1990).

[51] Given that the SPAW protocol applies to areas only in the Caribbean and Gulf of Mexico, is not likely that Canada would be able to sign, or have an interest in signing, the protocol.

CHAPTER 6: DISCUSSION

It seems appropriate here, in the final chapter of this thesis, to restate the research questions that helped to initiate this study. These questions are:

(i) How strong is Canada's federal endangered species legislation, SARA, for protecting migratory species, such as the leatherback turtle, within Canada and internationally?

(ii) How strong are other international instruments, which Canada may be party to, that aim to protect ALTs and how do these instruments relate to SARA, if at all?

(iii) How strong is the United States' endangered species legislation, the Endangered Species Act, 1973, and how does it compare to SARA?

(iv) What, if anything, should Canada do to better protect migratory species, such as leatherback turtles?

This chapter includes two sections. Section 6.1 discusses research questions (*i*), (*ii*), (*iii*), drawing on the data presented in the previous chapters, as well as the author's opinions and thoughts. Section 6.2 addresses research question (*iv*) and offers four recommendations for Canada to pursue in order to better protect ALTs.

6.1 DISCUSSION

While SARA is Canada's primary legislation for protecting species at risk, it is not without flaws. With regard to the recovery and protection of leatherback turtles, the Act is both weak in its application to the protection of the species within Canada and unclear in how it provides for the recovery and protection of species internationally. For example, within Canadian jurisdictions, SARA's prohibitions may not fully protect leatherbacks as the laws are difficult to enforce in marine areas and are not always applicable to the species. Most alarming, however, is the Act's allowance of certain activities by the responsible minister that would be harmful to listed species. For

example, DFO may issue permits and certain conditions to fishing licences which allow Canadian fishers to indirectly harm or even kill ALTs during normal fishing operations. While the incidental catch of turtles in some fisheries may be inevitable, the manner in which DFO is managing this 'system of allowance' is problematic.

First, DFO requires that fishers release incidentally caught turtles and report all turtle-fishery interactions. The department relies on voluntary compliance to ensure that these two licensing conditions are met, yet has done little to promote such compliance. Voluntary compliance may be a successful means of implementing conservation measures in fisheries. Arguably, however, for voluntary compliance to be successful, information sharing and proper training should occur annually, at minimum. To date, it appears that DFO has conducted only one workshop for Canadian longline fishers on proper release methods for turtles. Second, while it seems promising that fishers are required to record and report all turtle interactions, there is concern that this information is not collected or synthesized. DFO has yet to release a report on incidental catch of ALTs since the 2004 RAP report. Data on the rates of turtle-fisheries interactions from 2004 to 2008 are either: (*i*) not recorded by fishers; (*ii*) not collected by DFO officials; or (*iii*) not analyzed and published by DFO. Such data would be extremely useful to DFO and other research groups. The information could possibly help identify areas with greater concentrations of ALTs, possibly leading to reduction of fishing efforts during times when ALTs are present in those areas. The information could also be used to identify and compare possible changes in fishing gear leading to less by-catch and turtle mortality. The ALTRT (2006) also notes the importance of this information, stating that

it "will also enable [DFO] to assess the effectiveness of recovery efforts and work cooperatively with the fishing industry to find further solutions to assist leatherback turtle recovery" (p. 29).

These data are also necessary for preparing the periodic five-year reviews, required by SARA as part of the allowable harm conditions included in longline fishing licences. Yet again, DFO has poorly implemented the provisions of SARA, as there is no clear start date for such reviews. If the date of issue for the recovery plans is used, the first review would occur in 2011; however, if the date of the allowable harm assessment is used, the first review would be in 2009. DFO has also focused almost exclusively on the longline fishery, while ignoring others. Thus, the reported rate of interactions and mortality levels might underestimate the total, as the species is known to be captured in other gear types, such as fixed gear (James *et al.*, 2005c).

There are also a number of uncertainties with the timelines established by SARA for the recovery documents. Most pressing is the fact that although leatherbacks have been listed as endangered since 2002, no final action plans exist for either ALTs or PLTs. Recovery documents are useful as they identify what must be done to protect and recover species; however, it is the action plans that identify how these measures will actually be implemented and achieved. According to the recovery strategies, the final PLT plan was scheduled to be released in 2008 and the ALT plan in 2009. It is important to note, however, that while SARA does establish a deadline for recovery plans (within one year of listing for endangered species) no such timeline exists for action plans. SARA allows

each recovery team to establish when the action plans for that species shall be released. This is significant as it implies that because there are no established timelines in the legislation, there is no legal obligation to meet any deadline requirements. SARA also does not place any concrete timelines or requirements upon the responsible ministers for implementing the recovery activities identified as necessary for species protection and recovery in the action plans.

These points are exemplified by the PLT recovery documents. First, the PLT recovery strategy stated the action plan was to be released in 2008. Not only did this not materialize, but the projected release date is currently 2011. Additionally, the draft PLT action plan released in 2003 identified a number of recovery activities that were to be carried out between April 2003 and March 2008. Despite the lack of a final action plan, DFO has funded research activities for PLTS, including the development of a sightings network and database in collaboration with the Vancouver Aquarium (C. Eros, personal communication, November 18, 2008). However, these actions address only four of the proposed thirty-seven recovery activities identified in the PLT Action Plan. This lack of adherence to deadlines for implementing recovery activities undermines the credibility and validity of the legislation.

The disconnect between SARA's authority at the international level and the objectives of the SARA recovery documents is another inconsistency affecting the protection and recovery of leatherbacks in Canada. The SARA recovery strategies and action plans for PLTs and ALTs clearly stipulate that Canadian involvement at the international level is

necessary for species recovery and long-term population viability. For example, the PLT recovery documents state that Canada should ratify or contribute to the CMS and the IAC, while the ALT documents call for the investigation of possible international turtle agreements in which Canada could participate. If such objectives are to be successfully achieved, however, SARA must demonstrate that there is a legislative framework in place to facilitate and promote this international cooperation. While SARA does not necessarily obstruct the objectives and actions detailed in the recovery documents, it also does not provide the legislative basis for ease of implementation. For example, the Act does not grant authority to, or require, the responsible ministers to promote international initiatives, such as ratifying or supporting international agreements and documents, a valuable tool for the protection of leatherback turtles (Frazier, 2002). As such, it would appear that the international measures identified in the species' recovery documents would be difficult to implement as there is a general lack of federal commitment to these efforts. It is true that international cooperation may occur without federal commitment, for example between NGOs or research institutions. Arguably, however, it would be easier for organizations and institutions in Canada to initiate international efforts if the federal government were legally and actively committed to such efforts via SARA.

