A FUTURE FOR A FORGOTTEN PREDATOR: ASSESSMENT OF THE GLOBAL AND REGIONAL LEGAL FRAMEWORKS FOR PROTECTION AND RECOVERY OF THE CARIBBEAN SAWFISHES *PRISTIS PRISTIS* AND *PRISTIS PECTINATA* AND RECOMMENDATIONS FOR THE COURSE FORWARD

by

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ABSTRACT

Two species of sawfish, *Pristis pristis* and *Pristis pectinata*, used to be common in the coastal waters of the Caribbean Region. However, due to direct and incidental fishing pressures, national and international trade in body parts, and habitat loss, the populations of these ecologically and culturally significant species have drastically declined. This thesis identifies and reviews global and regional, binding and non-binding legal instruments in effect in the Caribbean Region that encourage states to protect biodiversity in general or address identified threats to sawfishes specifically. Despite the presence of obligations that call upon states to adopt sawfish conservation and habitat protection measures, declining numbers of these fishes in the Caribbean suggest deficiencies in the operation and implementation of the reviewed instruments. The thesis recommends steps that countries, intergovernmental organizations, and conservationists could take to secure a future for these remarkable species.

LIST OF ABBREVIATIONS USED

BRD – Bycatch Reduction Device

CBD – Convention on Biological Diversity

CEP – Caribbean Environment Programme

CITES – Convention on the International Trade in Endangered Species of Wild Fauna and Flora

CLOS – Convention on the Law of the Sea

CMS – Convention on the Conservation of Migratory Species

COFI – Committee on Fisheries (FAO)

COP – Conference of the Parties

CRFM – Caribbean Regional Fisheries Mechanism

EEZ – Exclusive Economic Zone

EBM – Ecosystem Based Management

ESA – Endangered Species Act (U.S.)

FAO – Food and Agriculture Organization of the United Nations

IPOA-SHARKS – International Plan of Action for Conservation and Management of Shark

IUCN – International Union for Conservation of Nature

MAB – UNESCO's Man and the Biosphere Programme

MEA – Multilateral Environmental Agreement

MPA – Marine Protected Area

NDF – Non-Detriment Finding

NGO – Non-governmental Organization

OUV – Outstanding Universal Value

NMFS – National Marine Fisheries Service

RFMO – Regional Fisheries Management Organization

Sharks MOU – Memorandum of Understanding on the Conservation of Migratory Sharks

SPAW Protocol – Specially Protected Areas and Wildlife Protocol

SSG – Shark Specialist Group

STAC – Scientific and Technical Advisory Committee

STRC – Scientific and Technical Review Committee

TED – Turtle Excluder Device

UNEP – United Nations Environment Programme

UNFSA – United Nations Fish Stock Agreement

UNGA – United Nations General Assembly

UNCLOS – United Nations Convention on the Law of the Sea

WCR – Wider Caribbean Region

WECAFC – Western Central Atlantic Fishery Commission

WHC – Convention Concerning the Protection of the World Cultural and Natural Heritage

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CHAPTER 1 – INTRODUCTION

Context

Sawfish is the world's most endangered fish.[1] Once common in tropical and sub-tropical coastal waters across the globe, it is now extinct in large portions of its range.[2] Scientists first talked about sawfishes in a publication in 1877.[3] In the 1970s, an American scientist, Thomas Thorson, conducted ground-breaking sawfish studies in Lake Nicaragua.[4] Despite this initial interest, even the U.S. National Marine Fisheries Service (NMFS) staff admit that no one noticed when these distinct fishes practically disappeared.[5]

By the beginning of the twenty-first century, sawfish's perilous status became recognized in national and international law. In 2003, it "won the dubious distinction of being the first animal that can spend its entire life in the ocean"[6] to be listed under the U.S. *Endangered Species Act* (ESA).[7] Sawfish also remains the only member of the sharks, rays, and skates subclass to be included on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),[8] even though it tends to be very

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[1] "SAWFISH: The world's most endangered marine fish," online: Dulvy Lab < www.dulvy.com/eastern-tropical-pacific-fast-facts.html>.
[2] Lucy R Harrison & Nicholas K Dulvy, eds, *Sawfish: A Global Strategy for Conservation* (Vancouver: IUCN Species Survival Commission's Shark Specialist Group, 2014).
[3] Thomas B Thorson, "Observations on the Reproduction of the Sawfish, Pristis perotteti, in Lake Nicaragua, with Recommendations for its Conservation" in Thomas B Thorson ed, *Investigations of the Ichthyofauna of Nicaraguan Lakes* (Lincoln, NE: University of Nebraska Press, 1976) 641.
[4] *Ibid*.
[5] Janet Raloff, "Hammered Saws" (2007) 172:6 Science News 90.
[6] *Ibid* at 91.
[7] *Supra* note 5 and *Endangered Species Act*, 16 USC §1531 (1973) [ESA].
[8] "Sharks and Manta Rays," online: CITES <cites.org/eng/prog/shark/more.php> and *Convention on International Trade in Endangered Species of Wild Fauna and Flora*, 3 March 1973, 993 UNTS 243(entered into force 1 July 1975) [CITES].

difficult for a marine fish species to get listed.[9] Indeed, both species of sawfish present in the Caribbean are assessed as critically endangered by the International Union for Conservation of Nature (IUCN), meaning that they are facing "an extremely high risk of extinction in the wild." [10]

In addition to the loss of biodiversity and potentially negative impacts on ecosystems, the disappearance of sawfishes raises concerns over the loss of traditional culture.[11] Sawfishes have been a part of indigenous myths and legends throughout their range, including in the Caribbean.[12] This is not surprising, given their unique look and shallow coastal habitat.[13] Indigenous people saw sawfishes as embodiment of ancestors.[14] They were spirits that controlled fish harvest,[15] assisted shamans in healing,[16] and protected humans from evil. [17] The Coclé people living in what is now Central Panama 1,400 years ago, depicted sawfishes on their pottery.[18] The meaning behind these drawings is unknown, but likely represented qualities esteemed by warriors or powerful spirits.[19] The Kuna people of the San Blas archipelago, on the Caribbean side of Panama, viewed sawfishes as their

[9] Margaret A Young, Trading Fish, Saving Fish: The Interactions Between Regimes in International Law (New York, NY: Cambridge University Press, 2011) and Solène Guggisberg, The Use of CITES for Commercially-exploited Fish Species: A Solution to Overexploitation and Illegal, Unreported and Unregulated Fishing? (New York, NY: Springer International, 2016).
[10] IUCN Species Survival Commission, "IUCN Red List Categories and Criteria" (2012), online: Red List < www.iucnredlist.org/technical-documents/categories-and-criteria> ["Red List"] at 14.
[11] Jori Lewis, "Twilight for the Sawfish" *Hakai Magazine* (14 June 2016), online: <www.hakaimagazine.com/article-long/twilight-sawfish>.
[12] Matthew McDavitt, "The Cultural and Economic Importance of Sawfishes (family Pristidae)" (1996) 8 Shark News 10 [McDavitt, "Cultural and Economic Importance"] and Matthew T McDavitt, "Sawfishes in the Indigenous Art of Panama" (2002) 14 Shark News 4 [McDavitt, "Indigenous Art"].
[13] *Ibid*.
[14] McDavitt, "Cultural and Economic Importance", *supr*a note 12.
[15] *Ibid*.
[16] McDavitt, "Indigenous Art", *supra* note 12.
[17] *Ibid.*
[18] *Ibid.*
[19] *Ibid.*

protectors.[20] Sawfishes helped them in the fight against evil sea monsters and rescued fishermen from drowning.[21] They were "special 'friends' of mankind, placed in the world by the creator to protect humanity physically, by patrolling the coasts and rivers, repelling dangerous beasts such as sharks, crocodiles, and whales."[22] Representations of sawfishes can be found today on Kuna molas, traditional appliqué used to decorate blouses by Kuna women.[23] The Aztecs sometimes depicted Cipactli, the revered sea monster that became the earth and sky, with a distinct toothy appendage on its head that looked like a sawfish "saw" or "rostrum."[24] The significance of sawfishes to the Aztecs was further confirmed by the discovery of multiple sawfish rostra buried in the Great Aztec Temple underneath Mexico City.[25]

Historically, coastal people exploited sawfish for meat, liver oil, and leather. Though high prices were paid for sawfish body parts – discussed in the next chapter – present economic value of sawfishes is unclear. At the same time, the cost of sawfish recovery within the U.S. territory alone is estimated at US $70 million over 100 years.[26] When countries in the Caribbean are faced with challenges of maintaining and restoring healthy fisheries,[27] it is reasonable to ask whether resources should be spent on sawfish conservation. The answer to this question is outside the scope of this thesis. But briefly, two perspectives can support an

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[20] *Ibid.*
[21] *Ibid.*
[22] Matthew T McDavitt, "The Cultural Value of Sawfishes" in Harrison & Dulvy, *supra* note 2, 30 at 31.
[23] *Supra* note 12.
[24] Matthew T McDavitt, "Cipactli's Sword, Tlaltecuhtli's teeth: Deciphering the Sawfish & Shark Offerings in the Aztec Great Temple" (2002) 14 Shark News 6 [McDavitt, "Cipactli"].
[25] *Ibid*.
[26] Smalltooth Sawfish Recovery Team, "Smalltooth Sawfish Recovery Plan (*Pristis pectinata*)" (January 2009), online: National Marine Fisheries Service <www.nmfs.noaa.gov/pr/pdfs/recovery/smalltoothsawfish.pdf> ["Recovery Plan"].
[27] Lucia Fanning et al, "The Symposium on Marine EBM in the Wider Caribbean Region" in Lucia Fanning, Robin Mahon & Patrick McConney, eds, *Towards Marine Ecosystem-based Management in the Wider Caribbean* (Amsterdam: Amsterdam University Press, 2011) 13 [Fanning, "Symposium"].

answer in the affirmative. One is to consider biodiversity as an insurance policy[28] against ecosystem disruptions such as climate change. The other is to recognize the intrinsic value of sawfishes and their right to exist.[29]

Transformations in the environment due to climate change will have direct and indirect effects on organisms, affect their physiological functions, predator-prey relationships, and habitats.[30] While the extent and exact nature of these changes are impossible to predict,[31] the general trend is for marine species to move into colder and deeper waters.[32] As tropical organisms shift their ranges in response to rising temperatures, no species exist that can take over the vacated niches.[33] Some researchers even predict an extinction of tropical biomass due to climate change.[34] However, researchers also acknowledge that "[n]onlinear responses, thresholds, and counterintuitive effects"[35] are possible and emergence of no-analog communities of organisms is difficult to predict.[36] Nevertheless, studies have shown that ecosystems need biodiversity to remain resilient and adaptable in light of anticipated changes, and to continue to perform the variety of functions relied upon by humans and non-humans.[37]

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[28] Andy Hector & Robert Bagchi, "Biodiversity and Ecosystem Functionality" (2007) 448 Nature 188.
[29] Michael Bowman, Peter Davies & Catherine Redgwell, *Lyster's International Wildlife Law*, 2nd ed (New York, NY: Cambridge University Press, 2010) and Jonathan E M Baillie & Ellen R Butcher, *Priceless or Worthless? The World's Most Threatened Species* (London, UK: Zoological Society of London, 2012).
[30] William J Sydeman et al, "Climate Change and Marine Vertebrates" (2015) 350:6262 Science 772.
[31] *Ibid*.
[32] Ove Hoegh-Guldberg & Rongshuo Cai, eds, "The Ocean" in VR Baros et al, eds, *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK: Cambridge University Press, 2014) 1655.
[33] Michael T Burrows et al, "The Pace of Shifting Climate in Marine and Terrestrial Ecosystems" (2011) 334 Science 652.
[34] Sydeman, *supra* note 30.
[35] Scott C Doney et al, "Climate Change Impacts on Marine Ecosystems" (2012) 4 Annul Rev Marine Science 11 at 28.
[36] *Ibid*.
[37] Andy Hector & Robert Bagchi, "Biodiversity and Ecosystem Functionality" (12 July 2007) 448 Nature 188.

Predators play an important role in maintaining biodiversity and the health of their ecosystems. [38] The full extent of their influence is not fully appreciated, in part because of the difficulties associated with tracing the complex web of interactions among organisms across different special and temporal scales. [39] But researchers believe that the removal of a top predator acts "additively and synergistically with other anthropogenic impacts on nature, such as climate and land use change, habitat loss, and pollution," [40] leading to unforeseen, far-reaching, cascading effects on ecosystem processes. [41]

The exact role of sawfishes in the ecosystem is unknown because no studies were done when the population was large enough to have an impact.[42] Based on their size, sawfishes were likely middle to top level predators,[43] a role that changed with age.[44] A large number of sawfishes have already been removed from their historic range, possibly altering the environment. Taking steps to protect and restore sawfish populations would be consistent with researchers' call for "restoration of effective predation regimes" [45] as a solution to the negative effects of predator loss discussed above.

Yet, the importance of sawfish should not be limited to its role in the ecosystem. The species should also be protected for their intrinsic value "regardless of the [species'] interests or utility to others."[46] The idea of an intrinsic value of wildlife is controversial;[47] and there is

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[38] James A Estes et al, "Trophic Downgrade of Planet Earth" (15 July 2011) 333 Science 301 and Francesco Ferretti et al, "Patterns and Ecosystem Consequences of Shark Declines in the Ocean" (2010) 13 Ecology Letters 1055.
[39] *Ibid*.
[40] *Ibid* at 301.
[41] Estes, *supra* note 38.
[42] Raloff, *supra* note 5.
[43] *Consideration of Proposals for Amendment of Appendices I and II*, CoP14, Prop 17 (2007), online: CITES <www.cites.org/eng/cop/14/prop/E14-P17.pdf> [*CITES Proposal*].
[44] R Dean Grubbs, "Ontogenetic Shifts in Movements and Habitat Use" in Jeffrey C Carrier, John A Musick & Michael R Heithaus, eds, *Sharks and Their Relatives II: Biodiversity, Adaptive Physiology, and Conservation* (Boca Raton, FL: CRC Press, 2010) 319.
[45] Estes, *supra* note 38 at 306.
[46] Bowman, Davies & Redgwell, *supra* note 29 at 63.

no consensus on the meaning of this value or how it should be expressed.[48] Nevertheless, it is recognized in the preamble of the Convention on Biological Diversity (CBD), a widely accepted global treaty.[49] It has been suggested that to prevent the sixth wave of mass extinction, people need to shift their perspectives from anthropocentrism to a more holistic world view. [50] This includes recognizing the intrinsic value of other species and their right to exist, rather than focusing on the species' usefulness to humans.[51] Such a shift is needed for successful recovery of sawfishes, given their doubtful economic value.

Geographical Boundaries

This thesis focuses on sawfishes in the Caribbean. However, there is no one way to delineate this region. The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention)[52] describes the Wider Caribbean Region (WCR) as "the marine environment of the Gulf of Mexico, the Caribbean Sea and the areas of the Atlantic Ocean adjacent thereto, south of 30˚ north latitude and within 200 miles of the Atlantic coasts of the States referred to in article 25 of the Convention."[53] Article 25 says that states that were "invited to participate in the Conference of Plenipotentiaries on the Protection and Development of the Marine Environment of the

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[47] Barbara Paterson, "Ethics of Wildlife Conservation: Overcoming the Human-Nature Dualism" (2006) 56 BioScience 145.
[48] J Baird Callicott, "Animal Liberation: A Triangular Affair" (1980) Winter Envtl Ethics 311 and Sahotra Sarkar, *Biodiversity and Environmental Philosophy: An Introduction* (New York, NY: Cambridge University Press, 2005).
[49] *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) [CBD].
[50] Martin Gorke, *The Death of Our Planet's Species: A Challenge to Ecology and Ethics* (Washington, DC: Island Press, 2003).
[51] *Ibid.*
[52] *The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region*, 24 March 1983, 1506 UNTS 157 (entered into force 11 October 1986) [Cartagena].
[53] Cartagena at art 2(1).

Wider Caribbean Region" are allowed to sign the Convention. Neither the definition nor article 25 clarifies the southern boundary of the WCR in this case.

The Caribbean Large Marine Ecosystem (CLME) project also covers the WCR but, in its case, the term describes the area "from the mouth of the Amazon River, Brazil, in the south, through the insular Caribbean, Central America, the Gulf of Mexico and north along the east coast of North America to Cape Hatteras."[54] As some of the remaining sawfish populations are found in the Amazon River basin,[55] this thesis will use the CLME's geographic boundaries. In order to avoid confusion with the Cartagena Convention terminology, the thesis will use the terms the "Caribbean" or the "Caribbean Region."

Priority States

In 2014, the IUCN Shark Specialist Group (SSG) published "Sawfish: A Global Strategy for Conservation" (Global Strategy) that reviewed sawfish biology, threats, and conservation needs.[56] The document called for greater national protection of the species,[57] given that at the time of publication, sawfishes were protected in 16 of 93 historical range states.[58] In the Caribbean Region, these are Brazil, Mexico, Nicaragua, and the U.S.[59] In Brazil and Mexico, take of sawfishes is prohibited throughout each country. [60] In Nicaragua,

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[54] Robin Mahon et al, "Governance Arrangements for Marine Ecosystems of the Wider Caribbean Region" (2013) at 7, online: Caribbean Large Marine Ecosystem Project: Regional Governance <http://www.clmeproject.org/gframework.html> [Mahon, "Governance Arrangement"].
[55] Patricia Charvet & Vicente V Faria, "Southwest Atlantic Ocean" in Harrison & Dulvy, *supra* note 2, 48.
[56] Harrison & Dulvy, *supra* note 2.
[57] *Ibid.*
[58] *Proposals for the Inclusion of All Species of Sawfish (Family Pristidae) in CMS Appendices I and II*, (2014) UNEP/CMS/ScC18/Doc 7.2.8, online: CMS < www.cms.int/sharks/en/listing-proposals> [*CMS Proposal*].
[59] *Ibid*.
[60] J Carlson, T Wiley & K Smith, "*Pristis pectinata*. The IUCN Red List of Threatened Species" (2013), online: Red List <www.iucnredlist.org/details/18175/0>.

there is a ban on targeted sawfish take in Lake Nicaragua.[61] In the U.S., both smalltooth and largetooth sawfish are listed under the ESA,[62] giving them access to conservation measures such as prohibition on take and trade, habitat protection, development of recovery plans, and international assistance to help the species recover throughout their range.

In addition to these four countries, 14 other range states in the Caribbean were identified by the Global Strategy as needing to improve their sawfish protection laws to various degrees. Altogether, these countries will be referred to as the "Priority States" throughout this thesis. The Priority States are grouped into three categories: (1) those that do not have any legislation protecting sawfishes; (2) those that have inadequate legislation; and (3) those that have suitable legislation but it is insufficiently enforced.[63] Within each category, countries are assigned either priority one or priority two, depending on a combination of six factors: extinction risk within the country, adequacy of current legislation, regional significance of the population, level of political support, likelihood of success, and the SSG's regional presence.[64] Appendix 1 lists the countries and their priority ranking.

Seven countries in the Caribbean Region are listed in the most urgent category (category one, priority one). These are: Cuba, Suriname, Guyana, French Guiana, Panama, Colombia, and Venezuela. Five countries are identified as category one, priority two: Belize, Dominican Republic, Haiti, Costa Rica, and Guatemala. Three countries, the Bahamas, Nicaragua and Honduras, are listed as category two, priority one. Finally, Brazil is placed in category three, priority one, while the U.S. and Mexico are recognized as category three, priority two. Although this thesis does not discuss national-level legislation, it takes into

[61] *Ibid*.
[62] Janet Raloff, *supra* note 5and *Enumeration of Endangered Marine and Anadromous Species*, 50 CFR §224.101 (2011).
[63] Harrison & Dulvy, *supra* note 2.
[64] *Ibid*.

account participation of the Priority States in the examination of international instruments, its evaluation of their effectiveness, and in the recommendations it offers.

Research Objective

This thesis identifies and reviews global and regional legal instruments in effect in the Caribbean Region that encourage states to protect biodiversity in general or address identified threats to sawfishes specifically. The objective is to identify obligations agreed to by the Priority States that could help sawfishes recover. The thesis recommends additional steps that the Priority States and intergovernmental organizations could take to improve the conservation status of sawfishes in the Region.

Methodology

This thesis answers its research questions via five approaches to legal analysis namely, doctrinal, ethical and international relations theory, historical, interdisciplinary, and policy. The doctrinal method or "research into the law and legal concepts"[65] informs discussion of the contents of the international instruments identified as relevant to the legal architecture that governs this subject-matter. These legal instruments are those in force in the Region. From an international relations and ethical theory angle, the discussion is underpinned by assumptions about the role and capacity of international law to prevent

[65] Terry Hutchinson & Nigel Duncan, "Defining and Describing What We Do: Doctrinal Legal Research" (2012) 17 Deakin LR 83 at 85.

extinction of sawfishes in the Priority States,[66] as well as help discuss theoretical justifications for trying to save the species.[67]

Historically,[68] the work traces the history of listing sawfishes under the Convention on Conservation of Migratory Species (CMS),[69] the Protocol Concerning Specially Protected Areas and Wildlife to the Cartagena Convention (SPAW Protocol), [70] and CITES. Listing successes and failures under the various agreements often highlight broad conservation problems and in regard to fishes, tensions often arise between the need for protection and exploitation of the species.[71] The degree of appreciation accorded to either interest influences prospects for achieving the desired conservation outcome.

This work is clearly interdisciplinary because it incorporates knowledge from fields other than law,[72] in this case, biology and other natural sciences. The latter explain facts about sawfishes, such as their life history and habitat use, that are central to effective conservation. But understanding their biology is not sufficient to help sawfishes recover. National governments must exert the requisite political will to enact and enforce appropriate legislation. This thesis pushes resolution of this need via policy recommendations to inform what decisions will be made at the national and regional levels on the matter.[73]

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[66] Ronald B Mitchell, "Compliance Theory: Compliance, Effectiveness, and Behaviour Change in International Environmental Law"in Daniel Bodansky, Jutta Brunée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York, NY: Oxford University Press, 2007) 893.
[67] Bowman, Davies & Redgwell, *supra* note 29.
[68] Robert Cryer et al, *Research Methodologies in EU and International Law* (Oxford, UK: Hart, 2011).
[69] *Convention on Conservation of Migratory Species*, 23 June 1979, 1651 UNTS 333 (entered into force 1 November 1983) [CMS].
[70] *Protocol Concerning Specially Protected Areas and Wildlife to the Cartagena Convention*, 18 January 1990, 2180 UNTS 101 (entered into force 17 June 2000) [SPAW Protocol or SPAW].
[71] Guggisberg, *supra* note 9.
[72] Moti Nissani, "Ten Cheers for Interdisciplinarity: The Case for Interdisciplinary Knowledge and Research" (1997) 34 Soc Sci J 201 at 203.
[73] Cryer, *supra* note 68.

Thesis Layout

Chapter 2, next, explains the biology and habitat needs of sawfishes, and Chapter 3 describes historic and continuing threats to the survival of the species, such as direct fishery and incidental capture, trade in body parts, and habitat loss. Current conservation status, as well as recovery projections are addressed in Chapter 4. Chapter 5 discusses the legal instruments applicable to sawfish conservation. First are the global conventions that impose general obligations (United Nations Convention on the Law of the Sea (UNCLOS)[74] and CBD), species-specific measures (CMS and CITES), and habitat-focused initiatives (Convention on Wetlands of International Importance (Ramsar Convention)[75] and Convention Concerning the Protection of the World Cultural and Natural Heritage (WHC))[76]. Chapter 6 focuses on non-binding instruments that deal with fisheries and shark issues (U.N. General Assembly Resolutions, FAO Guidelines, the International Plan of Action for the Conservation and Management of Sharks (IPOA-SHARKS),[77] and the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU)).[78] The Chapter concludes with a review of one non-binding program that focuses on protected areas namely, the Man and the Biosphere (MAB) Programme.[79] Chapter 7 focuses on binding and non-biding regional instruments. It discusses the Cartagena Convention and the SPAW Protocol,

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[74] *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) [UNCLOS].
[75] *Convention on Wetlands of International Importance*, 2 February 1971, 996 UNTS 245 (entered into force 21 December 1975) [Ramsar].
[76] *Convention Concerning the Protection of the World Cultural and Natural Heritage*, 23 November 1972, 1037 UNTS 151 (entered into force 15 December 1975) [WHC].
[77] FAO, *International Plan of Action for reducing incidental catch of seabirds in longline fisheries. International Plan of Action for the conservation and management of sharks. International Plan of Action for the management of fishing capacity* (Rome: FAO, 1999), online: FAO IPOA-Sharks document <www.fao.org/ipoa-sharks/tools/ipoa-sharks-documents/en/> [IPOA-SHARKS].
[78] "Memorandum of Understanding on the Conservation of Migratory Sharks" (2016), online: CMS Sharks MOU <www.cms.int/sharks/en/page/sharks-mou-text> ["Sharks MOU"].
[79] "Man and the Biosphere Programme," online: UNESCO MAB Ecological Sciences for Sustainable Development <www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/>.

reviews the regional fisheries organizations, including the Western Central Atlantic Fishery Commission (WECAF), and briefly describes the CLME project. Chapter 8 concludes the thesis with an assessment of the effectiveness of the frameworks currently in place to prevent extinction of sawfishes in the Caribbean. It also makes recommendations for the way forward in terms of sawfish conservation. These are (1) greater cooperation between the SPAW Protocol and WECAFC; (2) greater CBD involvement in endangered species protection in the Caribbean; (3) strategies to increase capacity and public awareness about sawfishes; and (4) strategies for sawfish habitat protection.

CHAPTER 2 – SAWFISH BIOLOGY AND THEIR HABITAT USE

Sawfishes may look like sharks with long snouts, but they are actually shark-like batoids,[80] more closely related to skates and rays than sharks.[81] They are members of the Chondrichthyes class of cartilaginous fishes comprised of almost one thousand species of sharks, rays, skates, and chimaeras.[82] Sawfishes also belong to the subclass, Elasmobranchii, that includes sharks, rays, and skates.[83] Knowing taxonomic classification is important because different legal instruments apply to different groups.

There are five species of sawfishes. Two of these, the smalltooth sawfish (*Pristis pectinata*) and largetooth sawfish (*Prisitis pristis*), have been historically present in the Caribbean.[84] These two species are distinguished by the position of the dorsal fin, the shape of the lower caudal fin, as well as the size of the rostrum, which is shorter and wider in a largetooth.[85] Initially, it was believed that largetooth sawfishes found in different geographical regions were distinct species - *Pristis microdon*, *Pristis perotteti*, and *Pristis prisitis*.[86] This was shown to be incorrect and the three species were combined into one species *Pristis pristis*.[87] Old species names can be still found in documents that predate the taxonomical study.

