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STRENGTHENING MARINE SPECIES PROTECTIONS IN CUBA: A CASE STUDY ON THE CRITICALLY ENDANGERED SMALLTOOTH SAWFISH

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Abstract: The Smalltooth Sawfish (*Pristis pectinata*), a critically endangered species of ray, is in urgent need of strong legal protection and conservation action in the Wider Caribbean Region, particularly in Cuba. Cuba has a long history of conservation initiatives for other marine species and is a signatory to multiple multinational agreements that direct the country to protect sawfish. Nevertheless, sawfish are only just beginning to be a species of concern on the island. Here we review existing domestic laws relevant to biodiversity and endangered species protection in Cuba, with a focus on safeguarding sawfish. We offer specific recommendations to improve sawfish protection in Cuba through clear prohibitions on killing and harassment, as well as safe release requirements for incidentally captured individuals.

Key words: Endangered species, Fisheries, Wider Caribbean Region, Elasmobranch conservation

Introduction

Two species of sawfishes were once common in the Wider Caribbean Region (WCR): Smalltooth Sawfish (*Pristis pectinata*) and Largetooth Sawfish (*Pristis pristis*; Kyne et al. 2013, Wiley et al. 2013). Today, the International Union for Conservation of Nature (IUCN) classifies both species as Critically Endangered, meaning they are facing an extremely high risk of extinction in the wild (Kyne et al. 2013, Carlson et al. 2013). While overfishing and habitat loss have resulted in severe depletion for all 5 sawfish species across the globe, IUCN analyses indicate that Cuba and neighboring countries that have recent sawfish sightings could serve as "beacons of hope" for the Smalltooth Sawfish if conservation actions are taken in the near future (Dulvy et al. 2016, Fordham et al. 2018).

Sawfishes are shark–like rays best known for their long, toothed rostra ("saws"), which they use for defense and feeding (Breder 1952, Wueringer et al. 2012). Smalltooth Sawfish (Figure 1A) can grow to 5 m in length (Brame et al. 2019). They mature relatively late and have low fecundity, making them particularly vulnerable to overexploitation (Simpfendorfer et al. 2008, Scharer et al. 2012). Smalltooth Sawfish are estimated to mature around 7–11 years of age (Carlson and Simpfendorfer 2015) and give birth to about 7–14 pups per litter (Feldheim et al. 2017, Brame et al. 2019). They feed primarily on smaller fishes (Brame et al. 2019, Hancock et al. 2019).

Overfishing is the main threat to sawfishes (Dulvy et al. 2016, Carlson et al. 2013). The meat is generally consumed locally where the fish was caught, rostra are valuable for curios and cockfighting spurs, and fins are among the world's most prized for shark fin soup (McDavitt 2005, NMFS 2009). Whereas severe population declines have made targeted fishing no longer economically viable, incidental capture of sawfish continues as rostra are easily entangled in fishing gear (McDa-

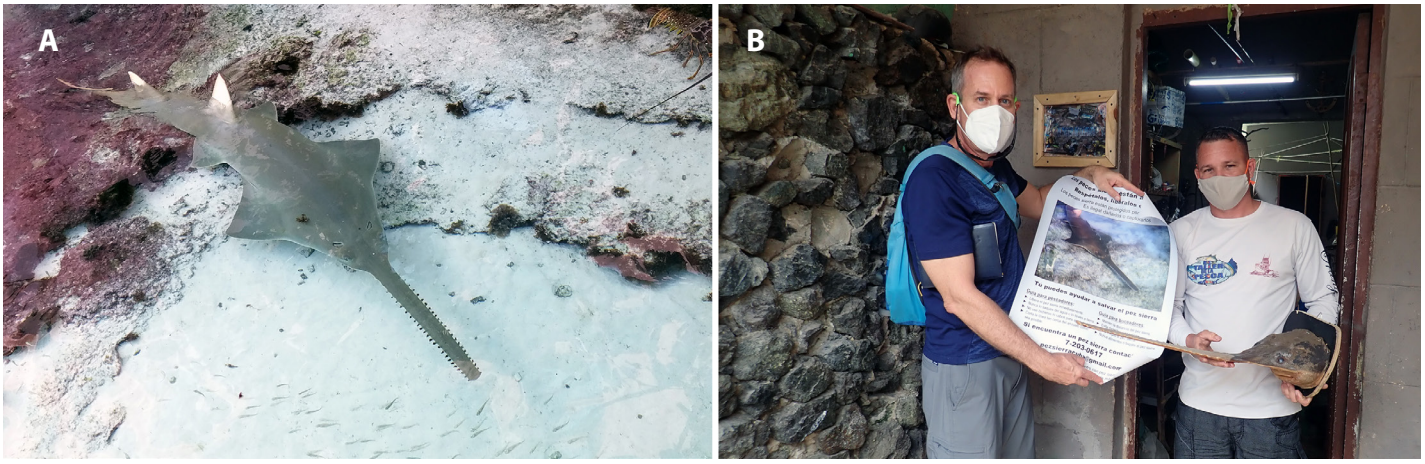

FIGURE 1. *The critically endangered Smalltooth Sawfish,* Pristis pectinata. *A. Smalltooth Sawfish on a reef. B. Example of a Smalltooth Sawfish trophy in Cuba, and information for the public regarding protection of the species.*

vitt 2005). Often, rostra are removed from the fish to aid in disentangling gear, and sawfish are killed opportunistically for parts (McDavitt 2005). Effective legal protections, education, and responsible fishing practices are urgently needed to prevent sawfish extinction in many countries, including Cuba.