In addition to domestic legislation such as SARA, there are a number of international agreements and documents that have the ability to protect ALTs in their marine habitats. Although the agreements and documents identified as relevant to this research vary greatly in their scope and objectives, in examining their implications for Canadian ALTs, two main themes are evident. These agreements and documents either: (*i*) aim to address

an environmental issue and, in doing so, indirectly protect ALTs; or (*ii*) aim to regulate fishing in an area that contains ALT habitat, and therefore, may affect turtles. Because these agreements and documents were previously analyzed, only those that have been identified by the author as the most significant to the current protection of Canadian ALTs are discussed below.[52] Table 6 provides a reference for several relevant points which are discussed in detail in the following sections. These include: (i) Canadian participation in the relevant international agreements or document (column 4); (ii) the current level of protection offered by each agreement or document to Canadian ALTs in their marine habitats (column 6)[53]; (iii) the possible facet of positive change (column 7)[54]; and (iv) the resulting possible future level of protection (column 8).

The Ramsar Convention, the NAAEC, and the CMS, are, According to this research, the three most significant environmental agreements that may indirectly protect ALTs. For example, the Ramsar Convention aims to protect ecologically significant wetlands, including wetlands that support endangered species (Peck, 2006). In doing so, the Convention has designated three nesting beaches in countries significant to the Canadian population of ALTs as protected areas. Because ALTs are found only in Canadian waters, not on Canadian land, it seems unlikely that a Ramsar site designation would protect ALTs within Canada. The protection of nesting sites elsewhere, however, will benefit the entire ALT population and Canada should, therefore, continue to support this agreement.

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[52] Significant agreements and documents are identified in Table 6 as those that have a possible future rank of medium or high in Column 8.
[53] This rank is determined by the author, see Notes on Table 6 for a full description.
[54] Only those changes that the author defined as reasonable are displayed, see Notes on Table 6 for a full description.

Table 6: Current and potential protection of Canadian ALTs provided by the international agreements and documents discussed in the text.

1. Type	2. Agreement Title	3. Area of Interest	4. Canada	5. USA	6. Current Level of Protection	7. Possible Facet of Change	8. Possible Level of Future Protection
GE	CITES	endangered species trade	P	P	low		
GE	CBD	biodiversity	P	X	low		
GE	CMS	migratory species	X	X	low	ratification by Canada & others	medium
GE	Rio Declaration	general environment	P	P	low		
GE	Agenda 21	general environment	P	P	low		
GF	UNCLOS	marine law	P	X	low		
RE	NAAEC	N. America environment	P	P	low	plan drafted for ALTs	medium
RF	CCSNA	NW Atlantic salmon	P	P	low	by-catch regulations adopted	medium
BF	Gulf of Maine	George's Bank fisheries	P	P	low	working group addresses turtles	medium
GF	FAO Code of Conduct	fisheries/ecosystems	P	P	low		
GF	FAO EAF	fisheries/ecosystems	P	P	low		
GE	Ramsar Convention	wetlands	P	P	medium		
GF	Fish Stocks Agreement	high-seas fish stocks	P	P	medium		
GF	FAO Turtle Guidelines	marine turtle by-catch	X	P	medium	FAO draft IPOA for sea turtles	high
RF	NAFO Convention	NW Atlantic fisheries	P	P	medium	by-catch regulations enforced	high
RF	ICCAT	Atlantic tuna fisheries	P	P	medium	by-catch regulations enforced	high
RE	IAC	sea turtle conservation	X	P	high	ratification by Canada	high

Key:

G	global	P	party/participant
R	regional	X	non-party/non-participant
B	bi-lateral	dark grey	instances where the two countries take different actions: the US is a participant in the agreement or document and Canada is not
E	environment		
F	fisheries		

Notes on Table 6:

- Column 6 shows the current level of protection provided by the document for Canadian ALTs. A low ranking indicates the document provides little direct protection to ALTs, a medium ranking implies the document attempts to provide moderate protection, and a high ranking means the document aims to provide full protection for ALTs, within the limitations or boundaries of the document. For example, ICCAT aims to provide moderate protection of ALTs within the tuna fisheries in the convention area.

- The ranking in column 6 has been assigned by the author based upon an analysis of the data presented in Chapter 4. This rank is a combination of (i) the extent to which the agreement or document has addressed the current protection of Canadian ALTs in their marine habitats and (ii) the extent to which Canada has addressed the document or agreement with regard to the species.

- Columns 7 and 8 display the potential that certain documents have to protect Canadian ALTs, if some facet were to be altered. Column 7 describes this possible change, while column 8 shows the possible level of protection the document could offer ALTs in the future. Only those documents that the author determined to be reasonable are addressed. Reasonable changes are defined as those that seem likely or possible to occur at some future point, based on the literature on that agreement or document.

In contrast to the Ramsar Convention's focused approach on wetlands, the NAAEC and the subsequent CEC have attempted to cover a wide range of shared environmental issues within Canada, the US, and Mexico, including an action plan for PLTs. While it is encouraging that such a plan exists, it appears the plan has yet to be implemented. Moreover, there are no measurable goals for the rather vague and seemingly unrealistic proposed tri-national priorities and timelines. If a similar plan was created for ALTs, it would at the very least draw attention to the status of leatherbacks in Atlantic Canada, and could possibly help initiate international recovery activities between the US and Canada.

Given that the main focus of the CMS is migratory species, it would be reasonable to assume that the CMS would be one of the most promising tools for protecting Canadian ALTs. However, several factors render the CMS ineffectual in the case of ALTs. First, CMS membership in North and South America is extremely limited (Bache, 2002). Not only are Canada and the US not contracting parties, but only two nesting countries for Canadian ALTs, Costa Rica and Panama, are party to the Convention (UNEP & CMS Secretariat, 2008b). Given these facts, it seems highly unlikely that an agreement protecting leatherbacks in the Western Atlantic will be created under the auspice of the CMS. This, however, does not diminish the value or the ability of the CMS to facilitate the protection of other migratory species, including other sea turtle species. It is possible that Canada and other countries in the Americas could ratify the CMS and draft an agreement protecting ALTs. This seems unlikely, however, given that an agreement protecting marine turtles (the IAC) already exists in the Americas.