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[80] Vicente V Faria et al, "Species Delineation and Global Population Structure of Critically Endangered Sawfishes (Pristidae)" (2013) 167 Zoological J Linnean Society 136 [Faria, "Species Delineation"].
[81] Lesley Evans Ogden, "Half Shark, Half Chainsaw" (2015) 226:3021 New Scientist 40.
[82] Douglas Long, "Chondrichthian," online: Encyclopaedia Britannica <www.britannica.com/animal/chondrichthian>.
[83] *Ibid*.
[84] Rachel T Graham, "Caribbean and Central American Coastal Seas" in Harrison & Dulvy, *supra* note 2, 45.
[85] Vicente V Faria et al, "Taxonomy: How Many Sawfish Species Are There?" in Harrison & Dulvy, *supra* note 2, 22.
[86] Faria, "Species Delineation", *supra* note 80.
[87] *Ibid*.

Sawfishes can reach over seven meters in length and weigh up to one tonne.[88] They grow this big by feeding on small schooling fish, such as mullets and herring,[89] as well as occasional crustaceans and other benthic organisms.[90] The rostrum has a large number of electroreceptors on the top and bottom[91] which allow sawfish to detect prey in the water column, as well as on the substrate.[92] If prey is sensed in the water column, sawfish swipes at it, trying to cut or impale its victim.[93] If prey is discovered on the substrate, a sawfish uses its rostrum to pin it down and then engulf it. [94] The sensory mechanism in the saw allows sawfishes to hunt in low visibility environments,[95] which is often the case in some of its preferred habitat. If a sawfish loses its saw, its feeding behaviour changes. This was discovered by researchers who incidentally caught and tagged a sawfish that had a fresh wound from a removed rostrum.[96] The injured sawfish increased its foraging range, either trying to locate easy prey, escape from predators or competitors, or as a manifestation of physiological stress.[97] As the animal was no longer detected by the equipment for a period of 75 days, the researchers speculate that it perished from hunger.[98]

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[88] Colin A Simpfendorfer, "Predicting Population Recovery Rates for Endangered Western Atlantic Sawfishes Using Demographic Analysis" (2000) 58 Envtl Biology Fishes 371 [Simpfendorfer, "Predicting Recovery"].
[89] National Marine Fisheries Services, "Status Review of Smalltooth Sawfish (*Pristis pectinata*)" (December 2000), online: NOAA Fisheries <www.fisheries.noaa.gov/pr/pdfs/statusreviews/smalltoothsawfish.pdf> ["Status Review"].
[90] *Ibid*.
[91] B E Wueringer et al,"Sensory Systems in Sawfishes.1.The Ampullae of Lorenzini" (2011) 78 Brain Behavior & Evolution 139 [Wueringer, "Sensory System"].
[92] Barbara E Wueringer et al, "The Function of the Sawfish's Saw" (2012) 22:5 Current Biology R150 [Wueringer, "Saw Function"].
[93] *Ibid*.
[94] *Ibid*.
[95] Wueringer, "Sensory System", *supra* note 91.
[96] David L Morgan et al, "What Is the Fate of Amputee Sawfish?" (2016) 41:2 Fisheries 71.
[97] *Ibid*.
[98] *Ibid.*

Smalltooth sawfishes are believed to live for up thirty years.[99] Some researchers suggest that this number is the same for largetooth sawfish,[100] while others put the lifespan estimate closer to forty.[101] Both smalltooth and largetooth sawfishes are thought to mature at about nine[102] to ten[103] years. But these estimates, mostly based on the development pattern of other elasmobranchs, may not be accurate, at least, for the smalltooth sawfish.[104] In the first two years of their life, juvenile smalltooth exhibit rapid growth. They grow by as much as 65 to 85 cm in the first year, doubling in size, and another 48 to 68 cm in the second year.[105] This rapid growth suggests that smalltooth sawfish could reach maturity earlier than initially estimated.[106] A Largetooth sawfish has a litter of 1 to 13 pups, with an average of about 7, a gestation period of 5 months, and litters every other year.[107] A smalltooth sawfish is known to have a litter of 15 to 20 pups, but no other data is available.[108]

With respect to reproduction, sawfishes have incredible adaptation – they are capable of facultative parthenogenesis or asexual reproduction in an otherwise sexually reproducing species.[109] Researchers discovered the first ever case of facultative parthenogenesis in the wild while conducting a genetics study on a population of smalltooth sawfish in southwest Florida.[110] While facultative parthenogenesis may reduce viability of the offspring, it could

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[99] Ogden, *supra* note 81.
[100] William T White & Emma Sommerville, "Elasmobranchs of Tropical Marine Ecosystems" in Jeffrey C Carrier, John A Musick & Michael R Heithaus, eds, *Sharks and Their Relatives II: Biodiversity, Adaptive Physiology, and Conservation* (Boca Raton, FL: CRC Press, 2010) 159.
[101] Ogden, *supra* note 81.
[102] *Ibid*.
[103] White & Sommerville, *supra* note 100.
[104] C A Simpfendorfer et al, "Growth rates of juvenile smalltooth sawfish *Pristis pectinata* Latham in the western Atlantic" (2008) 72 J Fish Biology 711 [Simpfendorfer, "Growth Rates"]
[105] *Ibid*.
[106] *Ibid*
[107] Simpfendorfer, "Predicting Recovery", *supra* note 88.
[108] *Ibid*.
[109] Andrew T Fields et al, "Facultative Parthenogenesis in a Critically Endangered Wild Vertebrate" (2015) 25 Current Biology R446.
[110] *Ibid*.

benefit depleted populations where chances of meeting a mate are low.[111] In the study, the observed juveniles were about one-year old, suggesting that they are capable of surviving in the wild. Researchers suspect that these sawfishes will be capable of sexual reproduction once mature, based on observations of other species.[112]

Neonate smalltooth sawfish occupy shallow mud banks (less than 30 cm) in the proximity of mangroves[113] or estuarine areas for the first two years of their lives.[114] Their dorso-ventral flattened shape allows sawfishes to access these areas.[115] It is believed that their relatively small size at birth means high predation mortality at the early life stage.[116] Shallow water,[117] along with affinity for lower salinity than sharks, [118] offers young sawfish protection from predators in their environment.[119] Mangroves also appear to be an essential feature of sawfish nurseries as there are positive associations between juvenile sawfish and mangroves, as well as the size of sawfish and distance from mangroves.[120] Sawfishes have been observed resting among mangrove roots,[121] and to move to the mangroves when the tide comes in and increases water depth.[122] Little is known about the movement patterns and types of habitat used by older juveniles once they leave the shallow banks. [123] As adults, smalltooths live on the shelf, estuaries, and brackish rivers with depth varying between 0 and

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[111] *Ibid*.
[112] *Ibid*.
[113] Colin A Simpfendorfer, "The Importance of Mangroves as Nursery Habitat for Smalltooth Sawfish (*Pristis pectinata*) in South Florida" (2007) 80:3 Bull Marine Science 933 [Simpfendorfer, "Mangroves"].
[114] Colin A Simpfendorfer et al, "Environmental Influences on the Spatial Ecology of Juvenile Smalltooth Sawfish (*Pristis pectinata*): Results from Acoustic Monitoring" (February 2011) 6:2 PLoS ONE 1 [Simpfendorfer, "Environmental Influences"].
[115] Colin A Simpfendorfer, Tonya R Wiley & Beau G Yeiser, "Improving Conservation Planning for an Endangered Sawfish Using Data from Acoustic Telemetry" (2010) 143 Biological Conservation 1460.
[116] Simpfendorfer, "Growth Rates", *supra* note 104.
[117] Simpfendorfer, "Mangroves", *supra* note 113.
[118] Simpfendorfer, "Environmental Influences", *supra* note 114.
[119] Simpfendorfer, "Mangroves", *supra* note 113.
[120] *Ibid*.
[121] Simpfendorfer, Wiley & Yeiser, *supra* note 115.
[122] Simpfendorfer, "Mangroves", *supra* note 113.
[123] Simpfendorfer, Wiley & Yeiser, *supra* note 115.

100 meters.[124] It has been suggested that they are rarely found at depths greater than 10 meters.[125] Largetooths live mostly in the riverine and estuarine areas, but can also be encountered on insular shelf.[126]

Little is known about sawfish geographic population structuring and boundaries at the global level. [127] As "large, mobile, and marine"[128], it is likely that adult sawfishes could disperse over great distances,[129] following the coastlines and avoiding cold water bands.[130] But data is lacking on the extent of this dispersion.[131] Historic capture records show smalltooth presence, with seasonal variations,[132] from Texas to New York as late as the first half of the 20th century.[133] It is likely that the fish migrated north along the Eastern Seaboard from a core population in Florida.[134] Largetooth sawfishes also showed ability to travel long distances. Seasonal migrants from core populations in Central America were encountered in Texas, Louisiana, and Florida until the 1960s.[135]

Genetic studies of largetooth sawfish in Australia suggest that females show high site fidelity to their natal nurseries.[136] Philopatry, or the tendency to return or stay in an area, is an evolutionary adaptation that helps females select successful nurseries.[137] Evidence of philopatry has significant conservation implications because if a female population at a site is

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[124] White & Sommerville, *supra* note 100.
[125] "Status Review," *supra* note 89.
[126] White & Sommerville, *supra* note 100.
[127] Faria, "Species Delineation," *supra* note 80.
[128] Nicole M Phillips *et al*, "Population Genetic Structure and Genetic Diversity of Three Critically Endangered *Pristis* sawfishes in Australian Waters" (2011) 158 Marine Biology 903 at 904.
[129] Phillips, *supra* note 128.
[130] Faria, "Species Delineation," *supra* note 80.
[131] Phillips, *supra* note 128.
[132] Joana Fernandez-Carvalho et al, "Status and the potential for extinction of the Largetooth Sawfish *Pristis pristis* in the Atlantic Ocean" (2013) 24:4 Aquatic Conservation: Marine & Freshwater Ecosystems 478.
[133] "Status Review", *supra* note 89.
[134] *Ibid*.
[135] Fernandez-Carvalho, *supra* note 132.
[136] Phillips, *supra* note 128.
[137] R E Hueter et al, "Evidence of Philopatry in Sharks and Implications for the Management of Shark Fisheries" (2004) 35 J Northwest Atlantic Fishery Science 239.

depleted, there is no outside recruitment to help recovery.[138] Similarly, there are implications for a population if a nursery area is destroyed. It is unknown if sawfishes have sufficient behavioural flexibility to adapt to this change in the environment, and there may be interspecies differences in the strength of this behaviour.[139]

Sawfishes are long-lived, late-maturing species that produce relatively few offspring. This makes them vulnerable to anthropogenic sources of mortality.[140] Plus, they occupy shallow coastal habitats that are subject to development pressures and overexploitation.[141] The next chapter discusses in detail, threats faced by sawfishes.

[138] Phillips, *supra* note 128.
[139] *Ibid*.
[140] Nicholas K Dulvy et al, "Extinction Risk and Conservation of the World's Sharks and Rays" (2014) 3 eLife e00590.
[141] *Ibid*.

CHAPTER 3 – THREATS TO SAWFISH SURVIVAL

A number of factors have contributed to the observed decline in sawfish populations. One of these, direct commercial fishery, no longer exists. But issues around by-catch, trade in body parts, and loss of habitat are still present. This chapter shows how sawfishes' biological features and habitat needs make them especially vulnerable to these threats.

Direct fishery and by-catch

The remaining populations of sawfish are not large enough to sustain a direct fishery.[142] But this was not always the case. Sawfish fishery in Lake Nicaragua is the best known example of commercial exploitation of the species in the Western Hemisphere. Target fisheries also existed in Belize and Mexico,[143] with some sport fishing for sawfish in the U.S.[144] Largetooth sawfishes were present in large numbers in Lake Nicaragua from before the time Columbus and the Spanish conquistadors came to the Americas.[145] The origin of these marine fishes in the Lake was always a mystery.[146] The mystery was resolved in the 1960s by tagging studies showing that largetooth sawfish migrated up the San Juan River from the Caribbean Sea to Lake Nicaragua.[147] Sawfishes were likely caught for sustenance needs throughout their history in the Lake. But the scale of exploitation increased in 1970

[142] *CITES Proposal*, *supra* note 43.
[143] Colin A Simpfendorfer, "Fisheries" in Harrison & Dulvy, *supra* note 2, 70 [Simpfendorfer, "Fisheries"].
[144] Center for Marine Conservation, "Petition to list North American populations of sawfish (*Pristis pectinata* and *Pristis perotteti*) as Endangered Pursuant to the Endangered Species Act of 1973, 16 U.S.C. §1533" (30 November 1999), online: NOAA Fisheries <www.fisheries.noaa.gov/pr/pdfs/species/sawfish_petition_to_list.pdf>.
[145] Thorson, *supra* note 3.
[146] *Ibid*.
[147] *Ibid*.

when the government subsidized the construction of a fish processing plant.[148] The plant created local jobs and supplied the local market.[149] Soon thereafter, a second plant was built, this time with intention of supplying the international market with sawfish filets, fins, and skin. [150] Fishing boats went out daily to set nets and, between 1970 and 1975, a conservative estimate of a total of 60,000 fish or 1,000 per month.[151] With no stock management measures in place, the industry collapsed in the 1980s.[152] In response, the Nicaraguan government imposed a moratorium on sawfish fishing in Lake Nicaragua, hoping it would be sufficient to replenish the stock.[153] But the ban was limited to direct fishery and did not address the issue of sawfish being caught as by-catch.[154] As a result, it was ineffective and the largetooth population in the Lake remains severely depleted.[155]

Historically, sawfishes were targeted not only for consumption but also for aquarium trade.[156] Sawfishes have been a popular aquarium exhibit for over 50 years[157] due to their unusual look and durability in captivity.[158] Between 1998 and 2000, NMFS and the State of Florida noted an increase in the number of received permit requests from aquaria collectors,[159] though prices for a largetooth sawfish were as high as US $5,400 per meter.[160]

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[148] *Ibid*.
[149] *Ibid*.
[150] *Ibid*.
[151] *Ibid*.
[152] Matthew T McDavitt, "Lake Nicaragua Revisited: Conversations with a Former Sawfish Fisherman" (2002) 14 Shark News 5 [McDavitt, "Lake Nicaragua"].
[153] *Ibid*.
[154] *Ibid*.
[155] *Ibid*.
[156] Matthew T McDavitt, "Sawfish Products and Trade" in Harrison & Dulvy, *supra* note 2, 72 [McDavitt, "Products and Trade"].
[157] "Status Review", *supra* note 89.
[158] McDavitt, "Products and Trade", *supra* note 156.
[159] "Status Review," *supra* note 89.
[160] McDavitt, "Products and Trade", *supra* note 156.

This threat has been significantly diminished since the listing of all sawfishes under CITES,[161] discussed in more detail in Chapter 5.

But the number one threat to the survival of sawfishes over the last 50 years has been incidental capture in fishing nets.[162] Gillnets, driftnets, trammel nets, and trawl nets all pose a problem for the species[163] with a toothy rostrum that gets easily entangled.[164] The proliferation of cheap monofilament nets, along with increased use of outboard motors in coastal fisheries, are blamed for the disappearance of sawfishes, especially in developing countries.[165] The fact that sawfish habitat often overlaps with areas of high density fishing pressure further exacerbates the problem.[166]

Shrimp trawling is one of the reasons for the disappearance of sawfishes along the coast of Texas, Louisiana, and Florida. [167] But sawfishes are not the only species affected by this fishing method, leading the industry to promote the use of turtle excluder devices (TEDs) and by-catch reduction devices (BRDs) as a way to stay sustainable.[168] However, what works for sea turtles does not necessarily work for sawfishes.[169] A study that looked at the effectiveness of TEDs and BRDs to reduce by-catch of a variety of different species found that while the use of TEDs and BRDs practically eliminated sea turtle capture, they did not change the number of sawfish caught.[170] It was found that almost 20 per cent of sawfish that

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[161] *Ibid*.
[162] Simpfendorfer, "Fisheries", *supra* note 143.
[163] *Ibid*.
[164] Simpfendorfer, "Predicting Recovery", *supra* note 88.
[165] Simpfendorfer, "Fisheries", *supra* note 143.
[166] *Ibid*.
[167] Fernandez-Carvalho, *supra* note 132.
[168] Steve Eayrs, "A Guide to By-catch Reduction in Tropical Shrimp-Trawl Fisheries" (2007) online: FAO <www.fao.org/docrep/015/a1008e/a1008e.pdf>.
[169] David Brewer et al, "The Impact of Turtle Excluder Devices and By-catch Reduction Devices on Diverse Tropical Marine Communities in Australia's Northern Prawn Trawl Fishery" (2006) 81 Fisheries Research 176.
[170] *Ibid*.

were caught in the trawl net got entangled before they reached the escape opening. [171] Additional measures, such as lining the forward portion of the net with a material such as canvas or tough plastic are needed to make TEDs and BRDs effective for sawfish. [172]

An entangled sawfish usually causes substantial damage to fishing gear, making it more likely that the fish will be kept to pay for the repairs. [173] As discussed in the next section, inadequate monitoring and enforcement and the high prices paid for sawfish products support this practice. [174] But even when there are good intentions to release the animal, untangling a large fish with sharp rostrum teeth can be dangerous.[175] The U.S. Sawfish Handling and Release Guidelines warn: "Use extreme caution when handling and releasing sawfish as the saw can thrash violently from side to side."[176] For this reason, some experienced sawfish fishermen believe that the animal has to be killed before it can be handled.[177] Nevertheless, it has been shown that both smalltooth and largetooth sawfishes are resilient and survive capture if released correctly.[178] Both Australia and the U.S. have developed sawfish release guides for commercial and recreational fishers who accidentally catch the animal.[179]

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[171] *Ibid*.
[172] *Ibid*.
[173] Matthew T McDavitt & Patricial Charvet-Almeida, "Quantifying Trade in Sawfish Rostra: Two Examples" (October 2004) 16 Shark News 10.
[174] Simpfendorfer, "Fisheries", *supra* note 143.
[175] Ogden, *supra* note 81.
[176] NOAA Fisheries, "Sawfish Handling & Release Guidelines," online: NOAA Fisheries <sero.nmfs.noaa.gov/protected_resources/outreach_and_education/documents/sawfish_handling_and_release_placard_2014.pdf>.
[177] McDavitt, "Lake Nicaragua", *supra* note 152.
[178] Simpfendorfer, "Fisheries", *supra* note 143.
[179] Department of Primary Industries and Fisheries, "A Guide to Releasing Sawfish: Gulf of Carpentaria Inshore and Offshore Set Net Fishery" (2010), online: Marine Education Society of Australia <www.mesa.edu.au/seaweek2008/Sawfish_release_guide.pdf>.

International and National Trade in Body Parts

Trade in sawfishes and their body parts is poorly documented[180] but very lucrative. Sawfish fins are preferred for shark fin soup; rostra are in demand as curios; and remaining parts are used in traditional medicine. It is said that in Kenya, a fisherman can retire after catching one fish with rostrum selling for up to US $1,450 and fins $3,896.[181] In northern Brazil, fins and large rostra are pre-ordered from fishermen prior to departure, destined most likely for export.[182] Rostra that are damaged or too small are cut into pieces of one to two centimetres and sold for about one dollar.[183] The pieces are then ground into a powder and made into a tea considered locally to be an effective asthma medicine.[184] Meat, especially juvenile meat, is also valued by local Brazilian buyers.[185] With the number of sawfish declining, there is concern that prices for sawfish products will increase,[186] posing a hurdle to conservation efforts.

International demand for sawfish fins is not new. The quality of fin rays is an important factor in the trade.[187] Unfortunately for sawfishes, they have long, thick cartilage needles[188] that are prized by the shark fin soup enthusiasts.[189] Records show a Chinese company catching and exporting sawfish from Lake Maracaibo, Venezuela, at the beginning

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[180] McDavitt, "Products and Trade", *supra* note 156.
[181] *Ibid*.
[182] Patricia Charvet-Almeida, "Sawfish Trade in the North of Brazil" (March 2002) 14 Shark News 9.
[183] McDavitt & Charvet-Almeida, *supra* note 173.
[184] *Ibid*.
[185] Charvet-Almeida, *supra* note 182.
[186] Ruth H Leeney, "Sawfish Research in Mexico, Central and South America" (11 November 2015), online: Sawfish Conservation Society <sawfishconservationsociety.blogspot.ca/2015/11/sawfish-research-in-mexico-central-and.html> and Rômulo Romeu Nóbrega Alves & Ierecê L Rosa, "Trade of Animals Used in Brazilian Traditional Medicine: Trends and Implications for Conservation" (2010) 38:5 Human Ecology 691.
[187] Shelley C Clarke et al, "Identification of Shark Species Composition and Proportion in the Hong Kong Shark Fin Market Based on Molecular Genetics and Trade Records" (2006) 20:1 Conservation Biology 201.
[188] Raloff, *supra* note 5.
[189] McDavitt, "Products and Trade", *supra* note 156.

of the 20th century.[190] Sawfishes were caught for fins during the 1920s in the Florida Keys,[191] already the preferred choice that commanded the highest price of all shark fins. [192] Today, given the low population numbers, trade in sawfish fins is opportunistic.[193] Shark fin dealers in Madagascar, Indonesia, Australia, and China occasionally advertise this product on their websites.[194] But traders may also take steps to mislabel or camouflage fins from rare and endangered species making it difficult to detect and document.[195]

Sawfish rostra of different sizes and quality can be found in international and domestic trade. Rostra are sold as curios, used to make cockfighting spurs, or ground into medicinal powder. The latest available data on the extent of rostra trade in the Caribbean Region is more than ten years old. A study published in 2004 reported juvenile and neonate sawfish rostra being sold for US $3-8 each, with 1,000-1,500 small and medium size (up to 100 cm) rostra sold annually at one of the main markets in northern Brazil.[196] It is estimated that approximately 90-180 large (120-180 cm) rostra are sold annually at the same market for US $150-500 each.[197]

Another study, also conducted in 2004, analysed rostra trade on eBay.[198] In a six-month period, 122 sawfish rostra were offered for sale, mostly by non-professional dealers. The average price was US $119 and the maximum price was US $1,242. The study estimated the annual eBay sales of rostra to amount to US $25,084. The majority of the items lacked capture data, but from the sellers' reports, appeared to be old specimens captured decades

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[190] *Ibid*.
[191] *Ibid*.
[192] William E Young & Horace S Mazet, *Shark! Shark! The Thirty-Year Odyssey of a Pioneer Shark Hunter* (New York, NY: Gotham House, 1934).
[193] *Shark Issues*, CoP14 Inf 45 (2007), online: <cites.org/common/cop/14/inf/E14i-45.pdf> [*Shark Issues*].
[194] McDavitt, "Products and Trade", *supra* note 156.
[195] Clarke, *supra* note 187.
[196] McDavitt & Charvet-Almeida, *supra* note 173.
[197] *Ibid*.
[198] *Ibid*.

earlier. The United States was the largest market for rostra trade, with two-thirds of the transactions made domestically. The authors caution that this is likely to be a function of eBay's popularity in the U.S. and does not provide an accurate representation of supply and demand. In 2006, eBay banned the sale of smalltooth sawfish rostra because of the species' endangered status under the ESA[199] and agreed to work with conservation groups to monitor and enforce compliance.[200] However, in 2012, smalltooth rostra were sill available for sale on eBay, calling the effectiveness of the ban into question.[201]

Sawfish rostrum teeth are the preferred material for cockfighting spurs in Peru[202] where cockfighting is a deep-rooted cultural tradition.[203] Rostra teeth are favoured because they are more durable and porous than other natural material, causing more bodily harm to opponents.[204] Half of one tooth can be made into a pair of spurs with teeth split longitudinally into four parts.[205] A finished pair of spurs can sell for US $80-220 amounting to US $1,120-13,200 per rostrum.[206] There is no data on the volume of this trade,[207] or its origins. Sawfish conservation groups are working with cockfighting associations to implement bans on using sawfish spurs.[208]

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[199] "EBay Bans Sale of Endangered Sawfish" (24 January 2006), online: NBC News <www.nbcnews.com/id/11007937/ns/us_news-environment/t/ebay-bans-sale-endangered-sawfish >.
[200] *Ibid*.
[201] Matthew T McDavitt, "Sales of Sawfish Rostra on eBay" in Harrison & Dulvy, *supra* note 2, 74.
[202] McDavitt, "Products and Trade" *supra* note 156.
[203] Alex Pashley, "In Peru, Cockfighting is More Than Just a Sport" (2 October 2014), online: Latin Correspondent <http://latincorrespondent.com/2014/10/great-economic-equalizer-peru-cockfighting/>.
[204] McDavitt, "Products and Trade" *supra* note 156.
[205] McDavitt & Charvet-Almeida, *supra* note 173.
[206] McDavitt, "Products and Trade" *supra* note 156.
[207] *Ibid*.
[208] Leeney, *supra* note 186.

Habitat Loss

Habitat destruction is another major contributing factor to the decline of sawfishes worldwide.[209] As discussed in the previous Chapter, sawfishes are a coastal fish, relying extensively on the nearshore and estuarine environment, especially in their early years. These preferred habitats are subject to negative impacts from coastal developments [210] such as dredging, construction, deforestation, and pollution.[211]

Two large scale developments in critical sawfish habitats pose a threat to the survival of the remaining sawfish populations in the Caribbean. North Sound, Bimini, in the Bahamas, is a shallow lagoon, home to one of the remaining populations of smalltooth sawfish in the Caribbean, along with other species at risk.[212] Since 1997, the lagoon has been subject to development that includes removal of surrounding mangroves for construction of private homes, condominiums, a marina, as well as an artificial island.[213] By August 2010, approximately 39 per cent of mangrove habitat around the lagoon was destroyed.[214] A marine protected area (MPA) in North Bimini was proposed in 2000 and became official in 2009.[215] However, no further action has been taken to institute protection measures and, as a result, development continues to encroach onto the MPA.[216] Due to "foreign development and corruption within the permitting process, inadequate [community] participation, shift in

[209] Simpfendorfer, "Environmental Influences", *supra* note 114.
[210] Danielle M Knip, Michelle R Heupel & Colin A Simpfendorfer, "Sharks in Nearshore Environments: Models, Importance, and Consequences" (2010) 402 Marine Ecology Progress Series 1.
[211] *Ibid*.
[212] David E. Jennings et al, "Assessment of the Aquatic Biodiversity of a Threatened Coastal Lagoon at Bimini, Bahamas" (2012) 16 J Coastal Conservation 405.
[213] *Ibid*.
[214] *Ibid*.
[215] Sarah P Wise, "Learning Through Experience: Non-Implementation and the Challenges of Protected Area Conservation in The Bahamas" (2014) 46 Marine Pol'y 111.
[216] *Ibid.*

political agenda, and weak institutional framework,"[217] the implementation of the MPA has been described as "indefinitely stalled."[218]

Another example of a development that can jeopardize the remaining sawfishes in the Caribbean is the proposed construction of a canal along the San Juan River and Lake Nicaragua.[219] This US $50 billion dollar project[220] connecting the Atlantic and Pacific oceans broke ground in December 2014.[221] Building the 286-kilometer canal will result in the removal of approximately 400,000 hectares of rainforest and wetlands.[222] Making the canal accessible to the largest ships in the world will require dredging millions of tonnes of sludge.[223] This scale of dredging will change the chemical composition, turbidity, and oxygen level in the San Juan River and Lake Nicaragua, impacting a variety of species, including sawfishes.[224] Environmental and Social Impact Assessment of the project commissioned by the development group was completed in May 2015 but has not been made available to the public.[225] A group of scientists who were invited to review the Assessment raised serious concerns about the adequacy of the study, accuracy of the data, and the defensibility of the conclusions.[226] The project appears to be on hold for the time being, but there is no indication that it is being terminated.[227]

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[217] *Ibid* at 113.
[218] Wise, *supra* note 215 at 114.
[219] Axel Meyer & Jorge A Huete-Pérez, "Nicaragua Canal Could Wreak Environmental Ruin" (2014) 506 Nature 287.
[220] David Z Morris, "Why China and Nicaragua's Canal Project is Floundering" *Fortune* (29 February 2016), online: <fortune.com/2016/02/29/china-nicaragua-canal/>.
[221] Suzanne Daley, "Lost in Nicaragua, a Chinese Tycoon's Canal Project" *The New York Times* (3 April 2016), online: <www.nytimes.com/2016/04/04/world/americas/nicaragua-canal-chinese-tycoon.html>.
[222] Meyer & Huete-Pérez, *supra* note 219.
[223] *Ibid*.
[224] *Ibid.*
[225] Keith Schneider, "Nicaragua Canal Environmental Assessment Criticized as Scientifically Weak, Technically Inadequate" (5 June 2015), online: Circle of Blue <www.circleofblue.org/2015/world/nicaragua-canal-environmental-assessment-criticized-as-scientifically-weak-technically-inadequate/>.
[226] *Ibid.*
[227] Morris *supra* note 220.