Sawfish are not recorded on any recent or historical lists of Cuba's fisheries landings (Figueredo Martín et al. 2012). Nevertheless, interviews with Cuban fishers conducted over the last 5 years indicated that sawfish were still caught in Cuban waters (T. Figueredo Martín, pers. comm., Blue Sanctuary—Avalon, La Habana, Cuba). A 2012 survey of Cuban fishers (Figueredo Martín et al. 2012) found that captured sawfish are usually consumed by the fishers and their families. While these fishers reported keeping and sometimes selling the rostra as trophies (Figure 1B), the sale of fins was uncommon. The interviews revealed relatively low knowledge of the species and an unfamiliarity with proper sawfish release techniques for minimizing damage to the gear and the animal. All fishers interviewed were also unaware that the Smalltooth Sawfish is a protected species in Cuba and that there are penalties for unauthorized take.

Until recently, sawfish received very little attention as a species of conservation concern in Cuba. This inattention came despite Cuba's multiple international obligations to protect marine biodiversity in general and sawfish specifically (Koubrak 2018), as well as a record of measures to protect other threatened marine species. For example, Cuba began increasingly restrictive fishing regulations for sea turtles in 1960, and announced a moratorium in 2008 (per Resolution 31—V in 1960). The West Indian manatee has been afforded scientific monitoring and policy protections on the island since the 2000s (Alvarez Aleman et al. 2018). The government's experience in acting to help survival and recovery of endangered species, along with the country's strength in science and education (Houck 2000), could be used to benefit sawfish.

The objective of this review is to examine Cuba's existing domestic laws relevant to biodiversity and endangered species protection, with a focus on potential safeguards for sawfish. The review of legal frameworks is followed by recommendations for improving the chances that Smalltooth Sawfish (hereafter sawfish) receive the protection they need to survive and recover.

Cuba's Legal and Institutional Framework for Protecting Marine Biodiversity and Sawfish

There are numerous international obligations and domestic legal frameworks in Cuba that are relevant to sawfish protection in the country (Table 1). Cuba has been an active player in international environmental law for a long time (Houck 2000), and its international positions are guided by the Constitution's commitment to promoting the protection and conservation of the environment (per Constitution article 16). According to the Constitution, every Cuban has a right to a healthy environment (per Constitution article 75) and both the State and citizens have duties to protect it, along with the country's natural resources (per Constitution article 75 and 90(j)).

The Rio Conference spurred Cuba's action on biodiversity conservation (Houck 2000). Cuba was one of the first signatories of the Convention on Biological Diversity (CBD), and in 1994, established the central authority for environmental matters, the Ministry of Science, Technology and the Environment (CITMA). Adoption of the first National Environmental Strategy followed in 1997. The Strategy was subsequently updated in 2007 and 2011, and the latest publicly available version is for 2016—2020 (CITMA 2016). The Strategy notes that biodiversity loss and deterioration

TABLE 1. *International obligations and domestic legal frameworks relevant to sawfish protection in Cuba*

	Treaty/Law	Year in force	Relevance to sawfish
International	United Nations Convention on the Law of the Sea (UNCLOS)	1984	General obligation to protect and preserve the marine environment
	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1990	Prohibits international commercial trade in sawfish and its parts.
	Convention on Biological Diversity (CBD)	1994	General obligation to conserve biological diversity (diversity within species, between species and of ecosystems), including promotion of recovery of threatened species.
	Specially Protected Areas and Wildlife (SPAW) Protocol	1998	Obligation to protect sawfish (no taking, killing, possession or disturbance), subject to narrow exemptions.
	Convention on the Conservation of Migratory Species of Wild Animals (CMS)	2008	Obligation to protect sawfish (no hunting, fishing capturing, harassing, deliberate killing or attempt to engage in any such conduct), subject to narrow exemptions.
Domestic	Resolution 252/14 – Shark Finning	2014	Requires all sharks to be landed with fins attached. The term "shark" is not defined in this resolution and as a result sawfish, a ray, is not covered.
	Law 129/2019 - Fishing	2020	Outlines rules for fishing in Cuban waters. Establishes the Fisheries Advisory Committee.
	Decree No. 1 of the Council of Ministers (2019)– Fishing Regulation	2020	Prohibits capture, take, landing, transport, processing, and trade, except for scientific purposes, of certain marine species. Sawfish is not covered by this law.
	Law 150 – The System of Natural Resources and Environment	2022	Authorizes the Ministry of Science, Technology and the Environment CITMA to identify threatened species in the country and implement recovery measures; directs the Cuban state to promote and participate in international agreements and activities.