The other six significant international agreements or documents, which affect Canadian ALT populations via their management of fishing areas in the Atlantic, include the Fish Stocks Agreement, the FAO Turtle Guidelines, ICCAT, the NAFO Convention, the CCSNAO, and the Gulf of Maine cooperative agreement. Most of these documents have established RFMOs responsible for all regulatory aspects of the fishing areas they manage. There is a growing concern about the effects of fishing on marine ecosystems, including polluted habitats, declining fish stocks, and by-catch of non-target species, and many RFMOs are now operating within sustainable fisheries mandates. In a proposal for the *28th Annual Symposium on Sea Turtle Biology and Conservation*, Donnelly (2008) calls for by-catch to be "systematically addressed around the world to arrest major sea turtle declines" (para. 1), and states that "RFMOs are an excellent vehicle for promoting sea turtle bycatch reduction on a large scale" (para. 1).

The FAO Turtle Guidelines offer specific and direct measures for reducing by-catch and protecting marine turtles in their pelagic habitats; as an instrument of soft law, however, their implementation and enforcement is voluntary. While Canada has not officially recognized these guidelines, the CMS, ICCAT, NAFO, and the IAC have officially adopted them. Because the FAO Turtle Guidelines offer specific and direct measures for reducing by-catch, they have potential to positively affect ALT populations in Canada. However, to achieve this, the guidelines must be implemented and enforced effectively, a common problem with other soft-law FAO guidelines (Lugten, 2006). An FAO IPOA for sea turtles, which Canada would likely participate in, could offer greater protection

for sea turtles via more binding obligations for parties such as enforcement of by-catch regulations and annual reporting requirements.

The NAFO Convention applies to all fisheries except salmon, tuna, marlin, or sedentary species such as shellfish. The 2007 NAFO Amendment demonstrates NAFO's commitment to the EA and other sustainable fisheries practices within NAFO fisheries. Moreover, under the *Resolution to Reduce Sea Turtle Mortality in NAFO Fishing Operations,* the NAFO parties have agreed to implement the FAO Turtle Guidelines; however, the degree to which these measures have actually been implemented is unknown. Most likely, the NAFO parties have only begun to collect data on turtle-fisheries interactions. If, however, NAFO were to actively implement these guidelines within the convention area, there would likely be a significant reduction in gear-caused turtle mortalities in many of the northwest Atlantic fisheries.

The salmon and tuna fisheries (including tuna-related species) in the Atlantic are managed by CCSNAO and ICCAT respectively. CCSNAO has done little to address turtle-fisheries interactions. In the future, NASCO could adopt turtle by-catch regulations; this might be slowed, however, by the current lack of turtle by-catch regulations in NASCO fisheries. ICCAT, on the other hand, has directly addressed these issues by adopting the *Resolution on Sea Turtles*, although it is likely that the ICCAT parties have only begun to collect data on turtle interactions. If this resolution is fully implemented and enforced, however, the potential protection offered to ALTs would be substantial, as the ICCAT convention area covers the entire Atlantic Ocean and the main

type of gear used in the commission's fisheries is longlines, a gear that has been well documented as a threat to ALTs. Thus, if the guidelines were actively monitored and enforced throughout the large convention area, ICCAT would serve to significantly reduce the number of turtles harmed or killed throughout the Atlantic

Finally, the bi-lateral informal cooperative agreement in the Gulf of Maine assists in regulating the fisheries of George's Bank. Although the SAR working group has yet to address the status of sea turtles, they have successfully worked to protect whale species in the management area. Additionally, given the close working relationship the US and Canada have in managing this area, and the small size of the management area, cooperation and action to protect ALTs appears to be a feasible goal for the future.

The IAC is unique among these agreements and documents as it aims to directly protect all six species of marine turtles found in the Americas. Specifically, the IAC attempts to "promote the protection, conservation and recovery of sea turtle populations and of the habitats on which they depend" (IAC, 2001). Regarding ALTs, the IAC has drafted the *Resolution for the Conservation of Leatherback Turtles*, which calls for parties to adopt measures specifically aimed at protecting ALTs and PLTs. The Convention has the potential to address a breadth of sea turtle conservation issues in both terrestrial and marine habitats and throughout the species' life stages; this is protection the other international agreements do not, or cannot, provide. While the IAC is still a young Convention and is working through many process issues, it is an important tool for the conservation of sea turtles in the Western Hemisphere (A. Gutierrez, personal

communication, November 7, 2008). One positive outcome of the IAC is standardized annual reporting by the contracting parties, as reliable and accurate data are an important first step in the conservation and protection of endangered species. Currently, there are twelve parties to the IAC, including the US, Costa Rica, and Venezuela, which host nesting habitats for Canadian ALTs. Canada has been an observer at the annual meetings of the parties, but is not a contracting party to the IAC. Although the IAC is not without flaws, it is the only international agreement to which Canada could become party, that specifically addresses the protection and recovery of ALTs in both their terrestrial and marine habitats. Currently, even without Canadian participation, the IAC stands to protect Canadian ALTs in many of their western Atlantic habitats. If Canada were to sign and ratify the Convention, it would allow for the protection of ALTs from their nesting beaches to their northern foraging areas. This would be a significant accomplishment in the conservation of marine turtles.

Given that SARA does not provide the legislative basis for protecting migratory species internationally, it is no surprise that Canada is not party to the CMS or the IAC, and has not fully implemented the FAO Turtle Guidelines. Canada has also not demonstrated strong leadership in the RFMOs that are pushing for the implementation of turtle by-catch regulations and guidelines. Furthermore, the relationship between these international agreements and documents and SARA is rather vague. The CBD is the only international agreement mentioned in the text of the SARA, and it is likely that the CBD, the Rio Declaration, Agenda 21, CITES, and UNCLOS, all influenced Canadian environmental policy, including the formulation of SARA. Most notably, however, it is

unclear what consideration, if any, DFO gives to SARA when dealing with the relevant RFMOs. Although DFO's main interest in these organizations is the management of Canadian fisheries, it would seem logical to assume that DFO is required to pay consideration to SARA, taking into account how the RFMO fisheries affect listed species. It is not clear, however, how DFO manages these two divergent ideals.