Looking beyond specific development projects, concerns arise over security of sawfish habitat in the long-term. The importance of mangroves to young sawfishes was already explained in Chapter 2. This ecosystem has been significantly impacted by human activities and faces an uncertain future in light of climate change and sea level rise.[228] A study published in 2002 estimated that approximately one-third of mangroves were lost over the previous 50 years with substantial variations among different countries.[229] Looking at examples from the Priority States, Mexico experienced a decrease in the mangrove cover, Belize showed no substantial change, while Cuba showed a gain due to reforestation projects.[230] Deforestation, aquaculture, mining, housing, industrial encroachment, and overexploitation were identified as the main threats to mangroves – threats that are not likely to subside given the current human population growth.[231] Specifically, in the Caribbean, there is a risk of damage to mangroves due to increase in aquaculture activities. Aquaculture is not fully developed in Latin America and the Caribbean yet.[232] However, its development has been identified as a priority by the Caribbean Regional Fisheries Mechanism (CRFM),[233] an organization discussed in Chapter 7.

With respect to sea level rise, mangroves are believed to be one of the most vulnerable ecosystems.[234] A study that looked at growth responses to sea level rise expected in the Caribbean found that plants exposed to higher water levels than currently experienced demonstrated initial rapid growth that "slowed dramatically once [the plants] reached the

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[228] Daniel M Alongi, "Present State and Future of the World's Mangrove Forests" (2002) 29:3 Envtl Conservation 331.
[229] *Ibid*.
[230] *Ibid*.
[231] *Ibid*.
[232] "New Study Helps Promote and Build Aquaculture in the Caribbean" (31 July 2014), online: The Fish Site < www.thefishsite.com/fishnews/23757/new-study-helps-promote-and-build-aquaculture-in-the-caribbean/>.
[233] *Ibid*.
[234] Aaron M Ellison & Elizabeth J Farnsworth, "Simulated Sea Level Change Alter Anatomy, Physiology, Growth, and Reproduction of Red Mangrove (*Rhizophora mangle* L.)" (1997) 112 Oecologia 435.

sampling stage."[235] The end result was an overall reduced growth rate. Mangroves can adapt to sea level rise by migrating landward. [236] It is thus important to have measures in place to preserve space for this response.

Construction of dams for hydropower generation or water management is another human activity that negatively impacts on sawfish habitat. In developing countries, hydroelectric power is seen as a source of renewable energy that plays an important role in providing electricity for economic development.[237] It is not developed to its full capacity in the Caribbean and Latin America.[238] For example, less than 10 per cent of this potential has been developed in Colombia, while the global average is approximately 15 per cent.[239] Depending on the location, hydroelectric dams can cause severe disruption in downriver habitats by flooding areas, altering water flow,[240] decreasing nutrient concentrations in the water, and changing sediment composition.[241] These changes can affect sawfishes at different life stages. Neonate and juvenile sawfishes that utilize river and estuarine habitats have been shown to have affinity for a particular salinity range.[242] In a tagging study conducted in Florida, juvenile sawfishes were observed moving up the river during drier months and down the river during wetter months. The neonate sawfishes, on the other hand, did not move in response to changes in salinity. The authors attribute this behaviour to the high risk of predation during this early life stage. Neonate sawfishes are willing to incur the higher cost

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[235] *Ibid* at 435.
[236] Ellison & Farnsworth, *supra* note 234.
[237] George Ledec & Juan David Quintero, "Good Dams and Bad Dams: Environmental Criteria for Site Selection of Hydroelectric Projects" (November 2003), online: The World Bank, Latin America and the Caribbean Region <siteresources.worldbank.org/LACEXT/Resources/258553-1123250606139/Good_and_Bad_Dams_WP16.pdf>.
[238] *Ibid*.
[239] *Ibid*.
[240] *Ibid*.
[241] F Y Al-Yamani et al, "The Effects of the River Diversion, Mesopotamian Marsh Drainage and Restoration, and River Damming on the Marine Environment of the Northwestern Arabian Gulf" (2007) 10:3 Aquatic Ecosystem Health & Mgmt 277.
[242] Simpfendorfer, "Environmental Influences", *supra* note 114.

of osmoregulation in response to salinity changes in order to minimize the risk of being eaten. But this behaviour also makes neonate sawfishes susceptible to osmotic stress in situations where water management plans do not correspond to natural freshwater flow fluctuations.[243] While the exact movement of sawfishes after they leave their nurseries in unknown,[244] they are likely to spend time in the coastal zone. This environment could also be impacted by dam construction, as it has been shown that modifying river basins results in changes to the coastal environment.[245]

The previous two chapters have explained how sawfishes' unique biology and habitat preference put them at risk of extinction. This next short chapter explains how extinction risk is assessed and what it means for the sawfishes.

[243] *Ibid*.
[244] Simpfendorfer, Wiley & Yeiser, *supra* note 115.
[245] F Y Al-Yamani *supra* note 241.

CHAPTER 4 – SAWFISH CONSERVATION STATUS AND PROJECTIONS

Sawfishes were first assessed as endangered by the IUCN in 1996.[246] This assessment was later revised and today, both largetooth and smalltooth sawfishes are classified as critically endangered, according to the Red List Categories and Criteria.[247] Only 2.4 per cent of chondrichthyans are found in the same category.[248]According to the Red List, an assessment of Critically Endangered means that the species is facing "an extremely high risk of extinction in the wild." [249] In order to arrive at this conclusion, "the best available evidence"[250] has to support one of the following findings: (A) reduction in population size based on one or more of the described parameters; (B) Geographic range that matches one of the descriptions; (C) Population size of less than 250 mature individuals showing continued decline that fits one of the descriptions; (D) Population size of less than 50 mature individuals; or (E) There is at least 50% probability of extinction in the wild within 10 years or three generations.[251]

For the smalltooth sawfish, the assessors used "negative records from scientific surveys, anecdotal fisher observations, and fish landing data"[252] to infer that the species experienced a population decline greater than 95% over the span of three generations.[253] The remaining populations are small, fragmented and face threats such as coastal fisheries and

[246] Faria, "Species Delineation", *supra* note 80.
[247] Carlson, Wiley & Smith, *supra* note 60 and P M Kyne, J Carlson & K Smith, "*Pristis pristis*. The IUCN Red List of Threatened Species" (2013), online: Red List <www.iucnredlist.org/details/18584848/0>.
[248] Dulvy, *supra* note 140.
[249] "Red List", *supra* note 10 at 14.
[250] "Red List", *supra* note 10 at 16.
[251] "Red List", *supra* note 10.
[252] Carlson, Wiley & Smith, *supra* note 60 at 1.
[253] Carlson, Wiley & Smith, *supra* note 60.

habitat degradation.[254] For the largetooth sawfish, the assessors looked at the area occupied by the species to infer that it declined by at least 80% over a period of three generations, while threats remain unabated.[255] Based on these conclusions, the assessors arrived at the Critically Endangered status.

The Red List criteria are not perfect. They do not take into account factors such as costs, logistics, and chances of success.[256] Concerns have also been raised about the accuracy of the assessment criteria since the same criteria are applied to species with different life histories and threats, by experts who may interpret them differently.[257] The publication acknowledges that in some cases, the risk of extinction may be over- or under- estimated.[258] Nevertheless, the Red List is a convenient and widely used document in conservation planning and management at national and international levels.[259]

Low population numbers is not the only concern when it comes to species recovery. When populations reach critically low levels, genetic diversity becomes an issue. Interbreeding and drift decrease genetic diversity,[260] making organisms less capable of adapting to changes in their environments.[261] With global populations at low levels, gene flow among populations is unlikely, making it difficult to recover from genetic problems.[262] But there is good news for the smalltooth sawfish. When researchers conducted a study on a population of smalltooth sawfishes in Florida, they found genetic diversity that is compatible

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[254] *Ibid*.
[255] Kyne, Carlson & Smith, *supra* note 247.
[256] "Red List", *supra* note 10.
[257] Nicholas Mrosovsky, *Predicting Extinction: Fundamental Flaws in IUCN's Red List System, Exemplified by the Case of Sea Turtles* (Toronto: Mrosovsky, Nicholas, 2003).
[258] "Red List", *supra* note 10.
[259] Ana S L Rodrigues et al, "The Value of the IUCN Red List for Conservation" (2006) 21:2 TRENDS in Ecology & Evolution 71.
[260] Demian D Chapman et al, "Genetic Diversity Despite Population Collapse in a Critically Endangered Marine Fish: The Smalltooth Sawfish (*Pristis pectinata*)" (2011) 102:6 J Heredity 643.
[261] "Bottlenecks and Founder Effects," online: Understanding Evolution <evolution.berkeley.edu/evolibrary/article/side_0_0/bottlenecks_01v>.
[262] Chapman, *supra* note 260.

to less depleted elasmobranch populations.[263] According to the researchers, this diversity is likely to be maintained in the population for the next 100 to 200 years if sawfish numbers remain the same or grow.[264] Sadly, the genetic good news does not spread across all populations of sawfishes. When another study looked at genetic diversity of largetooth sawfish in northern Australia, it found moderate to low genetic diversity remaining.[265]

Based on the intrinsic rate of population increase, scientists estimate that it will take from "several decades"[266] to 100 years or 4 generations[267] for the Atlantic smalltooth sawfish to recover, if all sources of external mortality are eliminated. Largetooth sawfish are expected to take longer given their lower intrinsic rate.[268] Elements of uncertainty, such as extent of population fragmentation[269] and age at maturity,[270] will either increase or decrease the estimates.

Even if predicting extinction risk is not an exact task, it is difficult to argue that sawfishes are not in trouble. There is a consensus among researchers that sawfish numbers have decreased substantially over the last half century. It is also evident that the threats facing the species are caused by humans and need to be regulated in order to decrease pressure on the remaining populations.

In light of the generally grim forecast for sawfish populations, the next three chapters reviews global and regional legal instruments that can be relied upon to support conservation measures.

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[263] *Ibid*.
[264] *Ibid*.
[265] Phillips, *supra* note 128.
[266] Simpfendorfer "Growth Rates", *supra* note 104 at 712.
[267] "Recovery Plan", *supra* note 26.
[268] Simpfendorfer, "Predicting Recovery", *supra* note 88.
[269] *Ibid*.
[270] White & Sommerville, *supra* note 100.

CHAPTER 5 – REGULATING SAWFISH EXPLOITATION AND CONSERVATION: THE GLOBAL LEGAL REGIME

The conventions analyzed in this chapter are divided into three categories: those imposing general obligations, those that mandate species-specific obligations, and those that impose obligations related to habitat protection. They are discussed in three sections, one category after the other.

General Obligations Conventions

UNCLOS and CBD set out general obligations to conserve biodiversity and protect the marine environment. UNCLOS assigns jurisdiction over these obligations in the marine environment, and CBD specifically instructs its parties to follow UNCLOS.[271] Neither UNCLOS nor CBD addresses the issue of sawfish conservation directly, but they lay the foundation upon which specific measures can be implemented. The fact that these conventions are nearly universally accepted[272] makes them more persuasive.

U.N. Convention on the Law of the Sea

When UNCLOS came into effect in 1994,[273] it outlined the main rules governing the use of the oceans and imposed an obligation on all states to protect and preserve the marine environment.[274] This obligation tempers the states' sovereign right to exploit their natural resources; they have to do it "in accordance with their duty to protect and preserve the marine

[271] CBD art 22(2).
[272] The U.S. is the only country on the Priority List that is not a party to both of these instruments. Venezuela is not a party to UNCLOS, while Colombia has signed but not ratified this Convention.
[273] "The United Nations Convention on the Law of the Sea (A Historical Perspective)" (1998), online: Oceans and Law of the Sea United Nations <www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm>.
[274] UNCLOS art 192.

environment."[275] One element of this duty is pollution control. UNCLOS contains several provisions that direct the parties to adopt measures to prevent, reduce, and control pollution of the marine environment.[276] Another element of this duty is conservation of the living resources within the exclusive economic zones (EEZs)[277] and the high seas.[278] Since sawfishes are a coastal species, the discussion will focus on the EEZs.

UNCLOS granted costal states jurisdiction to exploit natural resources within their EEZ,[279] which extends 200 miles offshore.[280] But as already mentioned, this comes with an obligation to conserve these resources, including an obligation to avoid seriously threatening populations of "species associated with or dependent upon harvested species."[281] This is significant because research has shown that the majority of threatened chondrichthyan species, which includes sawfishes, live in relatively shallow waters of 200 meters or less; and interaction with fishing gear is believed to be their main threat.[282] Under UNCLOS, coastal states have the authority and the obligation to address fisheries threats to these species. However, UNCLOS conservation measures have been criticized for their ambiguous language, lack of state accountability, and exclusion of fisheries management issues within EEZ from the Convention's dispute settlement mechanism.[283] The high prevalence of threatened chondrichthyans in coastal waters highlights the ineffectiveness of the measures

[275] UNCLOS at art 193.
[276] UNCLOS arts 194-196 and 207-212.
[277] UNCLSO art 61.
[278] UNCLOS art 119.
[279] UNCLOS art 56(1)(a).
[280] UNCLOS art 57.
[281] UNCLOS at art 61(4).
[282] Dulvy, *supra* note 140.
[283] Richard Barnes, "The Convention on the Law of the Sea: An Effective Framework for Domestic Fisheries Conservation?" in David Freestone, Richard Barnes & David M Ong eds, *The Law of the Sea: Progress and Prospects* (New York, NY: Oxford University Press, 2006) 233 and UNCLOS art 297(3)(a).

that are currently in place and supports the need for stronger conservation obligations on coastal states.

Just because there is a large number of threatened chondrichthyans in coastal waters does not mean that these species do not cross national boundaries. In fact, researchers found that the proportion of threatened chondrichthyans increases with the number of EEZs covered by the species.[284] A quarter of threatened chondrichthyans swim across at least 18 EEZs.[285] Articles 63 and 64 of UNCLOS address these situations. Article 63(1) directs the states that share fishing stocks to coordinate conservation and development of such stock either directly or through regional bodies. Article 64 is not relevant to this discussion because it deals with highly migratory species listed in Annex I, which does not include sawfishes. While the majority of countries on the Priority List share a boundary with at least two more countries on the List, it is unknown whether they also share sawfish populations. Historically, sawfishes were observed migrating long distances, but not a lot is known about this behaviour because the remaining populations are too fragmented. Nevertheless, the obligation to coordinate conservation measures under article 63 is relevant to the discussion of regional fisheries bodies and this is done in Chapter 7.

Although sawfishes are not likely to meet the criteria of a straddling stock,[286] the Agreement for the Implementation of the Provisions of the U. N. Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA)[287] warrants a brief discussion.

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[284] Dulvy, *supra* note 140.
[285] *Ibid*.
[286] According to article 63(2) of UNCLOS, it is a stock that occurs both within an EEZ and in the area of the high seas adjacent to this zone.
[287] *Agreement for the Implementation of the Provisions of the U. N. Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, 4 August 1995, 2167 UNTS 88 (entered into force 11 December 2001) [UNFSA].

UNFSA supplements UNCLOS and endorses the precautionary and ecosystem approaches to fisheries management.[288] The significance of the ecosystem approach to sawfish conservation is discussed in detail throughout this thesis. Article 5 of UNFSA sets out the general principles that apply to management of straddling fish stocks within areas under national jurisdiction.[289] These include: use of the precautionary approach; adoption of conservation and management measures for species in the same ecosystems as the target species to ensure "their reproduction may [not] become seriously threatened;"[290] minimize by-catch, especially of endangered species, "through measures including, to the extent practicable, the development and use of selective, environmentally safe and cost-effective fishing gear and techniques;"[291] and protection of marine biodiversity. Article 6 elaborates on the application of the precautionary approach, which again reiterates the need to monitor impacts on non-target species and to institute programs to conserve the species and their habitats when necessary.[292] All these measures, if they were applicable under UNFSA, would be beneficial to sawfishes.

Convention on Biological Diversity

Similar to UNCLOS, CBD outlines general principles and does not address specific species. Nevertheless, the text of the Convention and subsequent resolutions adopted under it create a framework that supports the call for sawfish protection and conservation. The Convention has three objectives outlined in article 1: "conservation of biological diversity,

[288] David Freestone, "The Law of the Sea Convention at 30: Successes, Challenges and New Agendas" (2012) 27 Marine & Coastal L 675.
[289] UNFSA art 3(2).
[290] UNFSA at art 5(e).
[291] UNFSA at art 5(f).
[292] UNFSA arts 6(3)(d) and 6(5).

the sustainable use of its component and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources." The following discussion focuses on the first objective, which is the most relevant here.

Biological diversity is defined in article 2 as "variability among living organisms from all sources … [and] includes diversity within species, between species and of ecosystems." *In-situ* conservation, defined as "conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings,"[293] is central to biodiversity conservation.[294] Under article 8, parties to CBD are required to engage in *in-situ* conservation "as far as possible and as appropriate,"[295] and to take actions such as to "establish a system of protected areas;"[296] "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;"[297] "rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, *inter alia*, through the development of plans or other management strategies;"[298] "develop or maintain necessary legislation … for the protection of threatened species;"[299] and "where a significant adverse effect on biological diversity has been determined … regulate or manage the relevant processes and categories of activities."[300] With respect to the last point, article 14 requires the parties "as far a possible and as appropriate"[301] to develop environmental impacts assessment procedures to review proposed projects "that are likely to have significant adverse effects on biological diversity with a view

[293] CBD at art 2.
[294] CBD preamble.
[295] CBD at art 8.
[296] CBD at art 8(a).
[297] CBD at art 8(d).
[298] CBD at art 8(f).
[299] CBD at art 8(k).
[300] CBD at art 8(l).
[301] CBD at art 14(1).

to avoiding or minimizing such effects."[302] Parties also need to ensure that national policies and programmes "that are likely to have significant adverse impacts on biological diversity"[303] take these consequences into account.

The next section discusses the plan of action and targets, agreed upon by the parties, which are meant to help them implement the CBD. Some of these have direct implications for sawfish conservation as they deal with protection of threatened species and their habitats.

Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets

Since biodiversity conservation is a broad objective, the parties to CBD adopted the Strategic Plan for Biodiversity 2011-2020 (Strategic Plan) and the Aichi Biodiversity Targets (Aichi Targets). [304] Parties are encouraged to use these documents to set national and regional goals and develop action plans to achieve them, taking into account national capacity and priorities.[305]

Two goals of the Strategic Plan are relevant to this discussion. The first one is to decrease pressure on biodiversity by minimizing impacts from competing sectors, such as fisheries and tourism. Since sawfishes are threatened by interaction with fisheries and coastal development, taking steps towards this goal could be beneficial. Similarly, working towards the second goal, which is to take action to protect and restore biodiversity and ecosystem services by designating protected areas, restoring habitats, and implementing species recovery programs, could also be helpful.[306]

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[302] CBD at art 14(1)(a).
[303] CBD at art 14(1)(b).
[304] *The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets*, UNEP/CBD/COP/DEC/X/2 (2010), online: CBD < www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.pdf> [*Strategic Plan and Targets*]
[305] *Ibid* para 2(b) and (c).
[306] *Strategic Plan and Targets*, *supra* note 304 para 10(b) and (c).

With respect to the Aichi Targets, four are directly applicable to this discussion. Target 6 deals with sustainable fisheries. It directs the parties to apply ecosystem based approaches to fisheries management to avoid overfishing, help recovery of depleted species, and avoid adverse impacts on threatened species and vulnerable ecosystems. Target 10 instructs the parties to minimize anthropogenic impacts on ecosystems that are vulnerable to climate change (mangroves in this discussion) or ocean acidification. Target 11 directs the parties to designate at least ten per cent of coastal and marine areas that are connected and ecologically representative as protected areas. Finally, in order to meet Target 12, parties have to prevent extinction and improve the conservation status of known threatened species.

At the Conference of the Parties where the Strategic Plan and Aichi Targets were adopted, the parties initiated discussions to institute a Sustainable Ocean Initiative (SOI).[307] The Action Plan for the SOI (2015-2020) was published in 2014 with the aims of helping countries achieve the Aichi Targets through "capacity building needs across the major ocean sectors, with a clear focus on improving coordination and cooperation between the fisheries and biodiversity sectors and across the science and policy realms."[308] For purposes of sawfishes management and conservation, a recognition of the interaction between fisheries and biodiversity sectors is definitely expedient. But if SOI aims to bring biodiversity concerns to fisheries, the omission of Target 12, prevention of extinction, from the list of targets addressed by the Initiative is puzzling. More so since SOI addresses Target 6 which aims to avoid "significant adverse impacts on threatened

[307] Sustainable Ocean Initiative Global Partnership Meeting, "Action Plan For the Sustainable Ocean Initiative (2015-2020)," online: CBD < www.cbd.int/doc/meetings/mar/soiom-2014-02/official/soiom-2014-02-actionplan-en.pdf> ["SOI"].
[308] *Ibid* at 4.

species" from fisheries. Targets 6 and 12 appear to be complementary and both should be supported by SOI.

A loss of sawfishes would result in decreased biodiversity, contrary to CBD. It is difficult to see how extinction of a species due to a lack of action by the Priority States could be justified by the conditional language in article 8 of the Convention or the general nature of the obligations, especially when Aichi Target 12 states that such outcomes should be avoided. All Priority States, except the U.S., are parties to CBD. Therefore, they need to take measures outlined in article 8 of CBD with the aim to achieve the Aichi Targets discussed above.

Habitat loss is one of the contributing factors to the declines in sawfish populations. The CBD text and its supporting documents reiterate the need to designate protected areas, restore habitats, and conserve ecosystems. Aichi Target 10 could be used to improve the status of mangroves, while Target 11 sets a measurable target for marine protected areas. The requirement for a state to engage in environmental impact assessment when adverse impacts are anticipated could be helpful when dams or other types of coastal projects are proposed by developers.

When implementing the Convention in general, as well as the goals of the Strategic Plan and the Aichi Targets specifically, the parties are encouraged to adopt the ecosystem approach. The next section discusses this concept in detail and explains its significance to sawfish conservation.

Ecosystem Approach

The CBD expressly endorses the ecosystem approach as "the primary framework for addressing" [309] the Convention's goals.[310] This does not resolve the ambiguity in its text, but it does encourage states to look beyond economic considerations to manage ecosystems "for their intrinsic values and for the tangible or intangible benefits to humans."[311] The ecosystem approach urges states to conserve and restore interactions between species and their environment in order to maintain ecosystem services and achieve sustainable development, while taking into account local conditions.[312]

The endorsement of the ecosystem approach under CBD implementation is advantageous to sawfishes. Since sawfishes are rare and their economic value is uncertain, there is little incentive to engage in their conservation. This is contrary to the ecosystem approach which makes the diversity of species and their interactions with each other, as well as their environment management, goals in themselves. The fact that sawfishes have been culturally important further supports their conservation under the ecosystem approach, since the CBD guidelines make cultural and biological diversity "central components of the ecosystem approach"[313]

Species-specific Conventions Obligations

The two conventions discussed next require their parties to adopt prescribed measures with respect to species listed in their appendices. This species-specific approach

[309] *Ecosystem Approach*, UNEP/CBD/COP/DEC/VII/11 (2004) [*Ecosystem Approach*] at para 2, online: CBD <www.cbd.int/doc/decisions/cop-07/cop-07-dec-11-en.pdf>.
[310] *Ibid* Annex 1.
[311] *Ecosystem Approach*, *supra* note 309 at 8.
[312] *Ecosystem Approach*, *supra* note 309.
[313] *Ecosystem Approach*, *supra* note 309 at 8.

complements the broad obligations imposed by UNCLOS and CBD. It recognizes that certain species may need special measures, and, helps states set conservation priorities. All species of sawfish are recognized on the highest priority lists of CMS and CITES.