This thesis investigated the US approach to protecting ALTs in their marine habitats in order to compare those instances where the US approach, both at the domestic and international level, diverged from the Canadian approach. Given that the ESA has existed in the US for 35 years, many critiques of the Act have been made. Nevertheless, scholars still recognize that the ESA is the US's most comprehensive and powerful tool for protecting endangered species (Rohlf, 1991). NMFS, whose actions are defined by the ESA, provides for the protection of ALTs in their marine habitats by establishing regulations to limit by-catch, by conducting research, and by designating critical marine habitat for the species. Actions in the US to protect and recover leatherbacks are certainly not flawless, but when compared to Canada's efforts, it appears that a greater effort is made by NMFS than DFO to address a number of important issues.

Four common concerns with the ability of SARA and the ESA to protect ALTS in their marine habitats were presented in Chapters 3 and 5 respectively. These include: (*i*) the applicability of the prohibitions to ALT populations; (*ii*) the enforcement of these prohibitions; (*iii*) the allowance of certain activities that may be harmful to the species; and (*iv*) the identification and protection of the species' habitats. While there are aspects

of both Acts that could be improved, in a comparison of these four concerns, the ESA does appear to better protect ALTs than does SARA. First, both SARA and the ESA include a prohibition against the taking or harming of listed species, which is the most applicable prohibition to ALTs. Both Acts also allow for voluntary compliance and strict enforcement of the prohibitions in the legislation. How DFO and NMFS have addressed these issues with regard to ALTs in the fishing industry, however, is quite different. While DFO relies heavily on fishers to voluntarily comply with the prohibitions, NMFS has demonstrated it is willing to take decisive actions against fishers who violate the terms of the ESA. The US Coast Guard also has the authority to enforce the ESA, which they have for ALTs in at least one public instance.

Both SARA and the ESA also allow for exceptions of the prohibitions by allowing fishers to incidentally harm or kill ALTs during normal fishing practices. SARA allows for a minister to grant *incidental harm permits* while the ESA provides for *incidental take permits*. Both systems operate in the same way: fishers may apply for permits that grant them authority to incidentally capture turtles during normal fishing operations. In the US, however, NMFS, as granted authority by the ESA, has created a number of regulations that aim to reduce turtle mortality from fisheries interactions. Current regulations require the extensive use of TEDs on certain trawl fisheries and also implement selective time/area closures during peak turtle-fisheries interaction times. Moreover, the ESA declares such regulations as legally binding and enforceable measures. Canada has no legally binding regulations in place to protect marine turtles from fishing activities.

SARA, unlike the ESA, does not grant authority to the responsible minister's to create general regulations protecting species, but rather ties regulations to the sections on actions plans and critical habitat. For example, Section 53 of the Act grants authority for the responsible minister to create regulations in order to implement recovery measures included in action plans (Species at Risk Act, 2002, sec. 53(1)), while Section 59 allows for regulations to be created to protect critical habitat (Species at Risk Act, 2002). Thus, as no action plan has been published nor critical habitat identified for ALTs, DFO is not able to create any regulations protecting the species.

SARA and the ESA also aim to protect critical habitat for listed species. However, neither act includes strong provisions for determining critical habitat. SARA requires the responsible ministers to designate critical habitat to the extent possible, while the ESA requires the secretary to establish critical habitat to the extent prudent and determinable. The provisions of both Acts usually result in the same outcomes: delays in establishing critical habitat and a low number of species with protected habitat. Surprisingly, however, the US has designated a critical habitat area for ALTs in the Atlantic Ocean. While this area is small, it is significant as it is the only protected marine habitat for ALTs in the US. The establishment of this area has set a precedent, and NMFS is considering a future marine critical habitat designation for PLTs, stretching from Oregon to California in the Pacific Ocean (NMFS, 2007).

Another critical part of SARA and the ESA to ALTs is the abilities within both Acts to provide for the protection and recovery of migratory species beyond national boundaries.

These Acts define how the authorities in each country responsible for the protection of ALTs will operate domestically and internationally. Additionally, the SARA recovery strategies and the ESA recovery plans, important tools for protecting species, are granted authority under SARA and the ESA, and as such are only as powerful as the legislation allows them to be. Both the Canadian and the US recovery documents for ALTs explicitly state that international cooperation is one of the main requirements for species recovery. However, as previously discussed, it appears that SARA does not grant authority to the responsible ministers to promote international cooperation in the protection of transboundary species. The ESA, however, does call for the relevant Secretary to encourage "the entering into of bilateral or multilateral agreements with foreign countries" to provide for the conservation of endangered species (*Endangered Species Act,* 1973, sec. 8(b)). This statement grants authority to the responsible authorities to enter into international agreements to protect ALTs and provides credibility to international measures identified in the recovery plans. Thus, not only does the ESA appear to better provide for the protection of ALTs within domestic jurisdictions than does SARA, the legislation also better provides for the international protection of the species.

In addition to the differences between Canadian and US protection of ALTs at the domestic level, the US has also taken a different approach internationally. Table 6 displays those instances were the US approach at the international level has diverged from Canada's (columns 4 and 5). If we refer to the discussion of the data presented in columns 6, 7, and 8 of Table 6, we can see that the FAO Turtle Guidelines, the NAFO

Convention, ICCAT, and the IAC have the greatest possible potential to protect ALTs in their marine habitats. If we then combine this data set with the differences in Canadian and US participation (columns 4 and 5), we can see that in two instances the US approach may serve as an example from which Canada can learn. Specifically, the FAO guidelines and the IAC both provide the potential for a high possible level of protection for ALTs; however, Canada has not adopted the guidelines nor has it participated in the Convention.

6.2 RECOMMENDATIONS

The following recommendations for the Government of Canada to implement in order to better protect leatherback turtles throughout their range in the Atlantic Ocean are based on the previous discussion and the data presented in Table 6. The four recommendations include: (i) amending SARA; (ii) taking a more active role in RFMOs; (iii) initiating regulations in the Gulf of Maine; and (iv) signing and ratifying the IAC.

Recommendation (1): Amend SARA

If Canada is serious about its commitments to the recovery and long-term protection of species at risk, the legislation should be reviewed and amended as necessary to address its weaknesses. This research suggests that possible amendments could include explicit and standardized timelines for the release of species' action plans and for the implementation of recovery activities. SARA should also define how and when the responsible ministers are to designate critical habitat for all listed species. Moreover, a system of external review and accountability is needed when the responsible departments do not meet these timelines.

There also needs to be a more clearly defined role for DFO in voluntary compliance measures for Canadian fisheries. Voluntary compliance is not intrinsically flawed and in many instances may be the only way to ensure compliance of SARA. The two stipulations attached to fishing licences, the proper release of entangled turtles and the reporting of all turtle interactions by fishers, could help protect and foster a greater understanding of the species in Canadian waters. DFO, however, is currently not promoting either of these measures; annual workshops are not held and any data that is collected is not made availble. As the protection of marine turtles are DFO`s responsibility, they should be held accountable for the active promotion of such compliance among fishers.

The Act could also be improved by allowing for enforceable general regulations, to be established by the responsible authorities when a species is listed on SARA. For example, while incidental harm to turtles from Canadian fisheries may be inevitable, a series of fisheries regulations, such as those established by NMFS in the US, could be used to better protect leatherbacks and other non-target species. Currently, SARA permits regulations only when they are related to the action plans or critical habitat. The allowance of general regulations may allow DFO to protect at-risk species more quickly in the absence of such plans and habitat designations.

Finally, if SARA is serious about its commitments to the recovery of all listed species, the legislation must allow for or encourage the responsible ministers to act beyond Canadian jurisdictions. SARA should include a section on the protection of highly

migratory species declaring Canada's commitment to protecting these unique species throughout their range. One possibility would for this section to include provisions for the responsible authorities to enter into cooperative international, regional, and bi-lateral agreements, programs, or initiatives, if such measures are identified as necessary for species survival in the recovery strategies or action plans. Again, this is an area where the US may serve as an example, as the ESA does include such provisions.

Recommendation (2): More active role in RFMOs

The role of RFMOs in the protection of marine turtles should not be underestimated. As incidental capture in fishing gear has been documented as one of the biggest threats to ALTs, these organizations have the ability to significantly reduce turtle mortality. Additionally, because the first priority of these RFMOs is harvesting fish, it can be assumed that any by-catch regulations altering gear types or fishing practices would do so at a minimal inconvenience to fishers, leading to a greater acceptance and compliance of the regulations. The two largest RFMOs in the Atlantic, ICCAT and NAFO, have already adopted the FAO Turtle Guidelines. While adopting such guidelines does not ensure protection for turtles, it is a positive first step in reducing turtle by-catch. As a contracting party to both ICCAT and NAFO, Canada should take an active leadership role in promoting compliance and enforcement of these guidelines in these RFMOs areas. Moreover, Canada could lead by example and implement these guidelines with Canadian fishers in these management areas. Canada should also take the lead in encouraging these RFMOs to adopt more binding by-catch regulations.

Recommendation (3): Initiate regulations in the Gulf of Maine

Despite past disputes in the Gulf of Maine, Canada and the US are currently working to closely manage fisheries in this area via the Canada-US Transboundary Steering Committee. Moreover, the SAR working group, as demonstrated by its actions with whales in the Gulf of Maine, has the potential to work to protect marine turtles in the area. Although the group has yet to formally address the protection of leatherbacks, the group did coordinate for representatives from DFO "to participate in a US workshop on sea turtle management" (D. Millar, personal communication, October 23, 2008). Given the close working relationship between the two countries, the relatively small size of the Gulf of Maine, and the fact that a SAR working group already exists, the management of this area might be a good place for Canada to work with the US to implement turtle by-catch regulations or time/area closures for fisheries. It would be naive, however, to believe that efforts to protect ALTs in Gulf of Maine area alone would be sufficient to protect this species in Canadian waters. Other marine areas with greater concentrations of ALTs, including identified critical foraging habitats, should be given generous attention, as efforts there will most likely protect a greater number of turtles. Recognizing this limitation, efforts to reduce by-catch in the Gulf of Maine would certainly benefit other marine turtle species in the area. Moreover, such an initiative could be used as a possible pilot project to test the effectiveness of by-catch regulations, including the acceptance and compliance of such regulations by certain fisheries.

Recommendation (4): Sign and Ratify the IAC

It is true that the Government of Canada could protect ALTs in Canadian waters without

becoming party to the IAC, for example by addressing fisheries by-catch. The IAC would certainly be strengthened, however, by Canada's support (K. Eckert, personal communication, September 23, 2008) and "Canadian participation in the treaty will strengthen the hand of scientists and conservationists working in Canada to reduce sea turtle bycatch" (M. Donnelly, personal communication, September 26, 2008). Signing the IAC would be a very positive and public way for Canada to declare that it is committed to the international protection of endangered migratory species. Marine turtles, as charismatic mega-fauna, are an excellent flagship species for such a public declaration. Most importantly, however, any conservation efforts to protect ALTs in Canadian waters are futile if in other jurisdictions the species is being incidentally captured or directly killed or if its habitats are being destroyed. As the IAC aims to control, mitigate, or prevent all threats to marine turtles and their habitats, Canadian involvement with the Convention would ensure not only that efforts within Canada are not in made in vain, but also that Canada has a voice in the protection of ALTs once they leave Canadian waters.

6.3 THE FUTURE

The future of these majestic marine turtle species is uncertain, but not bleak. A number of countries throughout the ALTs' range have recognised the importance of protecting these species both domestically and at the international level. Canada, albeit to a much lesser extent, has also been involved in these efforts. Moreover, marine turtles are a charismatic species and their status has received increasing public attention in recent years. While this study focused on ALTs, these findings may also be applicable to

Canada's protection of other marine migratory species, especially other species of sea turtles. Like other marine species in Canada, the leatherback turtle (*i*) is endangered throughout its range, (*ii*) has critical habitats in Canada, other national jurisdictions, and international waters, and (*iii*) requires an internationally coordinated approach for complete protection and recovery. Thus, ALTs would serve as a good case study or pilot project for the management of other migratory marine species listed by SARA. The recommended actions identified in this research may also be applicable and provide benefits to such species.