Convention on the Conservation of Migratory Species of Wild Animals

CMS is a conservation-focused global convention,[314] motivated by the recognition that the conservation and management of migratory animals that move across national borders during their lives requires a collective effort of all range states.[315] To be considered a migratory species under the Convention, a "significant proportion" [316] of the species' population has to "cyclically and predictably cross one or more national jurisdictional boundaries."[317]

Species covered by CMS are organized into two appendices, I and II, and the same species may be listed twice. [318]Appendix I contains endangered species, defined as species at risk of "extinction throughout all or a significant portion of [their] range."[319] Under CMS, "range" means "all areas of land or water that a migratory species inhabits, stays in temporary, crosses or overflies at any time on its normal migration route."[320] For these species, all parties agree to "provide immediate protection."[321] Parties that are Range States, meaning states that exercise jurisdiction "over any part of the range,"[322] have additional

[314] Bradnee Chambers, "A Watershed for the Conservation of Migratory Species" (2015) 45:1 Envtl Pol'y & L 7.
[315] CMS preamble.
[316] CMS at art 1(1)(a).
[317] CMS at art 1(1)(a).
[318] CMS art 4(2).
[319] CMS at art 1(1)(e) and art 3(1).
[320] CMS at art 1(1)(f).
[321] CMS at art 2(3)(b).
[322] CMS at art 1(1)(h).

obligations, such as to prohibit taking of the listed species.[323] Taking includes "hunting, fishing, capturing, harassing, deliberate killing or attempt to engage in any such conduct."[324] Exceptions can be made for scientific purposes or traditional use, to enhance breeding or survival of the species, or if required by extraordinary circumstances.[325] They have to be "precise"[326] and "not operate to the disadvantage of the species,"[327] and must be reported to the Secretariat.[328]

Parties that are Range States also agree to conserve and "where feasible and appropriate,"[329] restore critical habitats; mitigate adverse effects of activities or obstructions that are obstacles to migration "as appropriate;" [330] and "to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species."[331] The Conference of the Parties may recommend additional measures to be taken by the Parties that are Range States to benefit species listed in Appendix I. [332]

Appendix II is for migratory species that have "an unfavourable conservation status and which require international agreements for their conservation and management, as well as those which have a conservation status which would significantly benefit from international co-operation."[333] Conservation status is considered to be unfavourable if one of the following conditions is not met:[334](1) the population "is maintaining itself on long-term

[323] CMS art 3(5).
[324] CMS at art 1(1)(i).
[325] CMS art 3(5).
[326] CMS at art 3(5).
[327] CMS at art 3(5).
[328] CMS art 3(7).
[329] CMS at art 3(4)(a).
[330] CMS at art 3(4)(b).
[331] CMS at art 3(4)(c).
[332] CMS art 3(6).
[333] CMS at art 4(1).
[334] CMS art 1(d).

basis as a viable component of its ecosystems;"[335] (2) "the range of the migratory species is neither currently being reduced, nor is likely to be reduced, on a long-term basis;" [336] (3) there is sufficient habitat that will remain for the "foreseeable future" [337] to support the population; (4) "the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management." [338]

Parties that are Range States are encouraged to conclude ancillary agreements to benefit species listed in Appendix II, with priority given to species with unfavourable conservation status.[339] The objective of each agreement "shall be to restore the migratory species concerned to a favourable conservation status or to maintain it in such a status."[340] It has to contain details listed in article 5 and be open to "all Range States of the species, whether or not they are Parties to this Convention."[341]

Listing History of Sawfish

The Government of Kenya proposed to add all species of sawfish to Appendices I and II in 2014.[342] It justified the inclusion on the fact that it is impossible to know the full extent of sawfish migration given their severely depleted status.[343] Kenya argued that a combination of historical records and tracking studies suggests that sawfishes are capable of moving distances long enough to cross international boundaries and indicates "a high likelihood that

[335] CMS at art 1(c)(1).
[336] CMS at art 1(c)(2).
[337] CMS at art 1(c)(3).
[338] CMS at art 1(c)(4).
[339] CMS art 4(3).
[340] CMS at art 4(1).
[341] CMS at art 5(2).
[342] *CMS Proposal*, *supra* note 58.
[343] *Ibid*.

a significant proportion could, cyclically and predictably"[344] engage in transboundary migration. The proposal described the significant population declines experienced by the species throughout their range, factors that were still threatening their survival, as well as sparse legal protection at the national level. Kenya urged the parties to list sawfishes in order to extend strict protection "to larger numbers of sawfishes in larger numbers of range States and increas[e] cooperation between range states in particular with regard to collaborative research and monitoring to fill gaps in knowledge related to population status, structure and movements."[345] At a conference of the parties dominated by inclusion of marine species,[346] there were no objections from the parties to the proposal to add the five species of sawfish to Appendices I and II.[347]

In its proposal, Kenya also highlighted the desirability of adding sawfishes to the Sharks MOU, one of the ancillary agreements concluded under CMS, which is discussed in detail in Chapter 6.

CMS can be a useful tool in sawfish conservation. By listing sawfishes in Appendix I, the Range States agree to prohibit their taking. This obligation is not conditional, but subject to the listed exemptions. The definition of taking is very broad and could potentially address a number of threats. It does not limit fishing, capturing, and harassing to deliberate actions and, therefore, could apply to incidental capture in fisheries. But even if the definition is not broad enough to address the issue of by-catch, it definitely prohibits deliberate killing of entangled sawfish. Prohibition on taking could also indirectly address domestic trade in body parts. Only specimens that died from natural causes could be legally harvested under CMS,

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[344] *Ibid* at 9.
[345] *CMS Proposal*, *supra* note 58 at 14.
[346] Chambers, *supra* note 314.
[347] *Proceedings of the 11th Meeting of the Conference of the Parties* (2014), online: CMS <www.cms.int/sites/default/files/publication/cms_cop11_proceedings_e.pdf>.

significantly diminishing the supply, but potentially complicating enforcement. It is surprising that CMS does not require Range States to develop conservation plans for species listed in Appendix I. This measure is reserved for species listed in Appendix II. The development of Sharks MOU is the main benefit of Appendix II to its listing of sawfishes.

The obligations with respect to habitat conservation and restoration are not as stringent as the ones for protecting the animals. The obligation to conserve and restore applies to habitats which are "of importance in removing the species from danger of extinction."[348] This suggests that only critical habitats, such as nursery grounds, should be of concern. The obligation to restore applies only "where feasible and appropriate,"[349] which leaves a lot of discretion to Range States to decide whether to take action. For sawfishes, this means that it is not clear under what conditions Range States would be required to take care of mangroves that may not be nursery grounds, but are very important to young sawfishes.

The catch-all provision in article 3(4)(c) asks Range States to address factors that endanger the species. This could be relied upon to justify conservation measures that address all threats to sawfishes. However, its force is significantly reduced by the fact that such actions only need to be taken "to the extent feasible and appropriate."[350]

As already mentioned, CMS introduces useful conservation provisions. Its main downside, for the purposes of sawfishes in the Caribbean Region, is the lack of participation by the Priority States. Only six countries[351] are parties to the Convention, significantly limiting its influence in the Caribbean Region.

[348] CMS at art 3(4)(a).
[349] CMS at art 3(4)(a).
[350] CMS at art 3(4)(c).
[351] Brazil, Costa Rica, Cuba, French Guiana, Honduras, and Panama.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

CITES has been called "the most successful of all international treaties concerned with the conservation of wildlife."[352] However, given its narrow focus on trade, it is debatable whether CITES is a conservation treaty,[353] especially in relation to Appendix I species. This aspect of the Convention will be further discussed at the end of this section.

CITES establishes a system of permits for exporting, re-exporting, importing, or introducing from the sea listed species.[354] Because of its broad definition of "specimen," CITES applies to living, dead, recognizable parts and derivatives of a listed species. [355] Permits are granted by national Management Authorities, on advice from the national Scientific Authorities of the exporting and importing states.[356] Each party is required to designate these authorities to administer the Convention.[357]

CITES provides the criteria the authorities have to follow when granting permits. The most stringent, which practically prohibits all commercial trade, applies to species listed in Appendix I. These are species threatened with extinction.[358] In order to obtain an export permit for an Appendix I listed species, the Scientific Authority of the exporting state has to certify that "such export will not be detrimental to the survival of that species."[359] Then the Management Authority has to establish that the specimen was legally obtained and an import permit has been granted for it.[360] To receive an import permit, the Scientific Authority of the

[352] Bowman, Davies & Redgwell, *supra* note 29 at 484.
[353] Ed Couzens, "CITES at Forty: Never Too Late to Make Lifestyle Changes" (2013) 22:3 RECIEL 311.
[354] CITES arts 1(c) and 3 - 5.
[355] CITES art 1(b).
[356] CITES arts 3 - 5.
[357] CITES art 9.
[358] CITES art 3.
[359] CITES at art 3(2)(a).
[360] CITES arts 3(2)(b) and (d).

importing state has to advise that "the import will be for purposes which are not detrimental to the survival of the species,"[361] while the Management Authority has to be "satisfied that the specimen is not to be used primarily for commercial purposes."[362]

Species listed in Appendix II are not currently threatened with extinction but require regulations on their trade to protect them. The same criteria have to be met to obtain an export permit for an Appendix II species as for an Appendix I species. However, there is no requirement to show an import permit, which means there is no restriction on the commercial use of the imported specimen.[363] Species in Appendix III are listed unilaterally by countries that are trying to protect them under national laws. States that list a species in Appendix III have to issue an export permit before a specimen can be imported into another state.

History of Listing Sawfish

Considering the central role that listing plays in CITES, the text of the Convention provides little guidance for amending the Appendices. Article 2(1) says: "Appendix I shall include all species threatened with extinction which are or may be affected by trade." Trade is defined in article 1(c) as "export, re-export, import and introduction from the sea," while "affected by trade" means it is known the species is in trade, and that trade "has or may have a detrimental impact on the status of the species."[364] Or, the species is "suspected to be in trade, or there is demonstrable potential international demand for the species, that may be detrimental to its survival in the wild." [365]Whether a species is threatened with extinction is

[361] CITES at art 3(3)(a).
[362] CITES at art 3(3)(c).
[363] CITES art 4.
[364] *Criteria for Amendment of Appendices I and II*, Resolution Conf 9.24 (Rev CoP16) [*Criteria*] at Annex 5 "Affected by trade", online: CITES <cites.org/eng/res/09/09-24R16.php>.
[365] *Ibid*.

established according to the biological criteria outlined in the Criteria for Amendment of Appendices I and II resolution.[366]

Sawfishes were first proposed for listing in CITES Appendix I by the U.S. in 1997.[367] That proposal was rejected by the parties because there was no documentation showing international trade in sawfishes and their parts.[368] Seven years later, the issue came up again in response to a report submitted by the SSG to the Animals Committee.[369] The report showed a lack of progress in the implementation of IPOA-SHARKS,[370] a voluntary document that encourages states to adopt conservation measures with respect to Chondrichthyes species. This is discussed in detail in Chapter 6. But the SSG report did not help sawfishes as the draft proposal to list the species did not even reach the pre-conference consultation among the range states.[371] Instead, the Animal Committee asked the sawfish range states to review, as a matter of urgency, the status of the species in their waters and, if necessary, introduce conservation and trade measures to prevent their extinction.[372]

The final attempt to list sawfishes under CITES came in 2007 when Kenya and the U.S. submitted a proposal to add all species of sawfish to Appendix I. [373] They argued that all species of sawfish met the established biological criteria. The criteria are as follows:

> A. The wild population is small, and is characterized by at least one of the following:
> i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or

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[366] *Ibid*.
[367] *Proposals for Amendment of Appendices I and II*, (1997), online: CITES <cites.org/eng/cop/10/prop/index.php>.
[368] McDavitt & Charvet-Almeida, *supra* note 173.
[369] The Animals Committee and the Plants Committee were established at COP6 in 1987 in order to provide technical advice on the issues related trade controls and amendments of the Appendices.
[370] Working Group, Animals Committee, *Biological and Trade Status of Sharks (Resolution Conf 12.6 and Decision 12.47)*, AC20 WG8 Doc 1 (2004), online: CITES <cites.org/sites/default/files/common/com/ac/20/wg/E20-WG08-01.pdf>.
[371] Sarah Fowler, "Shark Conservation and Management through CITES" (2004) 16 Shark News 4.
[372] *Ibid*.
[373] Proponents, *Consideration of Proposals for Amendment of Appendices I and II*, CoP14, Prop. 17 (2007), online: CITES <www.cites.org/eng/cop/14/prop/E14-P17.pdf> [*Sawfish Proposal*].

> v) a high vulnerability to either intrinsic or extrinsic factors.
>
> B. The wild population has a restricted area of distribution and is characterized by at least one of the following:
> i) fragmentation or occurrence at very few locations; or
> iii) a high vulnerability to either intrinsic or extrinsic factors; or
> iv) an observed, inferred or projected decrease in any one of the following: the area of distribution; the area of habitat; the number of subpopulations; the number of individuals; the quality of habitat; or the recruitment.
>
> C. A marked decline in the population size in the wild, which has been either:
> ii) inferred or projected on the basis of any one of the following: a decrease in area of habitat; a decrease in quality of habitat; levels or patterns of exploitation; a high vulnerability to either intrinsic or extrinsic factors; or a decreasing recruitment.[374]

In their listing proposal, Kenya and the U.S. argued that Appendix I listing would have a positive effect on the populations of sawfishes in the wild because it would prohibit international trade in rostra, fins, and other body parts, decreasing demand and mortality.[375] They drew attention to the high value of sawfish products that deterred fishers from releasing incidentally caught animals. They described sawfish fins as commanding "spectacular prices"[376] on the Chinese market. Considering their depleted populations, they argued that

> [A]ny reduction in demand for these products leading to a decrease in mortality rates will benefit these species. It is difficult to imagine any conditions under which commercial trade in these Critically Endangered species or their products might lead to an improvement in their status in the wild.[377]

Furthermore, the proponents submitted that listing under CITES would increase awareness of the dire status of sawfishes, further benefiting the species. [378]

As part of its listing proposal, the U.S. representatives requested comments from the range states. From the Priority States, Colombia, Guatemala, and Nicaragua expressed their support for the listing.[379] However, some countries (outside the scope of this discussion), objected to the proposal. For example, China submitted its comments urging caution in

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[374] *Criteria*, *supra* note 364 at Appendix I and *Sawfish Proposal*, *supra* note
[375] *Sawfish Proposal*, *supra* note 373.
[376] *Ibid* at 9.
[377] *Sawfish Proposal*, *supra* note 373 at 10.
[378] *Sawfish Proposal*, *supra* note 373.
[379] *Ibid*.

listing Elasmobranch species under CITES, in general, given that the FAO has the technical expertise and mandate to regulate commercial marine fisheries. [380] With respect to sawfishes, China did not support the listing, arguing that the link between international trade and population declines was not established and that prohibition in international trade will not improve the population status of the species. According to China, it would be more effective to address the main causes of mortality, such as coastal fisheries by-catch and habitat destruction, at the national level rather through international action. China further questioned the feasibility of enforcing prohibitions on sawfish fin trade since "sawfish fins enter trade opportunistically in mixed shipments, and are not readily recognizable."[381]

However, the Chinese position was in the minority with respect to sawfishes. Even the FAO Expert Panel supported the listing proposal. [382] In particular, the Panel found that sawfish populations "have declined significantly from historical highs, that international trade is a key driver in their overexploitation, and that management of these species in the past has typically been poor."[383] As a result, the expert panel believed that "the listings would likely contribute to species conservation." [384] FAO's support of the listing is significant, considering that out of the seven marine species proposed for listing in 2007, FAO supported only two candidates – sawfishes and eels.[385]

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[380] *Shark Issues*, *supra* note 193.
[381] *Ibid* at 3.
[382] "FAO Panel Supports Trade Restrictions to Protect Sawfish and Eels" (30 May 2007), online: FAO Newsroom <www.fao.org/Newsroom/en/news/2007/1000569/index.html>.
[383] *Ibid*.
[384] *Ibid*.
[385] International Institute for Sustainable Development, "Summary of the Fourteenth Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora: 3-15 June 2007" (18 June 2007) 21:61 Earth Negotiations Bulletins 1 ["COP14 Summary"].

The majority of the parties voted in favour of listing all, but one, species of sawfish in Appendix I.[386]

At the Conference, Australia proposed an amendment to the U.S. and Kenya's proposal to list *Pristis microdon*[387] in Appendix II for the purpose of continuing aquarium trade.[388] The amendment garnered support because the remaining population of *Pristis microdon* in Australia was believed to be well managed.[389] However, the species was subsequently transferred to Appendix I in 2013.[390] When sawfishes were listed under CITES in 2007, CITES became the first international instrument that addressed conservation or management of sawfishes.[391]

This brings us to the issue raised at the beginning of the section regarding the value of CITES to sawfish. The main direct benefit of Appendix I listing is the prohibition on international trade. Undeniably, this benefits Caribbean sawfishes because it precludes trade in fins from the Caribbean Region to the Chinese market. But as explained in Chapter 3, trade in sawfish body parts is poorly documented. Without adequate education and enforcement, sawfish fins could be mislabelled and combined with other shark fins for export. Rostra trade for cockfighting spurs in Peru should be captured by the CITES trade ban. But just as with fins, the volume of this trade is unknown, making it difficult to estimate its conservation value.

Whether CITES will help with trade in rostra and body parts for curios and traditional medicines is a more complicated question. Some of this trade is domestic and not affected by

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[386] *Ibid*.
[387] Following the taxanomic delineation study of the largetooth sawfish, *Pristis microdon* was subsumed into *Pristis prisitis*. See Chapter 2 for details.
[388] "History of CITES Listing of Sharks (Elasmobranchii)," online: CITES <cites.org/eng/prog/shark/history.php> ["CITES Sharks"].
[389] "COP14 Summary", *supra* note 385.
[390] "CITES Sharks", *supra* note 388.
[391] *Sawfish Proposal*, *supra* note 373.

CITES. There are also documentation and identification issues since some of the specimens may have been harvested before the species was listed or might be difficult to identify correctly. The fact that CITES does not address domestic trade is a big downside for sawfishes. As explained in Chapter 3, sawfish parts were sold at domestic markets providing a disincentive to releasing the species alive.

There is a narrow opportunity for CITES to influence national conservation measures through the non-detriment finding (NDF) requirement. Under article 3(2)(a), an export permit can be issued only if the Scientific Authority "has advised that such export will not be detrimental to the survival of that species." Existence and effectiveness of recovery plans is one of the considerations in NDF for Appendix I species.[392] With commercial trade in sawfish prohibited, it is unknown whether trade for non-commercial purposes can be enough of a stimulus for countries to adopt conservation measures in order to issue NDFs. NDFs appear to play a more significant role in the management of Appendix II species, evidenced by a guide dedicated to shark species listed under CITES.[393]

Protected Areas Conventions

As discussed in Chapter 3, habitat loss is one of the factors contributing to the decline in sawfishes. It has also been noted that the need to preserve habitat has been acknowledged in the agreements already discussed. One way to preserve habitat is by designating protected areas. However, the term "protected area" does not have one definition and can refer to

[392] "CITES 'Non-detriment findings' – Current Policies on NDFs," online: CITES <cites.org/eng/prog/ndf/current_policies>.
[393] Victoria Mundy-Taylor et al, "CITES Non-detriment Finding Guidance for Shark Species" (1 October 2014) online: CITES <cites.org/sites/default/files/eng/prog/shark/docs/Shark%20NDF%20guidance%20incl%20Annexes.pdf>.

different levels of protection. The next two conventions deal exclusively with establishment and management of protected areas and they demonstrate this point.

Convention on Wetlands of International Importance

The Ramsar Convention is one of the oldest inter-governmental environmental treaties, originally concerned with waterfowl conservation needs. [394] The scope of the Convention has since expanded to recognize the importance of wetlands to other species at risk.[395] This includes sawfishes since the "extremely broad"[396] definition of wetland adopted by the Convention captures desirable sawfish habitat. States that are parties to the Ramsar Convention have to designate at least one suitable site for inclusion on the List of Wetlands of International Importance (Ramsar List or Ramsar Sites). [397] Wetlands are selected for inclusion on the Ramsar list based on their international significance in "ecology, botany, zoology, limnology or hydrology … [and] importance to waterfowl at any season,"[398] along with other criteria listed in the guidelines.[399]

Under Ramsar, wetlands are "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six

[394] "History of the Ramsar Convention," online: Ramsar <www.ramsar.org/about/history-of-the-ramsar-convention>.
[395] Alexander Gillespie, *Protected Areas and International Environmental Law* (Leiden: Martinus Nijhoff, 2007).
[396] Daniel Navid, "The International Law of Migratory Species: The Ramsar Convention" (1989) 29 Natural Resources J 1001 at 1004.
[397] Ramsar art 2(4).
[398] Ramsar at art 2(2).
[399] "The Ramsar Sites Criteria: The Nine Criteria for Identifying Wetlands of International Importance" at criterion 1, online: Ramsar <www.ramsar.org/sites/default/files/documents/library/ramsarsites_criteria_eng.pdf> ["Ramsar Criteria"].

metres."[400] The boundaries of wetlands may include, "riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands."[401] The area covered by this definition appears to be particularly suitable as nursery grounds and as habitat for young sawfishes. All countries on the Priority List, except Guyana and Haiti, have at least one site on the Ramsar List. However, due to the very broad definition, it is impossible to say how many of these sites are fit for sawfishes without reviewing each one individually.

In any case, parties to the Ramsar Convention have responsibilities towards all wetlands within their territory, and there is not a lot of difference between duties with respect to listed and non-listed sites. Under article 3(1) of the Convention, the parties have to promote conservation of wetlands included on the Ramsar List, and "as far is possible [promote] the wise use of wetlands in their territory."[402] Whereas the wording of article 3(1) appears to differentiate between the obligation to conserve listed sites and wise use of non-listed sites, this has not been the practice.[403] As well, this interpretation would be inconsistent with article 4(1).[404] Article 4(1) directs the parties to promote conservation of wetlands by designating nature reserves on listed and non-listed sites. This does not mean that the Ramsar Convention advocates a strict protectionist approach. On the contrary, the Convention promotes human exploitation of wetlands through the concept of wise use.[405] Wise use of wetlands is explained in resolution IX.1 as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of

[400] Ramsar at art 1(1).
[401] Ramsar at art 2(1).
[402] Ramsar at art 3(1).
[403] Bowman, Davies & Redgwell, *supra* note 29.
[404] *Ibid*.
[405] *Ibid*.

sustainable development" [footnotes omitted].[406] The ecosystem approach mentioned in this resolution includes the ecosystem approach developed by CBD.[407]

Conservation and wise use of listed and non-listed wetlands includes sustainable use of fisheries.[408] This involves minimizing by-catch by adopting appropriate fishing techniques; conducting assessments of the impact on fisheries of flow-altering projects such as dams; applying the Code of Conduct for Responsible Fisheries (discussed in the next chapter); and "tak[ing] into account any endangered species listed in Appendix I of [CITES]"[409] when developing management strategies for "the conservation of fisheries and aquatic biota especially in relation to Ramsar Sites."[410] As already mentioned, shallow coastal sawfish habitat qualifies as wetland under the Convention. As such, parties should be implementing by-catch reduction strategies for fisheries in these areas. The Convention also advises its parties to consider impacts on fisheries when evaluating flow-altering projects. This can indirectly benefit sawfishes by keeping estuaries and coastal areas healthy enough to sustain other fish species.

At least two Ramsar Sites, Refugio de Vida Silvestre Río San Juan (San Juan), a site that follows the San Juan River from Lake Nicaragua to the Caribbean Coast[411] and Sistema de Humedales de San Miguelito (San Miguelito), a site along the southeast coast of Lake Nicaragua,[412] used to be inhabited by sawfishes.[413] Based on Resolution IX.4, Nicaragua

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[406] *A Conceptual Framework for the Wise Use of Wetlands and the Maintenance of Their Ecological Character*, Resolution IX.1 Annex A (2005) at para 22, online: Ramsar <www.ramsar.org/sites/default/files/documents/pdf/guide/guide-wise-use-2005-e.pdf> [*Wise Use Framework*].
[407] *Ibid* at para 22
[408] *The Ramsar Convention and Conservation, Production and Sustainable Use of Fisheries Resources*, Resolution IX.4 (2005), online: Ramsar <www.ramsar.org/sites/default/files/documents/pdf/res/key_res_ix_04_e.pdf>.
[409] *Ibid* at 9.
[410] *Ibid*.
[411] "Refugio de Vida Silvestre Río San Juan," online: Ramsar < rsis.ramsar.org/ris/1138>.
[412] "Sistema de Humedales de San Miguelito," online: Ramsar <rsis.ramsar.org/ris/1140>.

should be incorporating sawfish measures when designing fisheries management plans in these areas, since sawfishes are on Appendix I of CITES. But as discussed in Chapter 3, Nicaragua's sawfish regulation is limited to prohibition of targeted fishery in Lake Nicaragua. This demonstrates that while the parties are willing to include such measures in the resolutions, they do not necessarily implement them. Overly technical Ramsar guidelines that fail to incorporate conditions in developing countries have been identified as some of the reasons for insufficient implementation in the Region.[414] In order to remove this hurdle, the Secretariat needs to be more effective at making its guidelines accessible and relevant to resource managers in developing countries, as well as provide adequate technical support to developing countries to implement the Convention and build capacity.

Although there is an overlap between responsibilities towards listed and non-listed sites, there are some obligations that are specific to the Ramsar List. One "not particularly rigorous"[415] obligation specific to the Ramsar List requires the parties to "formulate and implement their planning so as to promote conservation of the wetlands included in the List."[416] The parties also have to monitor and report to the Secretariat if there are adverse[417] changes to the ecological character of a listed wetland within their territory due to anthropogenic impacts.[418] Ecological character is defined in Resolution IX.1 as the "combination of the ecosystem components, processes and benefits/services that characterise

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[413] See chapters 2 and 3 for details.
[414] Maria Rivera, "Overview of the Implementation of the Convention and its Strategic Plan in the Americas (Neotropics & North American Regions) as Input for STRP17" (2013), online: Ramsar <www.ramsar.org/sites/default/files/documents/tmp/pdf/strp/STRP17docs/STRP17_AmericasRissues_MR%2025.0213.pdf>.
[415] Bowman, Davies & Redgwell, *supra* note 29 at 420.
[416] Ramsar at art 3(2).
[417] *Wise Use Framework*, *supra* note 406.
[418] Ramsar at art 3(2).

the wetland at a given point in time."[419] In addition to reporting, the parties are expected to take remedial action on sites experiencing these changes.[420]

Development is not the only threat to wetlands, especially when looking towards climate change and sea level rise. As already discussed, sawfishes need mangroves and mangroves are affected by sea level rise. Parties to the Convention have recognized that wetlands are "especially vulnerable to climate change"[421] and have urged each other "to maintain or improve the ecological character of wetlands" [422] in order to increase their resilience, as well as improve their capacity to act as mitigation and adaptation mechanisms. If this means that coastal development is done in a manner that accommodates mangroves, then this resolution could benefit sawfishes.

The parties also acknowledged the importance of energy in the development process but highlighted the risk of biodiversity loss, and "adverse impacts on the ecological character of wetlands" [423] if renewable and non-renewable sources of energy are exploited in an unsustainable manner. They adopted guidelines on how to minimize side effects, such as habitats and fauna loss, and encourage the parties to engage in Environmental Impact Assessment in a manner consistent with previously adopted resolutions and issued guidelines. [424] Again, this could be positive for sawfishes, if tidal or hydro projects proposed in their habitats are executed in a manner that minimizes negative impacts.

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[419] *Wise Use Framework*, *supra* note 406 at para 15.
[420] Bowman, Davies & Redgwell, *supra* note 29.
[421] *Climate Change and Wetlands: Implications for the Ramsar Convention on Wetlands*, Resolution XI.14 (2012) at para 2, online: Ramsar < www.ramsar.org/sites/default/files/documents/pdf/cop11/res/cop11-res14-e.pdf>.
[422] *Ibid* at para 26.
[423] *Wetlands and Energy Issues*, Resolution XI.10 (2012) at para 6, online: Ramsar <www.ramsar.org/sites/default/files/documents/pdf/cop11/res/cop11-res10-e.pdf>.
[424] *Ibid*.

Nevertheless, it is difficult to say whether the obligation to maintain the ecological character of wetlands can preserve and improve sawfish habitat. The two mentioned Nicaraguan Ramsar Sites offer as examples. The San Juan site is reported to be experiencing changes in ecological character due to a project to improve navigation on the San Juan River.[425] The Secretariat has been working with Nicaragua since 2010 to address the issue.[426] The San Miguelito site has been reported to be experiencing changes in ecological character from the construction of the canal.[427] The Secretariat has been working with Nicaragua since 2014 on that issue.[428] As discussed in Chapter 3, construction of the canal is a mega-project that will have significant environmental impacts and affect multiple species and habitats. It will be interesting to follow the development of this project and the Secretariat's involvement in it.

If sawfish habitat is identified, it may qualify for designation as a Ramsar Site. The criteria for listing says that a wetland is internationally significant if it "supports vulnerable, endangered, or critically endangered species or threatened ecological communities;"[429] "supports populations of plant and/or animal species important for maintaining the biological diversity of a … region;"[430] or "supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions."[431] However, it is unclear if there is additional benefit to listing as discussed in this section.

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[425] Standing Committee, *Update on the Status of Sites on the List of Wetlands of International Importance*, SC51-16 (2015), online: Ramsar <www.ramsar.org/sites/default/files/documents/library/sc51_16_status_ramsar_sites_e.pdf>.
[426] *Ibid*.
[427] *Ibid*.
[428] *Ibid*.
[429] "Ramsar Criteria," *supra* note 399 at criterion 2.
[430] "Ramsar Criteria," *supra* note 399 at criterion 3.
[431] "Ramsar Criteria," *supra* note 399 at criterion 4.

On its own, the Ramsar Convention is not enough to help sawfish recover. But it promotes the ecosystem approach and sustainable use of all coastal wetlands, which is prime habitat for sawfishes. If combined with species-specific protection measures, Ramsar could contribute to sawfish survival.

Convention Concerning the Protection of the World Cultural and Natural Heritage

Unlike the Ramsar Convention that covers all wetlands, WHC applies to distinct sites. WHC is concerned with preservation of natural and cultural heritage of outstanding universal value (OUV),[432] defined as "cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity."[433] WHC strives for a "representative, balanced and credible"[434] WH list. However, only 4.7 per cent of the total number of WHC sites are recognized for their marine OUV.[435] This number increases to 20 per cent when only natural heritage and mixed sites are considered; and there are some sites that are not inscribed for their marine value but that have significant coastal components.[436] Nevertheless, more marine sites need to be designated for the WH list to be balanced and representative.[437]

There is potential for WHC to protect valuable habitat since natural heritage is defined in article 2 to include areas "which constitute the habitat of threatened species of animals and

[432] WHC art 1.
[433] UNESCO Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, *Operational Guidelines for the Implementation of the World Heritage Convention*, WHC.15/01 (2015) at para 49, online: UNESCO WHC <whc.unesco.org/document/137843> [*WHC Guidelines*].
[434] "Global Strategy," online: UNESCO WHC < http://whc.unesco.org/en/globalstrategy/>.
[435] Ameer Abdulla et al, "Marine World Heritage: Creating a Globally More Balanced and Representative List" (2014) 24 (supplement 2) Aquatic Conservation: Marine & Freshwater Ecosystems 59.
[436] *Ibid*.
[437] *Ibid*.

plants of outstanding universal value from the point of view of science or conservation"[438] The Operational Guidelines expand on this definition by listing ten criteria of OUV, at least one of which has to be met.[439] The most relevant to this discussion is paragraph 77(x). According to this paragraph, a property has OUV if it contains "the most important and significant habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation." The World Heritage Committee, in charge of establishing and maintaining the WH list,[440] seems to take the position that all species satisfy this criterion.[441]The Operational Guidelines further elaborate that the properties claiming to fulfill paragraph 77(x)

> [S]hould be the most important properties for the conservation of biological diversity. Only those properties which are the most biologically diverse and/or representative are likely to meet this criterion. The properties should contain habitats for maintaining the most diverse fauna and flora characteristic of the bio-geographic province and ecosystems under consideration. [442]

Based on the Operational Guidelines, it is unlikely that an area that is habitat to one endangered species would qualify for listing. However, sawfishes share habitat with other species, making it possible to fulfill this criterion. For example, the Everglades National Park, a WH site,[443] is credited with helping to save the remaining smalltooth population in the U.S. by preserving its critical habitat.[444]

Article 4 imposes a duty on states that have listed properties within their territories to ensure "identification, protection, conservation, presentation and transmission to future

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[438] WHC at art 2.
[439] *WHC Guidelines*, *supra* note 433.
[440] WHC art 11(2).
[441] Bowman, Davies & Redgwell, *supra* note 29 at 467.
[442] *WHC Guidelines*, *supra* note 433 at para 95.
[443] "Everglades National Park," online: UNESCO WHC <whc.unesco.org/en/list/76>.
[444] *Sawfish Proposal*, *supra* note 373.

generations of the cultural and natural heritage."[445] This includes taking cost-effective steps to mitigate adverse effects of climate changed on listed sites.[446] Article 5 lists measures that the parties should adopt "in so far as possible, and as appropriate for each country,"[447] including establishment of protection services for the listed properties and ensuring that "legal, scientific, technical, administrative and financial measures"[448] are available to preserve the listing's OUV. There is no requirement in the WHC that properties on its list be subject to strict, no-use protection. However, human activity allowed in the area has to be sustainable[449] and not adversely affect the OUV of the property.[450] In practice, the majority of the listed sites are protected areas.[451]

With respect to managing listed marine protected areas, WHC encourages the parties to follow the Best Practices Guide (Guide).[452] One of the discussions in the Guide is about how to maintain OUV of a site that fulfills paragraph 77(x) criterion. The Guidelines give an example of the Aldabra Atoll WH site, which is home to a large number of endemic and endangered species. Since it is a globally important breeding site for endangered green sea turtles, the site's management plan includes strict protection of its 50 nesting beaches.

All countries on the Priority List are signatories to WHC and twelve countries have at least one natural heritage site.[453] Based on the Aldabra Atoll example, the first step should be to review these natural WH sites and identify those that may be inhabited by sawfishes. If

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[445] WHC at art 4.
[446] *Policy Document on the Impacts of Climate Change on World Heritage Properties*, WHC-07/16.GA/10 (2008), online: UNESCO WHC <whc.unesco.org/en/CC-policy-document/>.
[447] WHC at art 5.
[448] WHC at art 5(d).
[449] *WHC Guidelines*, *supra* note 433 at para 90.
[450] *WHC Guidelines*, *supra* note 433at para 119.
[451] Bowman, Davies & Redgwell, *supra* note 29.
[452] Fanny Douvere, "World Heritage Marine Sites: Managing Effectively the World's Most Iconic Marine Protected Areas" (2015), online: World Heritage Marine Programme <whc.unesco.org/en/marine-programme/>.
[453] Belize, Brazil, Colombia, Costa Rica, Cuba, Guatemala, Honduras, Mexico, Panama, Suriname, U.S., and Venezuela.

any sites are found, their management plans should be amended to protect sawfishes. Based on the discussion in this section, it is unlikely that new WH sites will be designated on account of the needs of one species. If present natural WH sites do not cover sawfish habitat, other instruments should be used to protect it.

CHAPTER 6 – REGULATING SAWFISH EXPLOITATION AND CONSERVATION: THE INTERNATIONAL SOFT LAW FRAMEWORK

This chapter first reviews non-binding instruments that address the issue of sustainable fishing in general, and shark conservation specifically. It then looks at one non-biding protected area program. The purpose of the examination of this program is to highlight another tool that can be used to protect sawfish habitat.

Fisheries and Sharks

As pointed out in Chapter 2, sawfishes are members of the Chondrichthyes class and Elasmobranchii subclass, which includes their well-known relatives, sharks. Though five out of the seven most threatened families of chondrichthyan fishes are rays,[454] international instruments often use the term "shark". Although convenient, calling such a diverse group of species "shark" can lead to confusion. It also misses an opportunity to raise awareness about other species covered by the instruments, such as sawfishes and rays.

This section first looks at the U.N. General Assembly (UNGA) Resolution, then the FAO Code of Conduct for Responsible Fisheries (Code of Conduct), [455] FAO Guidelines on Ecosystem Approach to Fisheries (Ecosystem Guidelines), [456] IPOA-SHARKS, and Sharks MOU. It concludes with the review of the MAB Programme.

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[454] Dulvy, *supra* note 140.

[455] FAO, "Code of Conduct for Responsible Fisheries" (1995), online: FAO <www.fao.org/3/a-v9878e/index.html> ["Code of Conduct"].

[456] S M Garcia et al, "The Ecosystem Approach to Fisheries: Issues, Terminology, Principles, Institutional Foundations, Implementation and Outlook" (2003), online: FAO <ftp://ftp.fao.org/docrep/fao/006/y4773e/y4773e00.pdf > [Garcia, "Ecosystem Guidelines"].

U.N. General Assembly Resolutions

Every year UNGA passes a fisheries-specific resolution dealing with sustainability issues in the industry.[457] They are important to the sawfish discussion because they address by-catch and shark conservation.

The first international effort to address by-catch was the 1989 UNGA Resolution 44/225[458] prohibiting driftnet fishing on the high seas.[459] However, the resolution explicitly excluded "small-scale driftnet fishing traditionally conducted in coastal waters, especially by developing countries"[460] because of its importance as a food source and a resource for economic development. This exclusion most likely negatively affected sawfishes, given the serious threat nets in coastal waters pose to them, as discussed in Chapter 2.

The UNGA has been urging states to implement measures to minimize by-catch every year for at least the last decade.[461] In the latest Resolution 70/75, UNGA encouraged states to study and develop fishing methods that minimize impact on non-target species; improve monitoring and reporting of incidental catches, especially of endangered species; develop conservation strategies for non-target species caught as by-catch; and follow the FAO Guidelines on Bycatch Management and Reduction of Discards.

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[457] Louise de La Fayette, "The Role of the United Nations in International Oceans Governance" in David Freestone, Richard Barnes & David M Ong eds, *The Law of the Sea: Progress and Prospects* (New York, NY: Oxford University Press, 2006) 63.

[458] *Large-scale Pelagic Driftnet Fishing and Its Impact on the Living Marine Resources of the World's Oceans and Seas*, GA Res 44/225, UNGAOR, 44th Sess, UN Doc A/RES/44/225 (1989).

[459] Sali Jayne Bache, "Turtles, Tuna and Treaties: Strengthening the Links between International Fisheries Management and Marine Species Conservation" (2002) J Intl Wildlife L & Pol'y 49.

[460] A/RES/44/225, *supra* note 458 at preamble.

[461] See for example, A/Res/60/31, A/Res/61/105, A/Res/62/177, A/Res/63/112, A/Res/64/72, A/Res/65/38, A/Res/66/68, A/Res/67/79, A/Res/68/71, and A/Res/69/109.

Shark issues have been on the UNGA agenda since 2000 when the UNGA noted its approval of IPOA-SHARKS (discussed later in this chapter).[462] UNGA encouraged states to implement conservation measures set out in IPOA-SHARKS either directly or through appropriate international organizations, fisheries or otherwise.[463] It has reiterated this message every year since then.[464] In 2012, UNGA noted the adoption of the Sharks MOU conservation plan under CMS and encouraged states to participate in the initiative.[465] In the latest Resolution 70/75, UNGA recognized economic, cultural, and ecological importance of sharks, and the fact that some species of shark are threatened with extinction. It welcomed the FAO review of the implementation of IPOA-SHARKS and some of the steps taken by states, such as measures to reduce by-catch, as well as establishment of closed seasons and areas. Nevertheless, UNGA expressed concern over continued incidental mortality of sharks in fisheries, the continued practice of shark finning, and the failure of some regional fisheries organizations to adopt shark conservation measures. UNGA called upon states to adopt IPOA-SHARKS measures either individually or through regional fisheries bodies, take action to restrict or prohibit shark harvesting solely for its fins, and become signatories to the Sharks MOU.

On their own, the UNGA resolutions are too brief and general to guide conservation measures. However, the repeated message about by-catch and sharks, given the significant

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[462] *Large-Scale Pelagic Drift-Net Fishing, Unauthorized Fishing in Zones of National Jurisdiction and on the High Seas, Fisheries By-catch and Discards, and Other Developments*, GA Res 55/8, UNGAOR, 55rd Sess, UN Doc A/Res/55/8 (2000).
[463] *Ibid*.
[464] See A/Res/56/13, A/Res/57/142, A/Res/58/14, A/Res/59/25, A/Res/60/31, A/Res/61/105, A/Res/62/177, A/Res/63/112, A/Res/64/72, A/Res/65/38, A/Res/66/68, A/Res/67/79, A/Res/68/71, A/Res/69/109, and A/Res/70/75.
[465] *Sustainable Fisheries, Including Through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and Related Instruments*, GA Res 67/79, UNGAO, 67th Sess, UN Doc A/Res/67/79 (2012).

negotiating effort put into their drafting, [466] demonstrates the importance of the issues to the international community. It also shows slow progress in addressing them. Since by-catch is the number one threat to sawfishes, encouraging states to adopt measures and develop gear that minimizes the practice would be helpful. The biggest benefit to sawfishes from the UNGA resolution is the credence they give to IPOA-SHARKS and the Sharks MOU,[467] two documents that outline concrete steps that countries should take when developing their sawfish conservation programs.

Code of Conduct for Responsible Fisheries

Before getting into the discussion about IPOA-SHARKS and the Sharks MOU, the next two sub-sections briefly review of one of the central organizations in international fisheries regulation and its widely used guidelines.

There is no one international organization responsible for fisheries. Instead, the FAO and its subsidiary body, the Committee on Fisheries (COFI), play active roles in developing international fisheries regulations.[468] COFI is particularly important because it is the only global forum for the discussion of fisheries issues among a broad range of stakeholders.[469] Its purpose is to review FAO's fisheries and aquaculture programs, assess and address international issues in the field of fisheries and aquaculture, and review matters referred to it by committee members or the UNGA. [470] COFI is also used as a forum to negotiate

[466] Guggisberg, *supra* note 9.
[467] Jake Rice, "Evolution of International Commitments for Fisheries Sustainability" (2014) 71:2 ICES J Marine Science 157.
[468] Bowman, Davies & Redgwell, *supra* note 29.
[469] "Committee on Fisheries (COFI) – Fisheries and Aquaculture Department," online: FAO <www.fao.org/fishery/about/cofi/en> [COFI].
[470] *Ibid*.

agreements, such as the Code of Conduct and IPOA-SHARKS, [471] and to monitor compliance through its reporting mechanism.[472]

The voluntary Code of Conduct was developed following the 1992 International Conference on Responsible Fishing in response to the concerns over unsustainable fishing practices.[473] It sets out "principles and standards applicable to the conservation, management and development of all fisheries."[474] Unanimously adopted at the 1995 FAO Conference, the Code of Conduct is "the most widely recognized and implemented international fisheries instrument,"[475] guiding national and international fisheries regulation. [476]

The Code of Conduct states that "the right to fish carries with it the obligation to do so in a responsible manner." [477] This includes "conserving aquatic ecosystems" [478] and "effective conservation and management of the living aquatic resources." [479] The Code lists conservation of "biodiversity of aquatic habitats and ecosystems," [480] along with protection of endangered species as one of the objectives of fisheries management.[481] It specifically says that "[m]anagement measures should not only ensure the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species,"[482] especially when the non-target species are endangered.[483] The Code of

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[471] *Ibid*.
[472] Bache, *supra* note 459.
[473] "Code of Conduct for Responsible Fisheries – Background and Overview," online: FAO < http://www.fao.org/fishery/code/en> ["Code of Conduct – Background"]
[474] "Code of Conduct", *supra* note 455at art 1.3.
[475] FAO, "Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries" (2015) at v, online: FAO <www.fao.org/3/a-i4356e.pdf> ["Small-Scale"].
[476] "Code of Conduct – Background", *supra* note 473.
[477] Code at art 6.1.
[478] Code at art 6.1.
[479] Code at art 6.1.
[480] Code art at 7.2.2 (d).
[481] Code art 7.2.2 (d).
[482] Code at art 6.2.
[483] Code art 7.6.9.

Conduct calls upon states to develop and use "to the extent practicable"[484] fishing gear and practices that preserve biodiversity and aquatic ecosystems.[485] States are urged to protect and rehabilitate critical fish habitats such as wetlands, mangroves, lagoons, and reefs,[486] and to minimize and correct "adverse environmental impacts on the resources from human activities."[487] States are encouraged to cooperate at "subregional, regional and global levels … to promote conservation and management, ensure responsible fishing and ensure effective conservation and protection of living aquatic resources throughout their range of distribution."[488]

The effectiveness of the Code of Conduct in supporting sawfish conservation measures is evaluated after the discussion of the FAO Ecosystem Guidelines, which is next.

FAO Guidelines on Ecosystem Approach to Fisheries

The Ecosystem Guidelines describe the principles of the ecosystem approach to fisheries, as well as steps that countries could take to implement this concept. The Ecosystem Guidelines describe the ecosystem approach as "an evolution of the fisheries management paradigm,"[489] combining conventional approaches to fisheries management with ecosystem-based considerations in response to concerns over sustainability of fisheries. It explains that although the Code of Conduct does not refer to the ecosystem approach, nevertheless, it covers most of its aspects. The Ecosystem Guidelines adopted the following definition of the ecosystem approach to fisheries:

[484] Code at art 6.6.
[485] Code at art 6.6.
[486] Code art 6.8.
[487] Code at art 7.2.2 (f).
[488] Code at art 6.12.
[489] Garcia, "Ecosystem Guidelines", *supra* note 456 at 47.

> [A]n extension of conventional fisheries management recognizing more explicitly the interdependence between human well-being and ecosystem health and the need to maintain ecosystems productivity for present and future generations, e.g. conserving critical habitats, reducing pollution and degradation, minimizing waste, protecting endangered species.[490]

The need to conserve habitat and protect endangered species as part of the ecosystem approach to fisheries is repeated several times throughout the document. In the discussion about principles of the ecosystem approach, the Guidelines talk about human and ecosystem well-being being interconnected and the need for ecosystem diversity in order to maintain its well-being. The Guidelines recommend protecting critical habitats and endangered species as some of the strategies for preserving ecosystem diversity and ensuring its benefits to people. Impact minimization is another principle that involves protecting endangered species. The Ecosystem Guidelines ask states to fish in a manner that does not threaten incidentally caught species and avoids mortality or injury to endangered or threatened species. The principles of ecosystem integrity and species interdependence touch upon preserving biodiversity at "biological community, habitat, species and genetic levels"[491] and take into account associated or dependent species, especially when they are threatened or endangered.

In addition to setting out principles of the ecosystem approach, the Guidelines recommended operational objectives that states should implement based on their circumstances. Minimizing by-catch and improving survival of incidentally caught specimens, protecting endangered species, as well as preserving and restoring habitats were recommended as measures by which to maintain biodiversity. The Ecosystem Guidelines call for greater collaboration between ministries in fisheries exploitation and conservation and "[a] systemic identification and characterization of endangered species …, as well as specific

[490] Garcia, "Ecosystem Guidelines", *supra* note 456 at 6.
[491] Garcia, "Ecosystem Guidelines", *supra* note 456 at 24 para 7.8.

considerations of the relative impact of fisheries."[492] To reduce by-catch, the Ecosystem Guidelines encourage states to develop and adopt selective gear and methods, and establish closed seasons or areas. The Ecosystem Guidelines recognize the need to protect habitats from fishing and pollution and recommend establishing protected areas and zoning fishing practices.

Recovery of stocks and their ecosystems is identified by the Ecosystem Guidelines as one of the top priorities. Some of the methods discussed include restoring habitats and original species composition. While the extent of such ecosystem restoration will be limited by technical and socio-economic realities, the Ecosystem Guidelines list protection of habitats and endangered species, and elimination of damaging fishing practices among the recommended steps.

The Code of Conduct and the Ecosystem Guidelines strongly support protection of endangered species and their habitats, even if these species are not commercially fished. Sawfishes appear to be exactly the species both of these documents encourage states to protect – vulnerable to by-catch and important to ecosystem health as a top-predator. Considering the low numbers of sawfishes that exist throughout their former range, it should be difficult to argue that these species are not endangered. But the Code of Conduct and Ecosystem Guidelines, just like CBD, when using the term "threatened," do not define the term "endangered." It remains within the discretion of individual states to decide which species fall into this category. For sawfishes, this means that if states do not have national legislation recognizing the species as endangered, the provisions discussed in the last two sub-sections do not apply. Concern for endangered species figures prominently in the Code

[492] Garcia, "Ecosystem Guidelines", *supra* note 456 at 32.

of Conduct and especially in the Ecosystem Guidelines. The FAO should help states identify these species in order to strengthen the endangered species provisions.

Further guidelines have been developed to complement the Code of Conduct and the Ecosystem Guidelines in order to address specific fisheries issues. The voluntary Guidelines for Securing Sustainable Small-Scale Fisheries states that the Code of Conduct and the ecosystem approach to fisheries need to be followed. It also outlines measures that should be taken when managing small-scale fisheries.[493] Since sawfishes live in shallow coastal waters, the guidelines demonstrate that unlike the UNGA Resolution 44/225 prohibiting driftnet fishing, the Code of Conduct and the FAO Ecosystem Approach apply to small-scale coastal fisheries as well.

The next FAO document is IPOA-SHARKS, which is a voluntary document within the framework of the Code of Conduct. It was negotiated following the 1997 session of COFI where concerns were raised about the conservation status of sharks.[494]

International Plan of Action for Conservation and Management of Sharks

By virtue of its broad definition of "shark," IPOA-SHARKS covers about 1,000 species[495] in class Chondrichthyes, including sawfishes.[496] Its objective is clear from its name – "ensure the conservation and management of sharks and their long-term sustainable use."[497] IPOA-SHARKS applies to "shark catches," defined as commercial, recreational, directed and non-directed takes. [498] It aims to achieve its objective by urging states that have

[493] "Small-Scale", *supra* note 475.
[494] IPOA-SHARKS, *supra* note 77.
[495] "Chondrichthyes – Rays, Sharks, Skates, Chimaeras," online: Wildlife Journal Junior <www.nhptv.org/wild/Chondrichthyes.asp>.
[496] IPOA-SHARKS para 11.
[497] IPOA-SHARK at para 16.
[498] IPOA-SHARKS para 11.

sharks caught within their jurisdiction or by their flagged vessels to develop a national Shark-plan. [499] This document is meant to ensure that all catches of shark are sustainable. Some of the recommended strategies include threat assessment, protection of critical habitat, and consultation among stakeholders. [500] States are encouraged to "identify and provide special attention, in particular to vulnerable and threatened stocks," [501] and minimize waste and discards. [502] IPOA-SHARKS encourages states to cooperate with each other, enter into regional plans, and engage with fisheries management bodies and the FAO to achieve the objective of the plan of action. [503] States are asked to describe their progress on assessment, development and implementation of national Shark-plans as part of their Code of Conduct reporting to the FAO. [504]

In 2011, the FAO conducted a review of the IPOA-SHARKS implementation.[505] It looked at the 26 top shark-fishing countries based on reported shark catches between 2000 and 2009. Four countries from the Priority List were included in the FAO review.[506] Based on the reviewed countries, shark finning measures were the most commonly adopted management strategy. But while those measures were found to help with monitoring shark catches, they have not significantly reduced shark mortality.[507] Other conservation measures adopted by the reviewed states included closed areas and seasons, by-catch and discard regulations, protected species, quotas, as well as special reporting requirements.

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[499] IPOA-SHARKS paras 17 and 18.
[500] IPOA-SHARKS para 22.
[501] IPOA-SHARKS at para 22.
[502] IPOA-SHARKS para 22.
[503] IPOA-SHARKS para 25.
[504] IPOA-SHARKS para 28.
[505] Johanne Fischer et al, *Review of the Implementation of the International Plan of Action for the Conservation and Management of Sharks*, FIRF/C 1076 (2012), online: FAO <www.fao.org/docrep/017/i3036e/i3036e.pdf>.
[506] Brazil, Mexico, U.S., and Venezuela.
[507] Dulvy, *supra* note 140.

Appendix A outlines the recommended content of a national Shark-plan. However, given the large number of chondrichthyan species, there is no guidance on how to address their different conservation needs. As a result, states take diverse approaches. For example, the adopted Shark-plan for Belize applies to species taken by their flagged vessels on the high seas.[508] The U.S. Shark-plan is comprehensive, covering a large number of chondrichthyan species,[509] while Brazil has a specific national plan for endangered elasmobranchs that includes both smalltooth and largetooth sawfishes.[510] Overall, eight countries[511] on the Priority List have submitted a Shark-plan under IPOA-SHARKS.

On its own, IPOA-SHARKS does not provide sufficient guidance for a sawfish conservation program. The content of Appendix A is very general and aimed towards commercial species. For example, it talks about controlling access to shark stocks and decreasing fishing effort as some of the potential management strategies. Nevertheless, the document applies to sawfishes and, as evidenced by Brazil, states have the discretion to use it as a foundation for adopting protection measures.

Memorandum of Understanding on the Conservation of Migratory Sharks

The Sharks MOU was developed to be consistent with IPOA-SHARKS and the 2007 UNGA Resolution on Sustainable Fisheries.[512] It is a global, non-binding conservation

[508] Belize High Seas Fisheries Unit, "National Plan of Action: Conservation and Management of Sharks on the High Seas" (2015), online: FAO <www.fao.org/3/a-be841e.pdf>.
[509] NMFS, "National Plan of Action for the Conservation and Management of Sharks" (February 2001), online: NMFS < www.nmfs.noaa.gov/sfa/Final%20NPOA.February.2001.htm>.
[510] Ministério do Meio Ambiente, "Plano de Açao Nacional para a Conservação dos Tubarões e Raias Marinhos Ameaçados de Extinção" (2014), online: ICMBio <www.icmbio.gov.br/portal/faunabrasileira/29-fauna-brasileira/plano-de-acao-nacional-lista/2839-plano-de-acao-nacional-para-a-conservacao-dos-tubaroes>.
[511] Belize, Brazil, Colombia, Costa Rica, Guatemala, Mexico, U.S., and Venezuela.
[512] Sharks MOU, *supra* note 78.

instrument that applies to chondrichthyan species listed in the MOU's Annex 1.[513] All species of sawfish were added to Annex 1 at the second Meeting of the Signatories in 2016.[514]

The goal of Sharks MOU is "to achieve and maintain a favourable conservation status for migratory sharks based on the best available scientific information, taking into account the socio-economic and other values of these species."[515] Conservation status is evaluated based on criteria very similar to those provided in CMS.[516] One difference is that CMS is striving for population distribution and abundance to approach historic levels, if feasible,[517] while Sharks MOU is looking for population levels that are sufficient to "maintain ecosystem integrity."[518]

Five major objectives are listed in subsection 4(12): (1) research, monitoring, and information exchange; (2) sustainable direct and non-direct fisheries; (3) protection, "to the extent practicable, of critical habitats and migratory corridors; "[519] (4) increased public awareness and participation in shark conservation activities; and (5) enhanced national, regional, and international cooperation. Subsection 4(13) elaborates on these objectives with a list of specific measures that should be taken "as appropriate and subject to availability of necessary resources."[520] It covers all major points relevant to conservation and management of sharks, including prohibition against take of species in Annex 1, enactment of relevant national laws, and promotion of practicable and enforceable conservation measures. The

[513] Sharks MOU s 1(1) and 1(2).
[514] "Species," online: CMS < http://www.cms.int/sharks/en/species>.
[515] Sharks MOU s 2.
[516] Sharks MOU s 1(3)(c) - (e).
[517] CMS art 1(c).
[518] Sharks MOU s 1(3)(d).
[519] Sharks MOU s 4(12)(c).
[520] Sharks MOU s 4(13).