Since 2002 Canada has made incremental steps to address the protection and recovery of ALTs in their marine habitats. If Canada is serious about protecting these species, and other marine migratory species, the responsible authorities need to stop stalling and take greater, more direct actions to protect ALTs and other species. The purpose of SARA is to provide for the protection and recovery of all wildlife species at risk; understandably a daunting task. Canada, however, must remain committed to this legislative mandate by providing DFO with the resources necessary to protect all marine species at risk. As well, DFO should make every effort to ensure that all listed species within their care are granted adequate attention. The IAC's 2008 Annual Meeting of the Parties, scheduled to occur at the beginning of November 2008, has been postponed until the Spring of 2009, and Canadian representatives will attend as observers. It will be interesting to see what, if anything, comes of their participation, particularly if these representatives make recommendations of actions Canada could take to better protect ALTs.

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APPENDIX A: PERSONAL COMMUNICATIONS

Personal communications cited in the text, including name and organization.

Name & Title	Organization	Location
A. Gutierrez US Focal Point for the IAC	Office of Protected Resources, NOAA Fisheries	Silver Spring, MD, USA
A. McMaster International Fisheries Advisor	Fisheries and Oceans Canada	Ottawa, ON, Canada
B. Wallace, PhD Science Advisor	Sea Turtle Flagship Program, Conservation International	Arlington, VA, USA
C. Eros Species at Risk Recovery Coordinator	Resource Management, DFO	Vancouver, BC, Canada
D. Millar Co-chair, SAR Working Group	DFO	Dartmouth, NS, Canada
E. Goverse	RAVON Working Group, University of Amsterdam	The Netherlands
K. Martin Executive Director	CSTN	Halifax, NS, Canada
K.L. Eckert, PhD Executive Director	Wider Caribbean Sea Turtle Conservation Network	Ballwin, MO, USA
L. Spaven Marine Mammal Response Coordinator, DFO	Cetacean Research Program, Pacific Biological Station	Nanaimo, BC, Canada
M. James, Ph.D	Department of Biology, Dalhousie University	Halifax, NS, Canada
M. Mota	University of Florida, Dept. of Wildlife Ecology & Conservation	Gainesville, FL, USA
M. Donnelly Director of International Policy	Caribbean Conservation Corporation	Ellicott City, MD, USA
Anonymous	Email communication via cturtle@lists.ufl.edu	unknown

APPENDIX B: RECOVERY OBJECTIVES & STRATEGIES – PACIFIC

Recovery objectives & strategies as identified in the *National Recovery Strategy for the Leatherback Turtle (Dermochelys coriacea) in Pacific Canadian Waters* (adapted from PLTRT, 2006, p. 21-24)

Objective 1: Conduct and support research that makes possible the development of measurable recovery criteria, within five years, for leatherback turtle population(s) that frequent Pacific Canadian waters

Strategies:

(a) Conduct research in Canada to identify critical habitat important to the recovery of leatherbacks in Pacific waters;
(b) Contribute to, and collaborate in, projects to identify population(s) of leatherbacks that are found in Pacific Canadian waters and distinguish them from other Pacific populations;
(c) Contribute to projects on basic demographic parameters for leatherbacks in order to predict the effectiveness of actions to promote recovery;
(d) Contribute to projects on the basic biology, physiology and behaviour of the Pacific leatherback turtle.

Objective 2: Identify and understand threats to the leatherback turtle and its habitat resulting from human activities in Pacific Canadian waters

Strategies:

(a) Synthesize existing data on activities that potentially harm the leatherbacks that frequent Pacific Canadian waters;
(b) Implement programs to collect information on leatherback turtle sightings in Pacific Canadian waters;

Objective 3: Mitigate human-caused threats to leatherback turtles in Pacific Canadian waters and protect their critical migratory and foraging habitats

Strategies:

(a) In consultation with the maritime industry, implement mitigation measures to reduce threats to leatherback turtles in Pacific Canadian waters once they are better understood (threats as identified through programs implemented under Objective 2);
(b) Once identified, protect the critical habitats of leatherback turtles in Pacific Canadian waters (see Objective 1 for determination of critical habitat);
(c) Develop and implement recovery procedures for strandings and/or entanglements, and, as appropriate, other emergency planning and response procedures (e.g. regarding oil spills).

Objective 4: Support the efforts of other countries to promote the recovery of the leatherback turtle population(s) that frequent Pacific Canadian waters

Strategies:

(a) Ratify, respect and/or contribute to international instruments (conventions, treaties, memoranda of understanding, and codes of conduct) that promote leatherback protection and recovery;

(b) Initiate agreements and collaborative projects with countries that share populations of leatherbacks that frequent Pacific Canadian waters;

(c) Make use of existing bilateral and multilateral donor programs such as CIDA and IDRC to support collaborative research, training and awareness, including community participation in leatherback recovery;

(d) Provide Canadian expertise and other support to protect nesting leatherbacks, their eggs, and nesting beaches (e.g., public education, law enforcement, monitoring of coastal construction, alteration/reduction of artificial lighting, and measures to improve hatching success);

(e) Facilitate participation of Canadians (government, academia, industry and NGOs) in international research and recovery programs (e.g. through letters of reference, permits, visas, internships, and secondments).

Objective 5: Raise awareness of Pacific leatherbacks and engage Canadians in stewardship projects

Strategies:

(a) Develop a public awareness campaign on the leatherback turtle that covers identification, life-cycle and biology, threats, Canadian recovery efforts, and what individuals can do to minimize threats at home and abroad;

(b) Promote professional awareness of Pacific leatherback issues in government departments;

(c) Facilitate participation of Canadians in stewardship projects throughout the leatherback's Pacific range.

APPENDIX C: RECOVERY OBJECTIVES & STRATEGIES – ATLANTIC

Recovery objectives and strategies as identified in the *Recovery Strategy for the Leatherback Turtle in Atlantic Canada* (adapted from ALTRT, 2006, p. 19-22)

Objective 1: Understanding Threats. Identify and understand anthropogenic threats to leatherback turtles in Atlantic Canadian waters.