Sharks MOU also includes a detailed conservation plan that breaks down the five objectives into steps and assigns them priority, timelines, and actors.[521]

The detailed nature of the conservation plan included in the Sharks MOU could serve is a foundation for sawfish conservation. The Sharks MOU identifies species that are listed under the CMS and CITES as "priority for conservation actions"[522]which should encourage signatories to take steps to protect the species. However, there are only three countries on the Priority List that are signatories to the MOU,[523] significantly limiting its impact. There are also disparities in the plans prepared by the parties. For example, the U.S. plan describes its sawfish research and conservation activities,[524] while the latest national report from Costa Rica is from 2012,[525] which predates sawfish listing.

Protected Areas Under Non-Binding Instrument

The Man and the Biosphere (MAB) Programme

The MAB Programme is a science-based initiative designed to generate solutions that promote human development while preserving the environment.[526] Instead of a

[521] "Amendments to Annex 3 of the Sharks MOU: Conservation Plan" CMS/Sharks/Outcome 2.3, 20 February 2016, Second Meeting of the Signatories.
[522] Sharks MOU at preamble.
[523] Colombia, Costa Rica, and U.S.
[524] NMFS, "2014 Shark Finning Report to Congress," online: CMS <www.cms.int/sites/default/files/document/CMS_Sharks_MOS2_Nat.Report_USA.pdf>.
[525] "National Reports," online: CMS <www.cms.int/sharks/en/documents/national-reports>.
[526] "Man and the Biosphere Programme," online: UNESCO <www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/>.

convention,[527] the Programme is governed by the Statutory Framework, with UNESCO acting as its Secretariat.[528]

Biosphere reserves are defined as "areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognized within the framework of UNESCO's programme on Man and the Biosphere."[529] The criteria for designation are found in article 4 of the Statutory Framework and include the requirements that the area be important for biodiversity conservation, and contains a legally protected core with buffer and transition zone(s). But biodiversity conservation is not the only purpose of a biosphere reserve. The selection criteria also include factors that would allow the area to promote economic and human development, as well as education.[530] Once a new biosphere reserve is designated in accordance with the procedure in article 5, it becomes a part of the MAB Network.

In addition to the factors already mentioned, article 4 requires institutional arrangements and management policies to be in place to manage human activities within the biosphere reserve, as well as carry out research and education. When combined with the statutory requirement of a protected core "devoted to long-term protection,"[531] the MAB framework could be effective in protecting sawfish habitat, while also encouraging research and education about the species. However, since an area proposed for designation has to be important for biodiversity conservation, it is doubtful that an area important for one species would qualify. This is the same issue as that discussed in the section on WHC.

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[527] Natarajan Ishwaran, "Biodiversity, People and Places" (2010) 17 Australasian J Envtl Management 215.
[528] UNESCO, "Biosphere Reserves: The Seville Strategy and the Statutory Framework of the World Network" (1996), at art 10 online: UNESCO <unesdoc.unesco.org/images/0010/001038/103849Eb.pdf> ["Statutory Framework"].
[529] "Statutory Framework" at art 1.
[530] "Statutory Framework" art 3.
[531] "Statutory Framework" at art 4(5)(a).

Ten countries on the Priority List have Biosphere Reserves. The number of reserves varies from one in the Dominican Republic to forty-two in Mexico.[532] Just like with Ramsar and WH sites, it is impossible to tell whether these reserves cover suitable sawfish habitat, unless each one is examined individually. For example, Darién Biosphere Reserve, National Park and World Heritage site covers an area inhabited by the indigenous Kuna people.[533] As explained in Chapter 1, sawfishes hold a special place in the traditional Kuna culture and still appear on Kuna clothing. But the Darién Biosphere Reserve does not extend to the Caribbean coast.[534] It is therefore impossible to tell whether it protects this culturally important fish.

The MAB Programme has a precedent of species-specific conservation. It works through the Great Apes Survival Partnership (GRASP) to preserve populations and habitats of chimpanzees, orangutans, gorillas, and bonobos in Africa and Asia.[535] The MAB Programme is joined by "nearly 100 national governments, conservation organizations, research institutions, [UN] agencies, and private companies"[536] in carrying out GRASP's activities which include political advocacy, habitat protection, and diseases monitoring.[537]

It is unlikely that a similar initiative would be practical for one species. However, as mentioned in the discussion on UNCLOS, there is a large number of threatened chondrichthyan species in coastal waters. The MAB Programme could launch an initiative to encourage states to establish Biosphere Reserves in areas important to these species, and

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[532] "Latin America and the Caribbean: 125 Biosphere Reserves in 21 Countries" (April 2016), online: UNESCO MAB Ecological Sciences for Sustainable Development < www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/latin-america-and-the-caribbean/>.
[533] "Darién," online: UNESCO-MAB Biosphere Reserve Directory <www.unesco.org/mabdb/br/brdir/directory/biores.asp?code=PAN+01&mode=all>.
[534] *Ibid*.
[535] "MAB Programme and Great Apes Conservation," online: UNESCO MAB Ecological Sciences for Sustainable Development <www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/partnerships/great-apes-conservation/>.
[536] *Ibid*.
[537] "GRASP Marks 15th Anniversary," online: GRASP <www.un-grasp.org/>.

engage in related research and education. If priority is given to chondrichthyans listed under CITES or CMS, then such a program could be helpful to sawfish conservation.

CHAPTER 7 – REGULATING SAWFISH EXPLOITATION AND CONSERVATION: THE REGIONAL LEGAL AND INSTITUTIONAL STRUCTURE

The Cartagena Convention is a regional framework for the protection of the environment of the Wider Caribbean Region.[538] The Convention itself sets out principles that the party states agree to follow, but it is "insufficient and too imprecise to lead to decisive actions."[539] Three protocols, including SPAW, are meant to provide the missing details.

Before proceeding with the discussion of the SPAW Protocol, habitat obligations under the Cartagena Convention warrant a brief mention. Three countries on the Priority List[540] are parties to the Cartagena Convention, but not the SPAW Protocol. Under Article 10 of the Cartagena Convention, they agree "individually or jointly, take all appropriate measures to protect and preserve … the habitat of depleted, threatened or endangered species … To this end, the Contracting Parties shall endeavour to establish protected areas." Even with the ambiguity contained in article 10, which is addressed by the SPAW Protocol, it should be difficult for the three countries on the Priority List to argue that sawfishes are not depleted, threatened, or endangered. As a result, they should be taking measures to protect sawfish habitat within their territories.

[538] "Protecting our Caribbean Sea & Securing our Future", online: UNEP-CEP < www.cep.unep.org/about-us>.
[539] Julien Rochette & Raphaël Billé, "Bridging the Gap between Legal and Institutional Developments within Regional Seas Frameworks" (2013) 28 Intl J Marine & Coastal L 433 at 438.
[540] Costa Rica, Guatemala, and Mexico.

The Protocol Concerning Specially Protected Areas and Wildlife to the Cartagena Convention

The SPAW Protocol is the best instrument to ensure a future for sawfishes in the Caribbean. Ten countries on the Priority List are parties to this agreement.[541] It contains provisions that address the majority of threats facing the species. The SPAW Protocol is seen as an agreement that emerged from within the Caribbean community, rather than being imposed by multilateral organizations or international NGOs.[542] It acknowledges the need to preserve biodiversity in the region and seeks to reconcile conservation and development needs.[543] It also meant to help its parties comply with global conventions such as CBD, Ramsar, CMS, and CITES.[544] But concerns have been raised over the effectiveness of the Protocol's implementation. [545] This review of the SPAW Protocol begins with a discussion of its obligations to protect endangered species, and it highlights some of the concerns regarding implementation and effectiveness.

As evidenced by the title, the SPAW Protocol is concerned with specially protected wildlife. The parties agree to "take the necessary measures to protect, preserve and manage in a sustainable way… threatened or endangered species"[546] within their jurisdiction in the Caribbean and to "regulate and, where necessary prohibit activities having adverse effects on these … species."[547]

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[541] Bahamas, Belize, Colombia, Cuba, Dominican Republic, French Guiana, Guyana, Panama, U.S., and Venezuela.
[542] Vijay Krishnarayan, Yves Renard & Lyndon John, "The SPAW Protocol and Caribbean Conservation: Can a Regional MEA Advance a Progressive Conservation Agenda?" (2006) 9 J Intl Wildlife L & Pol'y 256.
[543] *Ibid*.
[544] "Overview of the SPAW Protocol," online: UNEP CEP <www.cep.unep.org/cartagena-convention/spaw-protocol> ["SPAW Overview"].
[545] Krishnarayan, Renard & John, *supra* note 542.
[546] SPAW at art 3(1).
[547] SPAW at art 3(2).

"Endangered species" is defined in article 1(f) as "species or sub-species of fauna and flora, or their populations, that are in danger of extinction throughout or part of their range and whose survival is unlikely if the factors jeopardizing them continue to operate." According to article 1(g), "threatened" species, sub-species or populations are those that are (i) either likely to become endangered in the foreseeable future if factors causing "numerical decline" persist or habitat degradation continues; or (ii) they are rare in numbers or geographical spread and "potentially or actually subject to decline and possible endangerment or extinction."[548]

In addition to the general obligations to protect, preserve and manage endangered and threatened species, the Protocol lists specific measures that parties have to implement.[549] First, parties have to identify endangered or threatened species within their territories and offer them protection. They also have to carry out "recovery, management, planning and other measures to effect the survival of such species." [550] The obligation to "regulate and prohibit…where appropriate, activities having adverse effects on such species" [551] is extended to cover the endangered/threatened species' habitats and ecosystems.[552] Parties also shall:

> [R]egulate, and where appropriate, prohibit:
> (a) the taking, possession or killing (including, to the extent possible, the incidental taking, possession or killing) or commercial trade in such species or their parts or products; and
> (b) to the extent possible, the disturbance of wild fauna, particularly during the period of breeding, incubation, estivation or migration, as well as other periods of biological stress.[553]

Sawfishes are assessed as critically endangered by the IUCN, which means that they face "an extremely high risk of extinction in the wild."[554] The assessment reports for

[548] SPAW at art 1(g).
[549] SPAW art 10.
[550] SPAW at art 10(1).
[551] SPAW at art 3.
[552] SPAW art 10(1).
[553] SPAW at art 10(3).

smalltooth and largetooth sawfishes, discussed in Chapter 4, evidence that threats causing the declines are still present. Therefore, sawfishes should qualify as endangered or threatened species under the definition of these terms in the SPAW Protocol. This means that the parties to the Protocol have to implement the measures discussed above in order to help them. Compliance with these obligations could bring in conservation programs that address all threats facing sawfishes in the region.

In addition to the national obligations discussed above, the SPAW Protocol contains co-operative measures that the parties agree to take to help endangered and threatened species. These co-operative obligations are found in article 11 and, with the contentious nature of the listing process, appears to over-shadow the individual obligations.

Article 11 describes measures for the protection of species listed in Annexes I through III. Annex I is reserved for endangered and threatened flora; Annex II for endangered and threatened fauna; and Annex III for species subject to regulated exploitation. Before discussing Annex II and sawfishes, it should be mentioned that mangroves have been listed in Annex III since the original list was compiled.[555] Under article 11(c), parties are required to protect and take measures to help recovery of these species and "may regulate the use of such species in order to ensure and maintain their populations at the highest possible levels." For plant species, parties need to develop cooperative management plans that include "the regulation of their collection, harvest and commercial trade."[556] Mangroves were included in order to promote the ecosystem approach to conservation by encouraging the parties to focus on the mangrove system, as a whole, rather than individual specimens.[557] A number of

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[554] "Red List" *supra* note 10 at 14.
[555] David Freestone, "The Conservation of Marine Ecosystems under International Law" in Michael Bowman & Catherine Redgwell eds, *International Law and the Conservation of Biological Diversity* (London, UK: Kluwer Law, 1996) 91 [Freestone, "Ecosystems"].
[556] SPAW at art 11(1)(c)(ii).
[557] Freestone, "Ecosystems", *supra* note 555.

programs that address mangrove conservation are administered through the SPAW Protocol and its partners.[558]

Now onto Annex II, which lists endangered and threatened fauna, and requires parties to "ensure total protection and recovery" [559] of these species, subject to exemptions in article 11(2) and reservation.[560] Unlike article 10(3) where prohibition is conditional, article 11(1)(b) directs the parties to prohibit "the taking, possession or killing (including, to the extent possible, the incidental taking, possession or killing) or commercial trade in such species … [and] to the extent possible, the disturbance of such species during … periods of biological stress."[561] Listed species should be given priority for research and mutual assistance;[562] while "protected species"[563] should be the subject of regional recovery plans.[564] Protected species is a defined term. According to article 1(h), it means "species or sub-species of fauna and flora, or their populations, accorded protection pursuant to article 10 of this Protocol." As already discussed, article 10 deals with national obligations to identify and protect endangered species. This could mean that parties should be developing regional recovery plans for species that they recognize as endangered but that are not listed in one of the Annexes. It is unclear how the parties will agree on the species that warrant regional recovery planning. Nevertheless, a broad interpretation of Article 11(5) would be very beneficial to sawfishes. As explained in the next section, sawfishes are still not listed in Annex II. However, they would benefit from a regional recovery plan.

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[558] "Conservation and Sustainable Use of Marine and Coastal Ecosystems," online: UNEP CEP <cep.unep.org/content/about-cep/spaw/conservation-and-sustainable-use-of-marine-and-coastal-ecosystems-1>.
[559] SPAW at art 11(1)(b).
[560] David Freestone, "Specially Protected Areas and Wildlife in the Caribbean – The 1990 Kingston Protocol to the Cartagena Convention" (1990) 5 Intl Estuarine & Coastal L 362 [Freestone, "Specially Protected"].
[561] SPAW at art 11(1)(b).
[562] SPAW art 11(3).
[563] SPAW at art 11(5).
[564] SPAW art 11(5).

Disagreements among parties over species listings have plagued the SPAW Protocol since the very beginning.[565] The initial lists were compiled by the Secretariat together with the IUCN. [566] But there were delays in finalizing the documents, resulting in postponement of the coming into force of the entire Protocol.[567] The latest round of listing discussions demonstrates that the parties still have difficulties agreeing on which species to list.

In 2010, a Working Group was established to review listing guidelines and put together a short list of proposed listings.[568] The Working Group identified 100 species and presented the list at the Scientific and Technical Advisory Committee (STAC) meeting in 2012.[569] No new species were added to the Annexes that year.[570] The Working Group continued its work over the next two years and in 2014 proposed 25 species to be listed under Annex II and 9 species of fauna to be listed under Annex III. [571] In arriving at its proposal, the Working Group took into account the IUCN assessment, listing under other conventions such as CITES, CMS, and UNCLOS, as well as the need for regional cooperation based on the number of range states in the Caribbean. Smalltooth and largetooth sawfishes were both proposed for listing in Appendix II. After a heated discussion, the parties agreed to add four species of corals and three species of birds to the Annexes[572] It is unknown why sawfishes, given their undisputed critically endangered status and absence of a commercial fishery, were not included.

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[565] Freestone, "Specially Protected", *supra* note 560.
[566] *Ibid*.
[567] *Ibid*.
[568] *Report of the Working Group on the Application of Criteria for Listing Species Under the Annexes to the SPAW Protocol (Includes Species Proposed for Listing in Annex II and III)*, UNEP(DEPI)/CAR WG 36/4 (2014), online: UNEP CEP < cep.unep.org/meetings/documents/a20669ec1913e744c77a5b41087bb843> [*Working Group*].
[569] *Ibid*.
[570] *Decisions of the Meeting*, UNEP(DEPI)/CAR IG 31/3 (2012), online: UNEP CEP <www.cep.unep.org/meetings/documents/24e6499cf969dd7ab1efeb56767e3ead> [*Decisions of the Meeting*].
[571] *Working Group*, *supra* note 568.
[572] *Report of the Meeting*, UNEP(DEPI)/CAR IG 34/4 (2014), online: UNEP CEP <www.cep.unep.org/meetings/documents/28f9f5a0d328cc35023307ce474d303f> [*Report of the Meeting*].

Another indication that the Annexes to the SPAW Protocol are not fulfilling their function is that sea turtles, marine mammals, corals, queen conch, and spiny lobster are the only marine species listed in the Annexes.[573] Six species of sharks and rays in the Caribbean are assessed as endangered or higher by IUCN,[574] but like sawfish, they are not listed under the SPAW Protocol. It is clearly the mandate of the SPAW Protocol to protect endangered species. This has to include endangered marine species in the Caribbean given that the Cartagena Convention is focused on the protection and development of the marine environment.

As already discussed, the SPAW Protocol imposes national obligations on its parties that could stimulate national conservation action. Nevertheless, listing sawfishes in Appendix II would bring additional benefits, such as research focus and regional recovery plans. For a migratory marine species, there needs to be consistent protection across the region to ensure successful conservation. There also may be an opportunity to find synergies with established conservation programs administered through the SPAW Protocol. Sea turtles have an established multidisciplinary network of experts, Wider Caribbean Sea Turtle Conservation Network (WIDECAST), who work with stakeholders to protect and manage them.[575] Both sea turtles and sawfishes face the threat of by-catch in coastal fisheries. To address this issue, WIDECAST has been involved in development of tools and strategies to reduce sea turtle

[573] "Annexes of the SPAW Protocol," online: CA-SPAW-RAC <www.car-spaw-rac.org/?Annexes-of-the-SPAW-Protocol,83>.
[574] Search for location "FAO Region" – "Atlantic – western central" at "The IUCN Red List of Threatened Species" (2016), online: Red List <www.iucnredlist.org/>.
[575] "Welcome to the World of Caribbean Sea Turtles!" online: WIDECAST <www.widecast.org/> and "Marine Turtles," online: UNEP CEP <www.cep.unep.org/publications-and-resources/marine-and-coastal-issues-links/marine-turtles>.

mortality in coastal fisheries.[576] As explained in Chapter 3, by-catch reduction strategies that are effective for sea turtles, such as TEDs, need to be modified to accommodate sawfishes. Nevertheless, if sawfishes are listed under the SPAW Protocol, there may be benefit in sharing experiences and connections toward their protection and conservation.

Protected Areas

In addition to protecting species, the SPAW Protocol provides for establishment of protected areas. The parties are asked to designate protected areas that qualify for listing on the SPAW list "in order to conserve, maintain and restore, in particular,"[577] representative types of coastal and marine ecosystems and critical habitats of endangered, threatened or endemic species, among other types of sites.[578] Besides this national obligation, the SPAW Protocol requires the parties to work together to select, establish, and manage protected areas and combine them into a network.[579]

Before an area can be proposed for listing, it has to be legally protected and have a management system that complies with the SPAW Protocol guidelines.[580] But the SPAW Protocol, just like the Ramsar Convention and WHC, does not require strict exclusion zones. Instead, article 5 lists protective measures that the parties are encouraged to implement

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[576] "Proceedings of the Technical Workshop on Mitigating Sea Turtle Bycatch in Coastal Net Fisheries" (2009), online: WIDECAST <www.widecast.org/Resources/Docs/Gilman_2009_Proc_Sea_Turtle_Bycatch_Coastal_Net_Fisheries.pdf> and "Strategic Plan for Eliminating the Incidental Capture and Mortality of Leatherback Turtles in the Coastal Gillnet Fisheries of Trinidad and Tobago" (2005), online: WIDECAST <www.widecast.org/Resources/Docs/Eckert_and_Eckert_2005_Trinidad_Bycatch_Meeting_Proceedings.pdf>.
[577] SPAW at art 4(2).
[578] SPAW art 4(2).
[579] SPAW art 7.
[580] "Guideline and Criteria for the Evaluation of Protected Areas to be Listed Under the SPAW Protocol" (2010), online: UNEP CEP <cep.unep.org/content/about-cep/spaw/development-of-guidelines-for-the-management-of-protected-areas-and-species/protected-areas/protected-area-guidelines/guidelines-and-criteria-final-english.pdf/view> ["Guidelines and Criteria"].

"progressively"[581] and as "necessary and practicable,"[582] based on the characteristics and objectives of the protected areas. Three measures on the list touch upon endangered and threatened species, as defined in Articles 1(f) and 1(g) respectively,[583] and which should include sawfishes as already discussed. These are: "the regulation or prohibition of fishing, hunting, taking or harvesting of endangered or threatened species of fauna and flora and their parts or products;[584] "the prohibition of activities that result in the destruction of endangered or threatened species of fauna and flora and their parts and products, and the regulation of any other activity likely to harm or disturb such species, their habitats or associated ecosystems;" [585] and regulation of national and international trade in these species and their parts (it is unclear if they have to originate in a protected area).[586] There is also a catch-all provision which encourages the parties to take "any other measure aimed at conserving, protecting or restoring natural processes, ecosystems or populations for which the protected areas were established."[587]

Article 6 recommends planning, management, and enforcement measures that should be implemented to maximize the benefits from protected areas. These include development of management plans for the protected area; conducting scientific research and monitoring of the protected area and user impacts; engaging in education of users, decision-makers, and the public about the protected area and its objectives; as well as establishing procedures to regulate activities within the protected area.

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[581] SPAW at art 5(1).
[582] *Ibid*.
[583] SPAW art 1(f) and (g).
[584] SPAW at art 5(2)(d).
[585] SPAW at art 5(2)(e).
[586] SPAW art 5(2)(j).
[587] SPAW art 5(2)(m).

There are thirty-one sites listed under the SPAW Protocol.[588] Nine of them are also MAB reserves, eight are Ramsar sites, and two are WH sites.[589] Since there is no single definition of a protected area, IUCN introduced categories that group sites based on their objectives and the level of human use of the area's resources. [590] Ten protected areas on the SPAW list are IUCN category II, six are category IV, two are category III, one is category I, and twelve sites have no assigned category.[591] Category I are strictly protected areas established to protect biodiversity or wilderness areas preserved for their natural condition.[592] Human activity is limited and strictly controlled. [593] Category II refers to natural areas set aside to protect ecological processes and ecosystems.[594] Human activity that is compatible with this objective, such as research, education, and recreation is allowed.[595] Category III is assigned to natural monuments, which protect a specific natural feature such as a sea mount.[596] Finally, category IV protected areas are established to protect specific species or habitats.[597]

The SPAW Protocol could be a useful tool to protect sawfish habitat. The listing criteria specifically provides for designation of areas to protect critical habitat of endangered and threatened species. Based on the statistics discussed above, there are at least six sites designated for this purpose. Protected areas designated for other purposes could also be

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[588] "SPAW- Specially Protected Areas and Wildlife," online: UNEP CEP <www.cep.unep.org/content/about-cep/spaw>.
[589] "SPAW-Listed Protected Area Statistics – International Status," online: CAR-SPAW-RAC <www.spaw-palisting.org/stats/intStatus>.
[590] J Day et al, *Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas* (Gland, Switzerland: IUCN, 2012).
[591] "SPAW-Listed Protected Area Statistics – IUCN Status," online: CAR-SPAW-RAC <www.spaw-palisting.org/stats/iucn>.
[592] Day, *supra* note 590.
[593] *Ibid*.
[594] *Ibid*.
[595] *Ibid*.
[596] *Ibid*.
[597] *Ibid*.

helpful. There are also a number of recommended management measures, such as prohibition on take, and regulation of national trade, that could protect sawfishes, even if human activity is allowed in the protected areas. Furthermore, the SPAW Protocol promotes development of a protected area network, which would be beneficial for mobile marine species like sawfishes.

Regional Fisheries Organisations

The Code of Conduct, UNGA, and UNCLOS encourage states to work through regional fisheries bodies to achieve sustainable fisheries. Regional fisheries bodies can take different forms. Some adopt resolutions that are binding on their members, while others work in advisory roles.[598] As explained in this section, there are multiple organizations with overlapping membership (see Appendix I) involved in fisheries management in the Caribbean Region. In terms of sawfishes management and conservation, these organizations could help raise awareness about the issue and implement protective measures.

Western Central Atlantic Fishery Commission

The Western Central Atlantic Fishery Commission (WECAFC)[599] is responsible for marine waters with a southern boundary at 10 degrees south latitude and a northern boundary at 35 degrees north latitude.[600] This puts it within the geographical region discussed in this thesis. It is comprised of member states that have territories within the designated area,[601]

[598] "What are Regional Fishery Bodies (RFB)," online: FAO <www.fao.org/fishery/topic/16800/en>.
[599] "Western Central Atlantic Fishery Commission (WECAFC)," online: FAO <www.fao.org/fishery/rfb/wecafc/en#Org-GeoCoverage>.
[600] FAO Council, *Revised Statute of the Western Central Atlantic Fishery Commission (WECAFC)*, Resolution 1/131 (2006) at art 3, online: FAO <ftp://ftp.fao.org/fi/DOCUMENT/wecafc/statutes.pdf> [*Revised Statute*].
[601] *Revised Statute* art .5

which includes all countries on the Priority List. WECAFC is responsible for "all living marine resources, without prejudice to the management responsibilities and authority of other competent fisheries and other living marine resources management organizations."[602] Such a broad mandate leaves WECAFC as the organization responsible for sawfishes, in the absence of involvement by another competent organization. Based on the approach to fisheries management promoted by WECAFC, there is sufficient legal basis to support conservation action in regard to sawfishes. According to the Revised Statute of the Western Atlantic Fishery Commission (Revised Statute), "the Commission shall promote the effective conservation, management and development of the living marine resources"[603] by promoting the Code of Conduct, precautionary approach, and ecosystem approach to fisheries.[604] The Revised Statute also highlights the need to "ensure adequate attention to small-scale, artisanal and subsistence fisheries."[605] It lists WECAFC functions to include assisting states with implementation of the Code of Conduct and Plans of Actions,[606] including IPOA-SHARKS. According to the Revised Statute, WECAFC has to "promote and encourage utilization of the most appropriate … gear, fishing techniques … in accordance with the FAO Code of Conduct." [607]

WECAFC is already involved in promoting FAO International Guidelines on Bycatch Management and Reduction of Discards by its members.[608] Brazil, Colombia, Costa Rica, Mexico, and Suriname, all countries on the Priority List, participated in a new project aimed

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[602] *Revised Statute* at art 4.
[603] *Revised Statute* at art 1.
[604] *Revised Statute* art 2(a).
[605] *Revised Statute* at art 2(b).
[606] *Revised Statute* art 6(b).
[607] *Revised Statute* art 6(k).
[608] Scientific Advisory Group, *Intersessional Activities – Review of the WECAFC Work Programme 2014-2015*, WECAFC/SAG/VII/2015/4 (2015), online: FAO <ftp://ftp.fao.org/FI/DOCUMENT/wecafc/7th_sag_2015/4e.pdf>.

at by-catch reduction in trawl fisheries in the region.[609] In theory, a project like this could be beneficial to sawfishes since, as explained in Chapter 3, shrimp trawling poses a danger to the species. However, it is necessary to establish if this activity overlaps with sawfish habitat in the region before resources are spent on modifying gear for sawfish-specific needs.

WECAFC is also involved in species-specific programs. For example, it has working groups on lobster, queen conch, and flying fish. It also has working groups looking at clusters of species such as ground fish, spawning aggregations, and deep-sea fisheries.[610] Most of these working groups include other fishery bodies such as the Caribbean Regional Fisheries Mechanism (CRFM), the Organization of Fisheries and Aquaculture for Central America (OSPESCA), the Caribbean Fisheries Management Council (CFMC),[611] all of which discussed subsequently. A shark working group is mentioned as well, but due to a lack of funding, it has not met since its establishment.[612] Nevertheless, the Scientific Advisory Group recommended to the Commission to increase its efforts to "develop and implement national plans of action for the conservation and management of sharks."[613] The Commission adopted this recommendation and also acknowledged the need to develop a regional plan of action for sharks.[614] Given that all WECAFC working groups deal with commercially valuable species, it is likely that WECAFC action on sharks will also be commercially-

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[609] *Ibid*.
[610] "Working Groups," online: FAO WECAFC <http://www.wecafc.org/en/working-groups.html> ["Working Groups"].
[611] *Ibid*.
[612] Scientific Advisory Group, *Coordination and Collaboration in Fisheries Research in the Region*, WECAFC/SAG/VII/2015/8 (2015), online: FAO <ftp://ftp.fao.org/FI/DOCUMENT/wecafc/7th_sag_2015/8e.pdf>.
[613] Scientific Advisory Group, *Summary Report of the Sixth Session of the Scientific Advisory Group (SAG) of WECAFC*, WECAFC/XV/2014/5 (2014), online FAO <ftp://ftp.fao.org/FI/DOCUMENT/wecafc/15thsess/5e.pdf>.
[614] *Report of the Fifteenth Session of the Western Central Atlantic Fishery Commission* (2014), online: WECAFC <www.wecafc.org/en/sessions-and-meetings/sessions/commission-reports.html> [*WECAFC Report*].

focused. Such an approach would not help sawfishes recover because they require different protective measures.

Central America Fisheries and Aquaculture Organization

The objectives of the Central America Fisheries and Aquaculture Organization (OSPESCA) are "to encourage the development and the coordinated management of regional fisheries and aquaculture activities, helping to strengthen the Central American integration process."[615] Its jurisdiction covers inland and marine waters of its member states but does not extend to the high seas.[616] OSPESCA is responsible for developing common fisheries and aquaculture policy for its member states under the Central American Integration System (SICA).[617] As such, it has authority to issue binding directives to harmonize legislation among member states and achieve effective management of the common fisheries resources.[618]

OSPESCA actively promotes application of the Code of Conduct among its members. This effort was recognized in 2013, when OSPESCA was awarded the Margarita Lizárraga Medal for outstanding contribution to the implementation of the Code of Conduct.[619] As discussed in the previous chapter, the Code of Conduct contains provisions that support sawfish conservation, such as the need to consider non-target species in fisheries management plans, use gear that minimizes impact on biodiversity, and protect critical fish

[615] "Central America Fisheries and Aquaculture Organization (OSPESCA)," online: FAO <www.fao.org/fishery/rfb/ospesca/en>.
[616] *Ibid*.
[617]Central American Integration System, Regional Unit for Fisheries and Aquaculture, "Fisheries and Aquaculture Integration Policy for the Central American Isthmus", online FAO <ftp://ftp.fao.org/fi/DOCUMENT/ospesca/publications/FisheriesAquacultureIntegrationPolicyCentralAmerica.pdf>.
[618] *Ibid*.
[619] "Margarita Lizárraga Medal Award," online: FAO < http://www.fao.org/fao-awards/conference-awards/margarita-lizarraga/en/>.

habitats. As part of the policy on integration of fisheries and aquaculture under the Central American Integration System (SICA), OSPESCA developed a voluntary Code of Ethics for Responsible Fisheries and Aquaculture in the Central America Countries (Regional Code of Ethics) that was subsequently adopted by its member states.[620] This document also encourages states to develop and use fishing gear and methods that minimize damage to marine habitats and reduce by-catch, as well as establish measures to protect ecosystems.

With regards to shark conservation, members of OSPESCA adopted the Regional Plan of Action on Sharks (Regional Plan), which covers all chondrichthyan species.[621] The Regional Plan calls on states to enact special protection measures for threatened chondrichthyans such as prohibition on capture, gear restriction or area closures, but acknowledges that the socio-economic impacts of such actions have to be considered. Nevertheless, the Regional Plan explains how loss of a species or genetic variability within a species reduces biodiversity impacting ecological processes and human benefits. Other Regional Plan recommendations that are relevant to this discussion include implementing measures to reduce by-catch, raising public awareness about conservation activities and threats facing chondrichthyans and their habitats, as well as improving traceability of exported chondrichthyans and their products.

The practice of shark finning is prohibited within OSPESCA member territories.[622] All sharks have to be landed with fins naturally attached.[623] Furthermore, exports from and

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[620] "Code of Ethics for Responsible Fisheries and Aquaculture in the States of the Central American Isthmus" (2011), online: FAO <ftp://ftp.fao.org/FI/DOCUMENT/OSPESCA/publications/Ospesca_code_of_ethics.pdf>.
[621] Julio Lamilla Gómez, "Plan de Acción Regional de Tiburones para Centroamerica (PRATC)" (June 2010), online: OSPESCA <www.sica.int/busqueda/busqueda_basica.aspx> (search for **"**Regional de Tiburones").
[622] "Central America and Dominican Republic Outlaw Shark Finning" (2012), online: IISD Reporting Service Natural Resources Policy & Practice <nr.iisd.org/news/central-america-and-dominican-republic-outlaw-shark-finning/>.
[623] *Ibid*.

imports into member states of unattached shark fins have to be accompanied by a document certifying that these fins are not a product of finning.[624]

Seven countries on the Priority List are members of OSPESCA.[625] The fact that the organization promotes the Code of Conduct, along with the ecosystem and precautionary approaches to fisheries management,[626] supports the idea of sawfish conservation. Sawfish protection would also fit within the framework of shark conservation outlined in the Regional Shark Plan. While incidentally caught sawfishes could be a source of food and income, they are too rare to be relied upon by the local communities. Therefore, it is unlikely that a prohibition on sawfish capture would have socio-economic consequences. However, the reality is that despite the acknowledgment of the need to protect threatened and endangered species and their habitats, little concrete action is being taken. When the Regional Shark Plan reviewed national shark plans, it found that all states on the Priority List promoted conservation of threatened species and their habitats in principle. However, none of these states introduced specific measures targeting fisheries that incidentally catch chondrichthyans or brought in protection for juveniles, gravid females, or breeding grounds.

Latin American Organization for Fisheries

Another regional fisheries body in the Caribbean Region is the Latin American Organization for Fisheries (OLDEPESCA).[627] Its objectives are "to meet Latin American food requirements adequately, making use of Latin American fishery resource potential for

[624] *Ibid*.
[625] Belize, Costa Rica, Dominican Republic, Guatemala, Honduras, Nicaragua, and Panama.
[626] "Preguntas Frecuentes," online: OSPESCA <http://www.sica.int/busqueda/busqueda_basica.aspx?IdCat=15&IdMod=9&IdEnt=47&Idm=1&IdmStyle=1>.
[627] "Latin American Organization for Fisheries (OLDEPESCA)," online: FAO <http://www.fao.org/fishery/rfb/oldepesca/en>.

the benefit of Latin American peoples, by concerted action in promoting the constant development of the countries and the permanent strengthening of regional cooperation in this sector." [628] OLDEPESCA's area of competence is also limited to inland and marine waters under the jurisdiction of its member states.[629]

OLDEPESCA has been working with FAO to implement the Code of Conduct, as well as IPOA-SHARKS. [630] In its regional project on management and conservation of sharks, applicable to all chondriichthyan species, OLDEPESCA members are encouraged to adopt measures to minimize shark finning, decrease chondrichthyan by-catch, and protect threatened and endangered species, along with species that are vulnerable to interactions with fisheries. [631]

Eight countries on the Priority List are members of OLDEPESCA[632] and, as such, agreed to implement the measures described above. As discussed throughout this thesis, measures to eliminate shark finning, reduce by-catch, and protect species at risk would be beneficial to sawfishes. However, given OLDEPESCA's objective described in the beginning of this section, it is not likely specific implementation of these measures is going to be significantly different than in OSPESCA, especially since half of OLDEPESCA's members are also members of OSPESCA.

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[628] *Ibid*.
[629] *Ibid*.
[630] *Proyecto Regional Sobre Ordenacion y Conservacion del Tiburon*, OLDEPESCA-XXI-CM-2010-DI.10 (2010), online: OLDEPESCA <www.oldepesca.com/userfiles/DI_10_2010_PROYECTO_TIBURON.pdf>.
[631] *Ibid*.
[632] Belize, Costa Rica, Cuba, Guyana, Honduras, Mexico, Nicaragua, and Venezuela.

Caribbean Regional Fisheries Mechanism

The Caribbean Regional Fisheries Mechanism (CRFM) counts "efficient management and sustainable development of marine…resources within the jurisdictions of Member States"[633] as one of its objectives. The organization is guided by principles that include preservation of marine biodiversity, sustainable fishing methods, and the precautionary approach "to sustainable use and management of fisheries resources."[634] It promotes the ecosystem approach and the Code of Conduct among its members.[635]

As already mentioned, CRFM is involved in several WECAFC's species-specific working groups.[636] It is also interested in working with OSPESCA in "research, development and management of fisheries of regional interest, such as Queen Conch and Lionfish."[637] However, it does not appear that CRFM has developed or is promoting a shark conservation plan.

Five countries on the Priority List are members of CRFM,[638] with some membership overlap with OSPESCA and OLDEPSCA.

Caribbean Fishery Management Council

The Caribbean Fishery Management Council (CFMC) consists of the U.S., Puerto Rico, and the U.S. Virgin Islands. Its purpose is to administer U.S. fisheries legislation and

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[633] "Agreement Establishing the Caribbean Regional Fisheries Mechanism" at art 4(a), online: CRFM <http://www.crfm.net/index.php?option=com_k2&view=item&layout=item&id=2&Itemid=116> ["CRFM Agreement"].
[634] CRFM Agreement at art 5(c).
[635] CRFM Secretariat, "CRFM Strategic Plan (2013-2021) [provisional]," online: CRFM <www.crfm.net/images/CRFM_Strategic_Plan_updated_30_Jan_2015_FINAL_Online_version-signed.pdf> ["CRFM Plan"].
[636] "Working Groups", *supra* note 610.
[637] "CRFM Plan", *supra* note 635 at 9.
[638] Bahamas, Belize, Guyana, Haiti, and Suriname,

design fisheries management plans for the U.S. EEZ in the Caribbean.[639] CFMC is not helpful to sawfish conservation in the Caribbean because the U.S. is the only country on the Priority List that is a member of the organization. Its national sawfish recovery plan is governed by the ESA and administered by the NMFS.

International Commission for the Conservation of Atlantic Tunas

The International Commission for the Conservation of Atlantic Tunas (ICCAT) administers the International Convention for the Conservation of Atlantic Tunas (ICCAT Convention), which covers "all waters of the Atlantic Ocean, including the adjacent Seas."[640] The Convention is predominately concerned with managing tuna and tuna-like stocks; but it is also involved in implementing limited[641] shark conservation measures.[642] One of the main measures is the requirement that vessels do not have "onboard fins that total more than 5% of the weight of sharks onboard."[643] A proposal to strengthen this shark-finning measure by requiring sharks to be landed with their fins naturally attached has been advanced but not adopted.[644] Despite the fact that sawfishes have very valuable shark fins, it is unlikely that even an improved finning measure would help the species, partly because of the low frequency of interaction between ICCAT-regulated fisheries and sawfishes. From the available ICCAT by-catch data, there are no records of sawfishes caught by any major tuna

[639] "About the CFMC," online: CFMC < http://www.caribbeanfmc.com/about_us.html>.
[640] *International Convention for the Conservation of Atlantic Tunas*, 14 May 1966, 673 UNTS 63 (entered into force 21 March 1969) at art 1.
[641] "Atlantic Fishery Managers Fail Sharks Yet Again" (2014), online: Shark Advocates International <www.sharkadvocates.org/atlantic_fishery_fails_sharks_again.html>.
[642] "Introduction" (2007), online: ICCAT <www.iccat.int/en/introduction.htm>.
[643] *Recommendation by ICCAT Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT*, 04-10 at para 3, online: ICCAT <www.iccat.int/Documents%5CRecs%5Ccompendiopdf-e%5C2004-10-e.pdf>.
[644] International Commission for the Conservation of Atlantic Tunas, "Report for Biennial Period 2014-2015, Part II (2015) – vol 1", online: ICCAT <www.iccat.int/Documents/BienRep/REP_EN_14-15_I-1.pdf>.

fishery in the Atlantic and Mediterranean.[645] Sawfishes are also not included in the list of 62 elasmobranchs identified for monitoring by the ICCAT By-catch Co-ordination Study.[646]

Caribbean Large Marine Ecosystem Project

The CLME project aims to change the fragmented reality of Caribbean fisheries regulation and marine management by bringing together the organizations discussed in this section, along with others, under the umbrella of ecosystem based management and ecosystem approach to fisheries (EBM/EAF).[647] The project focuses on three key ecosystems that support fisheries and biodiversity in the Caribbean Region: coral reef ecosystem, pelagic ecosystem, and continental shelf ecosystem.[648] These ecosystems are being impacted by unsustainable fisheries, habitat degradation, and pollution – identified as the priorities for action by the participating states. [649] Through a series of Transboundary Diagnostic Analyses, it was determined that these problems are caused by: "weak governance; limited human and financial resources; inadequate knowledge; inadequate public awareness and participation; inadequate consideration of the value of ecosystem goods and services; population and cultural pressures; and trade and external dependency."[650]

To implement the EBM/EAF, the CLME project will rely on international agreements already in place in the region. Based on this framework, the CLME will develop information-

[645] "Bycatch Species" (2007), online: ICCAT <www.iccat.int/en/bycatchspp.htm>.
[646] John Cotter, "ICCAT By-catch Co-ordination Study" (2010) online: ICCAT <www.iccat.int/Documents/ByCatch/FinalReport-20100707.pdf>.
[647] While the FAO Ecosystem Guidelines, *supra* note 456, differentiate between these terms, the CLME project uses them together. Robin Mahon, Lucia Fanning & Patrick McConney, "Principled Ocean Governance for the Wider Caribbean Region" in Lucia Fanning, Robin Mahon & Patrick McConney, eds, *Towards Marine Ecosystem-based Management in the Wider Caribbean* (Amsterdam: Amsterdam University Press, 2011) 27 [Mahon, Fanning & McConney, "Ocean Governance"].
[648] "The Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME$^+$ SAP)" (2013), online: FAO < www.fao.org/fi/static-media/MeetingDocuments/WECAFC16/Ref12e.pdf> ["CLME$^+$ SAP"].
[649] *Ibid*.
[650] *Ibid* at 1.

sharing and decision-making strategies among all stakeholders that will result in a holistic management of the ecosystem.[651] The hope is that the EBM/EAF will be more effective than the fragmented approach to addressing the three common problems identified as priorities.[652]

The CLME has not yet adopted a comprehensive definition of EBM/EAF, but it will rely on ecosystem approaches described in multilateral environmental agreements and fisheries instruments for guidance.[653] In implementing EBM/EAF, the CLME project already recognizes that its course of action has to accommodate the needs of marine mammals, sea turtles, and seabirds.[654] Thus, there are strategies for these species that include monitoring distribution and abundance, protecting critical habitats, investigating ecological links with fisheries, and engaging stakeholders in education and conservation.[655] Since these are the marine species listed in Appendix II,[656] it appears that the CLME project indirectly included the SPAW Protocol within its framework.[657] However, it is unclear how other marine species, if they are listed under the SPAW Protocol, would be incorporated. Currently, the SPAW Protocol is identified as a tool for addressing habitat degradation but not for fisheries overexploitation.[658] Furthermore, the principle that "all species in an ecosystem are recognized as being important to the health of the ecosystem"[659] received low priority scores from stakeholders participating in a CLME seminar aimed at prioritizing principles of ocean

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[651] Mahon, Fanning & McConney, "Ocean Governance", *supra* note 647.
[652] Fanning, "Symposium", *supra* note 27.
[653] Lucia Fanning, Robin Mahon & Patrick McConney, "Focusing on Living Marine Resource Governance: The Caribbean Large Marine Ecosystem and Adjacent Areas Project" (2009) 37:3-4 Coastal Management 219 [Fanning, Mahon & McConney, "Resource Governance"].
[654] Julia Horrocks, Nathalie Ward & Ann M Haynes-Sutton, "An Ecosystem Approach to Fisheries: Linkages with Sea Turtles, Marine Mammals and Seabirds" in Lucia Fanning, Robin Mahon & Patrick McConney, eds, *Towards Marine Ecosystem-based Management in the Wider Caribbean* (Amsterdam: Amsterdam University Press, 2011) 123.
[655] *Ibid*.
[656] There are special protection and conservation measures in place for corals as well.
[657] However, Horrocks, Ward & Haynes-Sutton, *supra* note 654, stated that their concern is based on the ecotourism potential of these species.
[658] Mahon, "Governance Arrangement", *supra* note 54.
[659] Mahon, Fanning & McConney, "Ocean Governance", supra note 647 at 34.

governance.[660] This suggests that there is low interest among stakeholders to engage in conservation programs for endangered marine fishes such as sawfish.

Nevertheless, the focus of the CLME project on pollution control and habitat degradation is likely to benefit sawfishes, especially since all countries on the Priority List are participating in it.[661] A CLME Pilot Project on Management and Conservation of Reef Biodiversity and Fisheries[662] involved Montecristi National Park in the Dominican Republic and the neighbouring site of Caracol Bay in Haiti. Project activities included assessment of the ecosystem management needs, strengthening of management frameworks, and public education.[663] Both sites have coastal lagoons and extensive mangroves, [664] which are suitable sawfish habitat, and both countries are on the Priority List. If fisheries regulation and environmental management of these sites is improved for other fish species, it will have indirect benefits for sawfishes.

[660] *Ibid*.
[661] "CLME+ SAP", *supra* note 648.
[662] "Management and Conservation of Reef Biodiversity and Fisheries – Final Report", online: UNEP CEP <cep.unep.org/cep-documents/spaw/clme-final-report_mgt-conservation-of-reef-bd-fisheries.pdf>.
[663] *Ibid*.
[664] *Ibid*.

CHAPTER 8 – ASSESSMENT, RECOMMENDATIONS, AND CONCLUSION

Thus far, this thesis has reviewed global and regional, binding and non-binding instruments applicable to sawfish conservation in the Caribbean Region. Individual assessment of their effectiveness has been provided in the preceding three chapters. Throughout, the ecosystem approach to biodiversity conservation[665] and fisheries management[666] was treated as beneficial to sawfish conservation. By encouraging states to look beyond economic considerations[667] when dealing with marine species, the ecosystem approach supports conservation of non-commercial species, such as sawfishes. But the fact that the ecosystem approach has been accepted by all states on the Priority List[668] for over ten years, while very few of them have adopted sawfish protection measures, demonstrates a weakness in the implementation of this approach. Writing about biodiversity and ecosystem management, law professor Oliver Houck said: "however high we raise our sights towards managing the whole, the requirements of individual species will remain the bottom line, or we will have no bottom line, and the entire effort will fail."[669] Thus, the question is which global or regional instruments set the bottom line for managing the Caribbean sawfishes?

From the lack of conservation action, it would appear that there are no agreements that direct countries on the Priority List to protect sawfishes and to help them recover. But in reality, this is not the case. CBD requires 17 of the 18 countries on the Priority List to enact legislation protecting threatened species and to engage in conservation. Furthermore, the

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[665] See discussion on CBD.
[666] See discussion on UNFSA, FAO, WECAFC
[667] *Ecosystem Approach*, *supra* note 309 and Garcia, "Ecosystem Guidelines", *supra* note 456.
[668] All states on the Priority List, except U.S., are signatories to CBD. They are also all member of FAO, which recommends the ecosystem approach.
[669] Oliver A Houck, "On the Law of Biodiversity and Ecosystem Management" (1997) 81 Minn L Rev 869 at 872.

combination of CMS and the SPAW Protocol imposes binding obligations on 13 of the 18 countries on the Priority List[670] to adopt national measures to protect sawfishes specifically, or endangered and threatened species in general. These obligations are described in detail in Chapters 5 and 7. CBD measures would be easier to implement if there was more guidance. The regional effectiveness of CMS could be stronger if more countries on the Priority List were signatories. Similarly, listing sawfishes in Annex II of the SPAW Protocol would allow for parties on the Priority List to coordinate their conservation action. Even so, vagueness in definitions, low regional participation, and difficulties with listing discussed in Chapter 7 should not overshadow the national obligations of states that signed these agreements to protect sawfishes.

With respect to habitat protection, all the countries on the Priority List, except Haiti and Guyana, have designated protected areas under one of the instruments discussed in this thesis. All the countries are also signatories to the Ramsar Convention which imposes general obligations to engage in wise use of wetlands, as discussed in Chapter 5. Despite these measures,

> Most assessments conclude that the Caribbean Sea has been severely impacted by human uses: overexploitation of most coastal and offshore living marine resources, destruction of coastal habitats by tourism, industrial and urban development, and degradation of the marine environment by pollution from land- and ship-based sources.[671]

But it would be inaccurate to generalize these negative findings across all protected areas given that they vary in their objectives, management, and resources. It is necessary to review each site individually to accurately assess their individual effectiveness. The large-scale development projects in the Bahamas and Nicaragua highlighted in Chapter 3 raise concerns over the capacity of the reviewed legal instruments to mitigate adverse environmental

[670] Countries not covered are Guatemala, Haiti, Mexico, Nicaragua, and Suriname.
[671] Fanning, Mahon & McConney, "Resource Governance", *supra* note 653 at 226.

impacts when confronted with economic pressures. At the same time, the involvement of the Ramsar Secretariat in Nicaraguan canal development offers some hope that the principles of the Convention will be followed during the construction.

It is impossible to say how many of the designated sites cover suitable sawfish habitat without individual assessment. However, it is probably safe to say that outside of the U.S., protected area management plans in the countries on the Priority List do not include sawfish conservation measures. Likewise, critically important areas, such as nursery grounds, are probably not sufficiently protected despite the fact that they are critical to the survival of the species. In order to engage in targeted habitat protection, more research is needed into sawfish habitat use. As explained in chapter 2, researchers believe that sawfishes are born in shallow coastal and estuarine waters and move further offshore as they grow older. Tagging studies are underway in the U.S. and Bahamas to learn the details of these movement patterns.[672] However, it is doubtful that tagging studies are feasible in other Priority States given their very low sawfish population numbers.

The poor state of sawfish conservation in the Caribbean Region is likely explained by inadequate resources and different political priorities. States on the Priority List represent the economic and political complexity that exists in the Caribbean Region.[673] They vary in size and wealth and therefore have different capacities to adopt sawfish conservation measures. It should not come as a surprise that the three largest and wealthier nations[674] on the Priority List, U.S., Mexico, and Brazil, score the best on the IUCN priority ranking discussed in

[672] Simpfendorfer, Wiley & Yeiser, *supra* note 115, Simpfendorfer, "Environmental Influences", *supra* note 114, and T L Guttridge et al, "Occurrence and Habitat Use of the Critically Endangered Smalltooth Sawfish *Pristis pectinata* in the Bahamas," (2015) 87 J Fish Biology 1322.
[673] Fanning, Mahon & McConney, "Resource Governance", *supra* note 653.
[674] "The Richest Countries in the World" (2015), online: Global Finance <www.gfmag.com/global-data/economic-data/richest-countries-in-the-world?page=12>.

Chapter 1. After studying the implementation of the Cartagena Convention, business professor Benedict Sheehy concluded that there was an apparent lack of compliance with the obligations.[675] "[P]overty, unsustainable consumption patterns, and poorly managed social and economic development"[676] were discussed as factors contributing to poor implementation. Factors such as weak governance[677] at national and regional levels, and limited capacity at national levels were identified as challenges facing the Caribbean Region by the CLME project.[678] These inter-related factors need to be taken into account when envisaging the way forward for sawfish conservation in the Caribbean Region.

Recommendations

Four recommendations are made subsequently. They are aimed at improving the conservation status of sawfishes in the Caribbean Region. The first encourages greater cooperation between the SPAW Protocol and WECAFC. The second makes a case for greater CBD involvement in endangered species protection in the Caribbean by encouraging states to become parties to the SPAW Protocol and develop guidelines for national endangered species protection legislation. The third offers ideas on how to increase capacity and public awareness. The last one discusses strategies for sawfish habitat protection.

[675] Benedict Sheehy, "International Marine Environment Law: A Case Study in the Wider Caribbean Region" (2004) 16:3 Geo Intl Envtl L Rev 441.
[676] *Ibid* at 461.
[677] Described as "e.g., inappropriate national and regional institutional arrangements, low political will, lack of supporting legislation, inadequate enforcement" in Fanning, Mahon & McConney, "Resource Governance", *supra* note 653 at 226.
[678] Fanning, Mahon & McConney, "Resource Governance", *supra* note 653.