Rationale: The current state of knowledge about threats to leatherback turtles in Canadian waters is poor. Much more information, and synthesis of information, is needed to guide recovery activities, and to guide communication about them. Implementation of the following strategies will enhance the ability to assess and evaluate these threats and to work towards developing appropriate mitigation measures.

Strategies:

(a) Synthesize and evaluate existing data on commercial fishing activities known to, or having the potential to, impact survival and recovery.
(b) Synthesize and evaluate existing data on offshore development activities known to, or having the potential to, impact survival and recovery.
(c) Identify and understand the level of threat to leatherback turtles from marine debris and pollution.
(d) Identify and understand other activities that may pose a threat to leatherback turtles (e.g. vessel interactions or military activities).

Objective 2: Understanding Leatherback Turtle Life History Characteristics. Support research and monitoring that will fill knowledge gaps concerning general organism traits of leatherback turtles in Atlantic Canadian waters.

Rationale: The current state of knowledge about the basic biology and ecology of leatherback turtles in Atlantic Canadian waters is poor. More understanding is required for recovery efforts to be most effective.

Strategies:

(a) Synthesize existing knowledge from research and monitoring activities undertaken regarding leatherback turtles.
(b) Support research on basic knowledge gaps identified from (a) including, but not limited to, foraging ecology, diving behaviour, life history, distribution, and demographics.

Objective 3: Habitat Identification and Protection. Take steps to identify and protect habitat utilized by leatherback turtles in Atlantic Canadian waters.

Rationale: The lack of information about the biology and ecology of leatherback turtles is paralleled by what is not known of their habitat requirements, especially in Atlantic Canada. The following strategies will attempt to acquire further information about

habitats so that they may be protected in the future. A schedule of studies regarding critical habitat identification can be found in Appendix B.

Strategies:

(a) Undertake research to identify habitat use by leatherback turtles in Atlantic Canada
(b) Assess the distribution and abundance of leatherback turtle prey (and/or develop oceanographic proxies for turtle prey that can be assessed using remote sensing or sampling).
(c) Assess the extent to which critical habitat exists in Atlantic Canadian waters.
(d) Assess and evaluate tools for habitat protection.

Objective 4: Risk Reduction. Minimize risk of harm to leatherback turtles from anthropogenic activities under Canadian jurisdiction.

Rationale: Once threats and risks have been identified (Objective 1), it will be necessary to develop activities to mitigate those threats. Lack of full knowledge or understanding of threats should not preclude proactive work to reduce the risk to the turtles. Many mitigation activities, including stewardship, will be developed based on the outcomes of research activities and threats identified in the above Objectives.

Strategies:

(a) Implement, when practical, mitigation measures to minimize human-induced mortality.
(b) Further develop measures that will reduce known harm from human activities (e.g. vessel strikes and entanglement in fishing gear, stranding response teams, entanglement and stranding response teams).
(c) Utilize stewardship programmes developed under Objective 5 to engage stakeholders in the implementation of mitigation measures.

Objective 5: Education. Develop and implement education activities that support leatherback turtle recovery in Canada.

Rationale: Education is an important tool to further recovery efforts through both stakeholders and the general public. Specific documents and programmes should be developed, targeting a variety of audiences. This kind of education programme should result in improved marine environmental health overall.

Strategies:

(a) Develop programmes for educating Canadians about leatherback turtle conservation.
(b) Develop initiatives to educate and train stakeholders about their role in leatherback turtle conservation.

Objective 6: International Initiatives. Promote international initiatives contributing to the recovery of leatherback turtles.

Rationale: Canada has the opportunity to play a role in conservation of leatherback turtles throughout its range. A variety of Canadian organizations and agencies can influence activities in other countries, ultimately contributing to improvements in the conservation status of the species throughout its range.

Strategies:

(a) Investigate options for Canadian participation in, and promotion of, international agreements and conventions that promote leatherback turtle protection and recovery.

(b) Collaborate with U.S. agencies, other range nations, and international bodies, on leatherback turtle conservation initiatives, when possible.

APPENDIX D: IMPLEMENTATION SCHEDULE – UNITED STATES ATLANTIC LEATHERBACK TURTLES

Implementation schedule and priority one tasks as identified in the *Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico* (adapted from NMFS & USFWS, 1992, p. 52-60).

III. IMPLEMENTATION SCHEDULE

Priorities in Column 4 of the following Implementation Schedule are assigned as follows:

Priority 1 An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

Priority 2 An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

Priority 3 All other actions necessary to provide for full recovery of the species.

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
M-3	Implement and evaluate beach tilling	1111	3	continuing	COE, Project sponsors						No estimate; costs to be borne by specific replenishment projects
R-3	Evaluate the relationship of sand characteristics to hatch success, sex ratios and nesting behavior	1112	3	4 years	COE, Project sponsors				35	35	
M-3	Re-establish dunes and native vegetation	1113	3	continuing	COE, Project sponsors						No estimate; costs to be borne by specific replenishment projects
M-3, R-3	Evaluate sand transfer systems as an alternative to beach replenishment	1114	3	continuing	COE						Routine
O-3, M-3	Evaluate current laws on beach armoring	1121	2	continuing	FDNR PRDNR VIFWS						Routine
O-3, M-3	Ensure laws regulating coastal construction are adequate and enforced	1122	2	continuing	FDNR PRDNR VIDFW						Routine
M-3	Ensure failed erosion control measures are removed	1123	3	continuing	FDNR PRDNR VIDFW						Routine
M-3	Identify and ensure long-term protection of important nesting beaches	113	1	continuing	FWS PRDNR VIDFW FDNR						No estimate; costs will be related to acquisition if new areas are identified for long-term protection