WECAFC and the SPAW Protocol Cooperation

The SPAW Protocol and WECAFC are selected for consideration as to cooperation because they have the best combination of regional focus and high degree of participation. All countries in the Caribbean Region, not only those on the Priority List, are members of WECAFC.[679] It is partners with all but one[680] regional fisheries body discussed in the previous chapter;[681] and it has been identified as the lead organization on fisheries by the CLME project.[682] The SPAW Protocol is the only regional instrument that deals with endangered species. Although, it does not have the same universal membership as WECAFC, it is binding and has enough parties to make a difference in the Region if it is implemented conscientiously.[683]

The recommendation to strengthen ties between the SPAW Protocol and WECAFC is consistent with the current trend in international environmental law. Numerous studies and reviews of the field recognize fragmentation as one of the challenges here and recommend cooperation arrangements between institutions as one of the solutions. [684] For example, there is the Biodiversity Liaison Group consisting of CBD, CITES, CMS, Ramsar, WHC, and two plant-related treaties[685] working to develop synergies and integration between the conventions, admittedly with limited success.[686] An example of a simpler arrangement is a

[679] "WECAFC," online: WECAFC < http://www.wecafc.org/en/menu/projects.html>.
[680] OLDEPESCA.
[681] "Partners," online: WECAFC <http://www.wecafc.org/en/menu/partners.html>.
[682] Mahon, "Governance Arrangement" *supra* note 54.
[683] 10 out of 18 Priority State have signed and ratified the SPAW Protocol, while altogether it has 16 members, with another 5 states signing but not ratifying the Protocol ("Status of the Cartagena Convention," online: CAR-SPAW-RAC < www.car-spaw-rac.org/IMG/pdf/pays_ratifies_spaw.pdf>).
[684] Karen N Scott, "International Environmental Governance: Managing Fragmentation through Institutional Connection" (2011) 12 Melbourne J Intl L 177.
[685] International Treaty on Plant Genetic Resources for Food and Agriculture and International Plant Protection Convention.
[686] "Minutes of the Tenth Ordinary Meeting of the Liaison Group of the Biodiversity-Related Conventions" (2015), online: CBD < www.cbd.int/doc/meetings/biodiv/brcws-2016-01/other/brcws-2016-01-blg-10-minutes-en.pdf>.

one-page Memorandum of Understanding (MOU) between FAO and CITES.[687] The MOU recognizes that both regimes have a role in conservation and management of commercially important fish species[688] and outlines the process for FAO involvement in amending the CITES Appendices.

The idea of engaging with fisheries organizations was approved by the parties of the SPAW Protocol in 2012.[689] The parties adopted a resolution encouraging the Secretariat to negotiate a memorandum of cooperation with these organizations "in the context of the listing of species in the Annexes of the SPAW Protocol."[690] WECAFC parties also expressed an interest in collaboration,[691] but it is less clear whether it extends to listing new species.[692] Nevertheless, an arrangement between the SPAW Protocol and WECAFC could push the parties towards adding eligible fishes to the Annexes. A strong correlation is observed between FAO recommendations and CITES listing decisions.[693] This was advantageous to sawfishes because, with FAO's support, sawfishes were listed under CITES by a vote of 67 to 30.[694] But FAO and CITES do not always agree on their listing recommendations,[695] which has been detrimental to some shark species.[696] Nevertheless, considering there are

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[687] "Memorandum of Understanding Between the Food and Agriculture Organization of the United Nations (FAO) and the Secretariat of the Convention on International Trade in Endangered Species (CITES)" (2006), online: CITES <cites.org/sites/default/files/eng/disc/sec/FAO-CITES-e.pdf>.
[688] Young, *supra* note 9.
[689] *Decisions of the Meeting*, *supra* note 570.
[690] *Ibid* at para 9.
[691] *WECAFC Report*, *supra* note 614.
[692] However, there were discussions among WECAFC parties about Nassau grouper, currently not listed, and the role the SPAW Protocol can play in its management. (*Report of the First Meeting of the CFMC/WECAFC/OSPESCA/CRFM Working Group on Spawning Aggregations, Miami, United States of America, 29-31 October 2013*, UNEP(DEPI)/CAR WG.36/INF.14 (2014), online: UNEP CEP <www.cep.unep.org/meetings/documents/332525cf2a6fb4129c2d9e53a41eb03a> [*Spawning Aggregations*]).
[693] Sikina Jinnah, *Post-Treaty Politics: Secretariat Influence in Global Environmental Governance* (Cambridge, Massachusetts: MIT Press, 2014).
[694] "CITES COP14 Highlights Monday, 11 June 2007" (2007), online: Earth Negotiations Bulletin <www.iisd.ca/vol21/enb2157e.html>.
[695] Jinnah, *supra* note 693.
[696] Richard Black, "Shark Trade Restriction Bid Fails" (2007), online: BBC News <news.bbc.co.uk/2/hi/science/nature/6735047.stm>.

currently no marine fish species listed under the SPAW Protocol, cooperation with WECAFC may be a necessary way forward.

But cooperation between the SPAW Protocol and WECAFC should not be limited to listing species. The need for biodiversity and fisheries organizations to work together was acknowledged by way of a resolution of CBD parties, which includes all but one country on the Priority List. [697] In the resolution, the parties recognized that the regional fisheries organizations have to play a role in addressing impacts of fisheries on biodiversity, and encourage collaboration between the two sides. The FAO Ecosystem Approach specifically points out the need for "closer integration"[698] between organizations concerned with survival of endangered species and those concerned with harvesting. Researchers are also calling for complementary action between global and regional conservation conventions and regional fisheries organizations to help the threatened chondrichthyans.[699]

As already mentioned, WECAFC members have expressed an interest in working with the SPAW Protocol. [700] In particular, they are interested in collaborating to manage spiny lobster and queen conch, both listed in Annex III. WECAFC members also "agreed to improve coordination and strengthen collaboration on matters of mutual interest (e.g. regional management plans, support to WGs [working groups])," [701] and to encourage more states to becomes parties to the SPAW Protocol.[702] Furthermore, the WECAFC working

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[697] *Marine and Coastal Biodiversity: Sustainable Fisheries and Addressing Adverse Impacts of Human Activities, Voluntary Guidelines for Environmental Assessment, and Marine Spatial Planning*, UNEP/CBD/COP/DEC/XI/18 (2012), online: CBD <www.cbd.int/doc/decisions/cop-11/cop-11-dec-18-en.pdf>.
[698] Garcia, "Ecosystem Guidelines", *supra* note 456 at 32.
[699] Dulvy, *supra* note 140.
[700] *WECAFC Report*, *supra* note 614.
[701] *Ibid* at para 37.
[702] *WECAFC Report*, *supra* note 614.

group on Nassau grouper, a species assessed as endangered by IUCN[703] but not listed under the SPAW Protocol, discussed the role the Protocol could play in managing the species.[704]

This is not to say that establishing collaboration between the two organizations will be easy. The SPAW Protocol has been criticized for failing to consider the livelihood and development needs of its parties.[705] While its emphasis on regulation and prohibition is seen as a barrier to collaborative initiatives regarding sustainable development.[706] WECAFC, on the other hand, is a fisheries organization focused on utilization of marine resources. This presents a potential conflict on account of the history of disagreement along preservation-utilization lines among CITES parties, as well as CITES and FAO.[707] Despite the differences, there is also potential common ground. Both WECAFC and the SPAW Protocol endorse the ecosystem approach.[708] In its presentation to WECAFC parties, the SPAW Programme Officer explained:

> SPAW objectives are to conserve and sustainably manage the marine biodiversity of the WCR through the protection of threatened and endangered species and their habitats and related ecosystem. In this context, the SPAW follows an ecosystem management approach while also focusing on priority [listed] species which require special attention.[709]

Furthermore, all countries on the Priority List agreed to proceed with management of the marine resources in the Region based on the ecosystem approach under the CLME project.[710] Thus, WECAFC and the SPAW Protocol could have complementary roles in maintaining marine biodiversity and fisheries. Sawfish conservation could be a starting point for the collaborative relationship between WECAFC and the SPAW Protocol because sawfishes do

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[703] "Epinephelus striatus," online: Red List <www.iucnredlist.org/details/7862/0>.
[704] *Spawning Aggregations*, *supra* note
[705] Krishnarayan, Renard & John, *supra* note 542.
[706] Krishnarayan, Renard & John, *supra* note 542 at 275.
[707] Jinnah, *supra* note 693 and Young, *supra* note 9.
[708] WECAFC Statute art 2(a) and "Cartagena and SPAW: Introduction," online: CAR SPAW RAC <www.car-spaw-rac.org/?Cartagena-and-SPAW-introduction,50>.
[709] *SPAW Protocol and Fisheries Management*, WECAFC/XV/2014/8 (2014), online: FAO <ftp://ftp.fao.org/FI/DOCUMENT/wecafc/15thsess/8e.pdf>.
[710] "CLME+ SAP", *supra* note 648.

not present contentious issues associated with direct fisheries. At the last conference of the parties to the SPAW Protocol, 14 shark and ray species were proposed for listing in Annex II.[711] This means that, eventually, there may be several chondrichthyan species recognized as threatened or endangered in the Caribbean Region requiring collaboration between the two organizations.

Increased CBD Involvement in Endangered Species Protection

Cooperation between WECAFC and the SPAW Protocol, by itself, will not be enough to motivate countries to engage in sawfish conservation. CBD needs to assume a greater role in protecting threatened species in the Caribbean by encouraging additional states to become parties to the SPAW Protocol and provide support to identify threatened species and enact requisite protection.

As explained in Chapter 7, the SPAW Protocol is meant to be a tool that assists its parties in complying with obligations under multilateral environmental agreements, including CBD. This is means that CBD should be helping the SPAW Protocol recruit additional parties, especially since there are countries on the Priority List that signed, but not ratified the Protocol.[712] The SPAW Protocol provides for species-specific and habitat protection measures, thus addressing both elements of *in-situ* conservation recognized as central to biodiversity conservation by CBD. In Chapter 7 it was also argued that the SPAW Protocol is the best instrument to ensure a future for the Caribbean sawfishes and by extension, other threatened species in the Region.

[711] *Working Group*, *supra* note 568.
[712] Guatemala and Mexico.

Supporting the SPAW Protocol would be consistent with the principle of subsidiarity, recognized as an element of good governance.[713] In general terms the principle means that "any particular task should be decentralized to the lowest level of governance with the capacity to conduct it satisfactorily."[714] The SPAW Protocol fits this definition with respect to protection of threatened species in the Caribbean. Furthermore, the principle of subsidiarity is being implemented by the CLME project, indicating national-level support for this approach in the Region.[715]

To attract additional parties to the SPAW Protocol, CBD needs to provide incentives. It appears that CBD has done that with respect to protected areas through the Caribbean Challenge Initiative (CCI). This regional partnership aimed at achieving CBD goals brings together government leaders, business leaders, private foundations, and NGOs to "effectively conserve and manage at least 20% of the marine and coastal environment by 2020." [716] Securing sustainable financing is a major component of the CCI. Participating governments agree to establish national conservation trust funds endowed by sources such as tourism fees and dedicate them to management of protected areas.[717] The Initiative is also supported by the Caribbean Biodiversity Fund, among other donors and development agencies. [718] The CCI has partnered with the SPAW Protocol on a project that supported the MPAs "towards building a biologically-representative, functional network of marine protected areas."[719] By helping countries establish sustainable financing for their projects, CCI removes one of the

[713] Robin Mahon et al, *Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean. Volume 2. Areas Beyond National Jurisdiction* (Paris: UNESCO-IOC, 2015).
[714] Graham R Marshall, "Nesting, Subsidiarity, and Community-Based Environmental Governance Beyond the Local Level" (2008) 2:1 Intl J Commons 75 at 80.
[715] "CLME+ SAP", *supra* note 648.
[716] "Caribbean Challenge Initiative Summit Outcomes" (2013), online: CBD <www.cbd.int/cooperation/cci/>.
[717] "The Caribbean Challenge Initiative", online: The Nature Conservancy <www.nature.org/ourinitiatives/regions/caribbean/caribbean-challenge.xml>.
[718] "The Caribbean Challenge Initiative", *supra* note
[719] "SPAW Overview", *supra* note 544.

main obstacles to conservation. Given this valuable element of the Initiative, it is unclear why participation is limited to nine countries. The Bahamas is the only country on the Priority List that is involved. Furthermore, it does not appear that CCI is engaged in species conservation.[720] This is a missed opportunity considering that concern for threatened species is clearly expressed in the CBD text and Aichi Biodiversity Targets. CBD either needs to encourage CCI to expand its mandate to involve more countries and partner with the SPAW Protocol to address species concerns or develop a similar initiative that deals with these points.

In addition to encouraging states to become parties to the SPAW Protocol, CBD needs to help states identify species that are threatened and enact appropriate legislation. The fact that sawfish populations declined significantly, while few range states adopted protective measures in response, demonstrates a failure in CBD implementation globally, and not only in the Caribbean. One way to address this issue is for CBD to develop guidelines on how to identify species that are threatened and should be protected. Developing criteria that combine IUCN assessment and listing under conventions such as CMS, CITES, and UNCLOS could make national-level conservation status evaluations more cost-effective. The guidelines must explain how to tailor such broad criteria to national conditions to lessen concerns over scientific validity of the assessments. Furthermore, as briefly mentioned in Chapter 6 and in light of the preceding recommendation, CBD should cooperate with FAO to develop guidelines for threatened and endangered marine species.

Although convenient, it is unlikely that all states will be willing to adopt such an approach. The SPAW Protocol Working Group on listing species unsuccessfully relied on

[720] At the latest CCI Summit of Caribbean Political and Business Leaders in 2013, the participants agreed on the urgent need to protect sharks and rays in the Region, "with the aim of protecting within two years." However, it is unclear what measures are being taken to achieve this goal.

criteria similar to the ones discussed above at the last conference of the parties.[721] Some delegates objected to the Working Group's listing proposal, claiming there was insufficient information on the status of the species in the Caribbean Region.[722] This is a disappointing precedent. While the need for accurate scientific information is understandable and desirable, it should not be used to deny protection to species that are clearly declining across their range, such as sawfishes. To the contrary, CBD should offer states cost-effective and scientifically valid tools to identify species at risk within their territories before it is too late.

CBD should not stop at encouraging states to identify threatened species, but also help them enact effective protective legislation. However, traditional endangered species protection legislation has been criticized for being inconsistent with the ecosystem approach and failing to correspond to the reality of nature.[723] As a global convention with almost universal membership, CBD is in a position to review national legislation protecting threatened species, identify common elements, and offer recommendations on how to make them consistent with the ecosystem approach and flexible enough to accommodate new scientific knowledge.

Building Capacity and Public Awareness

But greater collaboration between WECAFC and the SPAW Protocol and better national legislation are not likely to increase available resources. WECAFC already has a sharks working group (which potentially could include sawfishes), but as explained in Chapter 7, the group does not have enough money to conduct its work. In these circumstances, NGOs and donors could bring resources from outside the Caribbean Region.

[721] *Working Group*, *supra* note 568.
[722] *Report of the Meeting*, *supra* note 572.
[723] See for example, Houck, *supra* note 669 and Holly Doremus, "The Endangered Species Act: Static Law Meets Dynamic World" (2010) 32 Wash U J L & Pol'y 175.

International organizations, such as Save Our Seas Foundation, are funding sawfish research, conservation, and education projects in different parts of the world.[724] The World Wildlife Fund is working to "regulate the trade in shark fins and meat and reduce market demand"[725] which would benefit sawfishes.

In order to bring resource to the Priority States for sawfish conservation, saving this fish has to be recognized as a concern at the national and regional levels. The IUCN Shark Specialist Group (SSG) should organize a regional workshop for stakeholders from the Priority States to raise awareness about sawfishes and develop a regional conservation plan. A regional workshop would be consistent with the IUCN SSG mandate[726] and the course of action proposed in the Global Strategy. Since sawfishes are a popular aquarium attraction, aquaria that hold sawfishes could be asked to support the regional workshop.[727] The Global Strategy lists 14 aquaria in the U.S. and Bahamas that have sawfish exhibits, presenting a fundraising opportunity.

National level NGOs, as well as local-level fisheries organizations have to be a part of the regional sawfish conservation plan. These groups can help implement conservation measures, raise public awareness about the issues, and push politicians within the countries to support sawfish conservation at the national and international levels. Partnering with local conservation groups that focus on species sharing the same threats or habitats as sawfishes (sea turtles and manatees, for example) could be synergistic. For example, in Costa Rica,

[724] "Keystone Grants," online: Save Our Seas Foundation <saveourseas.com/keystone-grants/>.
[725] "Species Shark Overview," online: WWF <www.worldwildlife.org/species/shark>.
[726] "Conservation Strategies: Sawfish," online: IUCN SSC Shark Specialist Group <www.iucnssg.org/conservation-strategies-sawfish.html>.
[727] IUCN/SCC, *Strategic Planning for Species Conservation: A Handbook* (Gland, Switzerland: IUCN Species Survival Commission, 2008).

Programa Restauración de Tortugas Marinas (PRETOMA) is working towards sustainable fisheries by minimizing their impacts on sea turtles and sharks.[728]

Engaging the academic community in the Caribbean is another opportunity to attract resources and increase awareness about sawfishes. For example, Centre for Resource Management and Environmental Studies (CERMES) works on sustainable development in the Region.[729] It conducts research, leads regional environmental projects, and engages in outreach activities.[730] But given its focus on sustainable development and broad issues such as socio-economic monitoring for coastal management,[731] it is unlikely that CERMES would be interested in a single species. Nevertheless, a project that looks at threatened chondrichthyan species in coastal waters, discussed in the next recommendation, could be potentially appealing.

Finally, to sustain sawfish conservation in the Caribbean beyond a workshop, there is a need for a regional forum that would bring together NGOs, donors, government officials, and academics to coordinate conservation projects, share expertise and resources, and raise more awareness about the species. This reiterates the need for a strong SPAW Protocol and projects like CCI discussed in the preceding recommendation.

Habitat Protection

With respect to habitat protection, it has been noted that the only populations of sawfishes not in immediate danger of extinction are those found in highly protected areas, or

[728] "About Us," online: PRETOMA < http://www.pretoma.org/about-us/>.
[729] "Welcome to CERMES", online: The University of the West Indies <www.cavehill.uwi.edu/cermes/home.aspx>.
[730] "About Us: Mission", online The University of the West Indies <www.cavehill.uwi.edu/cermes/about-us/mission.aspx>.
[731] "Research and Outreach", online: The University of the West Indies <www.cavehill.uwi.edu/cermes/projects.aspx>.

in unfished, remote coastal areas.[732] However, it is highly unlikely that large areas can be set aside under strict protection, given that exclusionary policies can be politically unpopular.[733] It is therefore recommended that the countries on the Priority List review protected areas already established, including areas protected under national legislation, which fall outside the scope of this thesis to discuss, for suitable sawfish habitat. For internationally designated sites, this review could be a part of the reporting requirements under Ramsar, WHC, SPAW or MAB Programme. In areas where sawfishes could still exist, management plans should be developed or amended to include conservation measures.

Species' needs, such as nursery grounds and habitat connections to accommodate ontogenic changes in use, must be identified and effectively protected. Designating these areas under the SPAW Protocol is the recommended course of action for countries that are parties because the Protocol's listing criteria specifically apply to habitats of endangered species, while the recommended measures provide for strict protection when necessary. Countries that are not parties could use national legislation to achieve a similar result. All countries on the Priority List should continue to implement the Ramsar Convention and engage in the CLME project in order to improve the state of their coastal ecosystems, as this would indirectly benefit sawfishes as well.

As mentioned in Chapter 6 and in the preceding recommendation, the MAB Programme could form a foundation for a regional initiative aimed at threatened chondrichthyan species in coastal waters. Since using Biosphere Reserves for research and

[732] *CMS Proposal*, *supra* note 58.
[733] Josep Maria Mallarch et al, "In Defence of Protected Landscapes: A Reply to Some Criticisms of Category V Protected Areas and Suggestions for Improvement" in Nigel Dudley & Sue Stolton ed, *Defining Protected Areas: An International Conference in Almeria, Spain* (Gland, Switzerland: IUCN, 2008) 31.

education is a major component of the MAB Programme, partnering with CERMES to carry out the initiative could be a good fit.

Conclusion

There are two species of sawfish that used to be common in the Caribbean and formed part of indigenous cultures: smalltooth sawfish and largetooth sawfish. Both of these species are currently assessed as critically endangered in large part due to anthropogenic impacts such as direct and indirect fishing pressure, trade in body parts, and habitat degradation.

The thesis reviewed global and regional, binding and non-binding instruments in effect in the Caribbean Region that encourage states to engage in biodiversity conservation or address identified threats to sawfishes. The objective was to identify obligations agreed to by the eighteen countries on the Priority List that could help sawfishes recover. Given that only four countries on the Priority List have measures in place protecting the species, suggests that there are no agreements in place that direct the Priority States to engage in sawfish conservation. However, this is not the case. Almost all parties on the Priority List agreed to obligations to protect the marine environment under UNCLOS and apply the ecosystem approach to preserve biodiversity under CBD. Three countries on the List agreed to protect sawfishes by virtue of being parties to CMS, while ten countries assumed these obligations under the SPAW Protocol. All countries on the Priority List are parties to CITES and as such, support prohibition on trade in sawfish body parts.

The thesis also discussed non-binding fisheries instruments such as the U.N. General Assembly Resolutions, the Code of Conduct, and the FAO Ecosystem Approach that

encourage protection for endangered and threatened species and reduction in by-catch. The later FAO guidelines are promoted by regional fisheries organizations discussed in the thesis. Furthermore, IPOA-SHARKS and Sharks MOU set out measures that states could use as a foundation for sawfish conservation program.

With respect to habitat, almost all countries on the Priority List have designated protected areas under one of the instruments reviewed in this thesis. However, it is impossible to assess how many of these sites effectively protect sawfish habitat without reviewing each site individually. All countries on the List are participating in the CLME project aimed at addressing pollution and habitat degradation issues in the Region.

Despite these global and regional instruments in place, the future of Caribbean sawfishes remains uncertain unless actions are taken. Recommendations outline additional steps that the Priority States and intergovernmental organizations could take to improve the conservation status of sawfishes in the Region.

Sawfishes are some of the most unique and rare fishes in the world. Obviously, the reviewed legal documents that, otherwise, encourage states to protect these species and restore their populations cannot do this without political and public support. The need is to rationalize the obligations impose by legal instruments with actions to preserve biodiversity not only for human benefit, but most likely, out of compassion for these irreplaceable species. Otherwise, sooner than later, they would disappear, with cascading consequences for ecosystem integrity and cultural continuity.

APPENDIX 1 – PRIORITY STATES AND THEIR PARTICIPATION IN THE DISCUSSED INSTRUMENTS

Conventions, Shark Instruments, and Other

		Global				Regional		Sharks	
	IUCN Category/ Priority	**LOSC**	**CBD**	**CITES**	**CMS**	**SPAW/ Cartagena**	**CLME**	**IPOA-SHARKS**	**Shark MOU**
Bahamas	2/1	Yes	Yes	Yes		SPAW	Yes		
Belize	1/2	Yes	Yes	Yes		SPAW	Yes	Yes	
Brazil	3/1	Yes	Yes	Yes	Yes		Yes	Yes	
Colombia	1/1	*	Yes	Yes		SPAW	Yes	Yes	Yes
Costa Rica	1/2	Yes	Yes	Yes	Yes	Cartagena	Yes	Yes	Yes
Cuba	1/1	Yes	Yes	Yes	Yes	SPAW	Yes		
Dominican Republic	1/2	Yes	Yes	Yes		SPAW	Yes		
French Guiana	1/1	Yes	Yes	Yes	Yes	SPAW	Yes		
Guatemala	1/2	Yes	Yes	Yes		SPAW*	Yes	Yes	
Guyana	1/1	Yes	Yes	Yes		SPAW	Yes		
Haiti	1/2	Yes	Yes				Yes		
Honduras	2/1	Yes	Yes	Yes	Yes	Cartagena*	Yes		
Mexico	3/2	Yes	Yes	Yes		SPAW*	Yes	Yes	
Nicaragua	2/1	Yes	Yes	Yes		Cartagena*	Yes		
Panama	1/1	Yes	Yes	Yes	Yes	SPAW	Yes		
Suriname	1/1	Yes	Yes	Yes			Yes		
U.S.	3/2			Yes		SPAW	Yes	Yes	Yes
Venezuela	1/1		Yes	Yes		SPAW	Yes	Yes	

* signed but not ratified

IUCN Categories:
(1) Legislation protecting sawfishes does not exist;
(2) Legislation does not cover all relevant species in a specific manner;
(3) Legislation is sufficient but it is not adequately enforced.

Fisheries

	FAO	UNFSA	ICCAT	WECAFC	CRFM/OSPECA/CFMC/OLDEPESCA
Bahamas	Yes	Yes		Yes	CRFM
Belize	Yes	Yes	Yes	Yes	CRFM/OSPESCA/OLDEPESCA
Brazil	Yes	Yes	Yes	Yes	
Colombia	Yes			Yes	
Costa Rica	Yes	Yes		Yes	OSPESCA/OLDEPESCA
Cuba	Yes			Yes	OLDEPESCA
Dominican Republic	Yes	Yes		Yes	OSPESCA
French Guiana	Yes	Yes	Yes	Yes	
Guatemala	Yes		Yes	Yes	OSPESCA
Guyana	Yes			Yes	CRFM/OLDEPESCA
Haiti	Yes			Yes	CRFM
Honduras	Yes		Yes	Yes	OSPESCA/OLDEPESCA
Mexico	Yes		Yes	Yes	OLDEPESCA
Nicaragua	Yes		Yes	Yes	OSPESCA/OLDEPESCA
Panama	Yes	Yes	Yes	Yes	OSPESCA
Suriname	Yes			Yes	CRFM
U.S.	Yes	Yes	Yes	Yes	CFMC
Venezuela	Yes		Yes	Yes	OLDEPESCA

Protected Areas

	SPAW Protected Area	Ramsar	MAB Reserve	WHC Natural Site
Bahamas		Yes		
Belize	Yes	Yes		Yes
Brazil		Yes	Yes	Yes
Colombia	Yes	Yes	Yes	Yes
Costa Rica		Yes	Yes	Yes
Cuba	Yes	Yes	Yes	Yes
Dominican Republic	Yes	Yes	Yes	
French Guiana	Yes	Yes		
Guatemala		Yes		Yes
Guyana				
Haiti				
Honduras		Yes	Yes	Yes
Mexico		Yes	Yes	Yes
Nicaragua		Yes	Yes	
Panama		Yes	Yes	Yes
Suriname		Yes		Yes
U.S.	Yes	Yes		Yes
Venezuela		Yes	Yes	Yes

* Ramsar, UNESCO and World Heritage current to 2014

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Convention Concerning the Protection of the World Cultural and Natural Heritage, 23 November 1972, 1037 UNTS 151 (entered into force 15 December 1975).

Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, 24 March 1983, 1506 UNTS 157 (entered into force 11 October 1986).

Convention on Biological Diversity, 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993).

Convention on Conservation of Migratory Species, 23 June 1979, 1651 UNTS 333 (entered into force 1 November 1983).

Convention on International Trade in Endangered Species of Wild Fauna and Flora, 3 March 1973, 993 UNTS 243(entered into force 1 July 1975).

Convention on Wetlands of International Importance, 2 February 1971, 996 UNTS 245 (entered into force 21 December 1975).

Endangered Species Act, 16 USC §1531 (1973).

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International Convention for the Conservation of Atlantic Tunas, 14 May 1966, 673 UNTS 63 (entered into force 21 March 1969).

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