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
R-2	Identify important marine habitats	121	1	continuing	NMFS, VIDFW PRDNR, east and gulf coast resource agencies						Funds are identified under 2211 and 2212 because of research overlap with population studies
M-3	Prevent degradation of habitat from oil and gas developments, refining, and transhipment activities	122	2	continuing	USCG, NMFS, MMS, FWS, FDNR, PRDNR, VIDPNR						Routine
M-3, O-3	Prevent degradation of coastal habitat from industrial and sewage effluents	123	2	continuing	NMFS, EPA, coastal resource agencies						Routine
I-2	Identify other threats to marine habitat	124	2	continuing	NMFS						Routine
I-1	Monitor trends in nesting activity	211	1	continuing	FWS VIDFW PRDNR USN FDNR	85 10	85 10 10 10 10	85 10 10 10 10	85 10 10 10 10	85 10 10 10 10	
R-1, R-9 R-14, M-4	Evaluate hatch success and implement nest protection measures	212	1	continuing	FWS, USN, VIDFW, PRDNR, FDNR						Costs included in task 211
R-14	Determine effects of artificial lighting on hatchlings and nesting females	2131	2	2-3 years	FWS, PRDNR, VIDFW, FDNR				20	20	Routine

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
O-3	Implement, enforce, and evaluate lighting ordinances where appropriate	2132	2	continuing	VIDPNR, PRDNR, FDNR, Florida east coast Counties						Routine
O-2, O-3	Enforce take provisions of Endangered Species Act and evaluate need for Federal lighting regulations	2133	2	continuing	FWS						Routine
M-7	Eliminate vehicular traffic on nesting beachs	214	2		PRDNR, VIDPNR FWS, FDNR						Routine
M-7	Ensure beach replenishment and coastal construction avoid nesting/hatching season	215	2		PRDNR, FWS FDNR, VIDPNR						Routine
M-3	Prevent waste disposal on nesting beaches	216	3	continuing	PRDNR, VIDPNR FDNR						Routine
O-2	Ensure law enforcement prevents poaching and harassment	217	2	continuing	FWS, NMFS						Routine
R-14	Determine natural hatchling sex ratios	218	2	3 years	FWS, VIDFW				25	25	
R-1, R-14	Determine genitic relationship of U.S. Caribbean population to other major nesting populations	219	2	3-5 years	FWS, NMFS, FDNR, PRDNR, VIDFW			50	50	50	

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
R-14	Determine hatchling dispersal patterns and juvenile distribution and abundance	2211	2	3-5 years	NMFS, FWS			50	50	50	Costs for all agencies
R-8, R-14	Determine migratory pathways, distribution and interesting movements	2212		5-10 years	NMFS, FWS, VIDFW, PRDNR FDNR		150	150	150	150	Costs for all agencies
R-1,R-6	Determine growth rates, age at sexual maturity, survivorship rates	2213	2	10-15 years	NMFS, FWS, VIDFW, PRDNR FDNR		100	100	100	100	Costs for all agencies
R-1, R-14	Quantify threats to adults and juveniles along migratory routes and on foraging grounds	2214	2	5-10 years	NMFS, VIDFW PRDNR, FDNR						Unable to determine costs which are dependent on results of 2211 and 2212 tasks
R-14	Evaluate effects of industrial and sewage effluents	2215	3	3 years	EPA, FWS, NMFS				100	100	
M-7, 03	Implement measures to reduce capture and mortality from shrimp vessels	2221	1	2 years	NMFS, FDNR, GDNR, SCWMRD, NCDNR						Routine
I-14	Evaluate extent of incidental take from other commercial fisheries	2222	2	5-10 years	NMFS			50	50	50	Some overlap with task 2214
O-3	Promulgate and enforce appropriate regulations to reduce mortality from other commercial fisheries	2223	2	continuing	NMFS						Routine

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
I-14	Maintain carcass stranding network	2224	3	continuing	NMFS,FWS, coastal resource agencies						Volunteer efforts or costs associated with surveys identified in Loggerhead/Green Turtle Recovery Plans
R-14	Determine effects of oil and oil dispersants on all life stages	2231	2	continuing	MMS,Industry						No estimate
M-7	Determine sea turtle distribution and use of marine habitats associated with oil and gas developments	2232	3	3-5 years	MMS, COE, NMFS						Costs are included in Loggerhead/Green Turtle Recovery Plans
O-4,M-7	Ensure impacts are addressed during planning of oil and gas development	2233	3	continuing	MMS, COE, NMFS, Industry						Routine
R-12, R-14	Evaluate extent of entanglement and ingestion of persistent marine debris	2241	1	3-5 years	NMFS, coastal resource agencies		10	10	10	10	costs for all agencies
R-12, R-14	Evaluate effects of ingestion of persistent marine debris	2242	1	3-5 years	NMFS, coastal resource agencies		50	50	50	50	Costs for all agencies
O-2	Implement and enforce MARPOL	2243	1	continuing	USCG						Routine
O-3	Implement other measures to reduce persistent marine debris	2244	3	continuing	USCG, NMFS						Routine

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
I-14, O-4	Centralize tag series and records	2251	3	1 year	NMFS, FWS						Routine
I-14, O-4	Centralize turtle tagging records	2252	3	continuing	FWS, NMFS						Costs identified in Loggerhead/ Green Recovery Plans and inclusive of leatherback costs
R-14, M-7	Develop care and maintenance standards for captive leatherbacks	2261	3	5 years				20	20	20	
M-7	Designate rehabilitation facilities	2262	3	continuing	NMFS, FWS						Routine
O-1	Provide slide programs and information leaflets	31	2	continuing	NMFS, FWS, coastal resource agencies		10	10	10	10	All agency costs
O-1, M-7	Develop brochure on recommended lighting modifications	32	2	1 year	FWS, NMFS						Costs identified in Loggerhead Green Turtle Recovery Plans and inclusive of leatherback requirements
O-1, M-7	Develop public service announcements on sea turtle conservation issues	33	2	3 years							Costs included in Loggerhead/ Green Recovery plans and inclusive of leatherback requirements
O-1, M-7	Post information signs on important nesting beaches	34	3	continuing	NPS, PRDNR, VIDPNR, FDNR						Routine
M-7, O-1	Develop criteria for public observation of recovery and research activities	35	3	continuing	FWS, VIDFW						Routine
M-7, O-4	Develop international agreements	41	2	continuing	FWS, NMFS						Routine

Leatherback Turtle (Recovery Priority#7)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency	Estimated Fiscal Year Costs $000 Current	Fy 2	Fy 3	Fy 4	Fy 5	Comments/ Notes
M-7, O-4	Ratify Protocol to Cartagena Convention	42	2		FWS, NMFS State Dept.						Routine