of ecosystems are some of the key environmental problems in Cuba. Addressing direct and indirect factors that threaten biodiversity, along with conservation and sustainable use of ecosystems, habitats, species and genera, is one of the objectives of the Strategy. The Strategy uses a precautionary vision to identify sustainable development using ecosystem and landscape approaches as some of its guiding principles. Although goals addressing protection and recovery of threatened species focus on terrestrial vertebrates, there are commitments to increase the protected area critical for marine species by 3% and setting catch limits for at least 20% of vulnerable fishes. Improving environmental legislation and enforcement are also some of the Strategy's goals and include updating existing legal frameworks to reflect best practices, adopting regulatory norms for effective implementation of international obligations, and improving interagency consultation mechanisms for issuing authorizations for activities that impact the environment and natural resources.

Two statutes and their respective regulations and resolutions govern the protection and use of marine species: the newly enacted Law 150 – The System of Natural Resources and Environment and Law 129/2019 – Fishing. These laws and their relevant provisions are reviewed here in more detail.

Law 150 – The System of Natural Resources and Environment

In 2022 the National Assembly of People's Power passed Law 150 which repealed and replaced Law 81 – Environment, although this law had not been fully implemented prior to publication of this paper. The new law is intended to strengthen Cuba's implementation of its international obligations and the constitutional rights and responsibilities related to the environment (per Agreement Number IX—129/2022 (GOC—2022—625—O58). This is to be done using 4 methods: 1) improving the integration of environmental policies in national economic and social plans and activities; 2) adoption of an ecosystem approach to guide protection and rational use of natural resources; 3) strengthening the role of local governments in environmental management; and 4) enhancing public access to information and participation in decision—making (San Martín 2022).

Law 150 is a comprehensive framework covering a broad range of issues such as preservation of biodiversity, sustainable tourism, response to climate change, and environmental quality standards and licensing as well environmental education. The statute identifies 10 objectives and 16 principles to guide its application (Law 150 articles 3 and 4). These include 1) strengthening the legal framework to ensure conservation, protection and rational use of natural resources, 2) incorporating environmental considerations in all government policies and applicable legal norms, 3) engaging in science—based decision—making, and 4) adopting an ecosystem approach to environmental management.

Three state agencies have a direct role in sawfish conservation in Cuba. These are CITMA, its Office of Environmental Regulation and Safety (ORSA), and the Ministry of Food Industry (MINAL). CITMA has a complex institutional structure that includes various departments, research institutes and affiliated agencies (CITMA 2022). It remains the lead state authority responsible for proposing domestic environmental policies as well as their execution, monitoring and compliance and is also charged with ensuring implementation of international environmental agreements (per Law 150, article 10.1(c)). Law 150 gives CITMA a broad mandate related to species protection that has to be exercised without prejudice to the authority of MINAL with respect to the aquatic resources (per Law 150, article 21.1).

The details of CITMA's mandate to protect biodiversity are found in article 21.1 which directs the organization towards 21 actions. These include identifying components of national biodiversity and establishing rules for its exploration and use; monitoring the identified biodiversity components and engaging in follow—up activities, with special attention given to components with urgent conservation requirements and greatest potential for utilization; adopting *in situ* and *ex situ* conservation measures; and managing biological resources that are important for the conservation of Cuba's biodiversity. CITMA is specifically given authority to declare and manage species of special significance because of their endemism, threatened conservation status, or protection by international conventions to which Cuba is a party, in addition to other factors (see Law 150, article 21.1(k)). The agency is also authorized to develop and implement action plans and strategies for the recovery of threatened species and restoration of degraded ecosystems (per Law 150, article 21.1(o)).

In order to guide the execution of the above provisions, and identify species of special significance, CITMA is tasked with developing a Red List of Species that includes species threatened with extinction, endemic species, and species that have high economic or ecological values, as well as species protected by international conventions (per Law 150, articles 23.1 and 24.3.) Species are to be evaluated on objective criteria that assign them to one of 9 categories based on the magnitude of extinction risk (per Law 150, articles 23.1 – 23.2). The Red List has to be updated every 10 years or sooner if new scientific information is available (Law 150, article 24.1).

Declaration and regulation of species of special significance is assigned to ORSA, an independent administrative body affiliated with CITMA (per Law 150, article 21.2 and Decree Law No. 10, article 11.1(2)(c)). ORSA has authority to issue legal, technical and procedural regulations and oversee compliance with legislation (per Decree Law No. 10 of the Council of State (GOC—2020—602—O65), article 3). Subordinate legislation passed by ORSA does not need to be approved by the Minister of CITMA, which significantly simplifies and expedites the law—making process. CITMA and ORSA are currently developing regulations necessary for the implementation of their mandates under the new law.

Law 150 recognizes MINAL's role in regulating sustainable use of aquatic resources and specifically gives it complementary authority with respect to the protection of threatened aquatic species, as well as preservation of aquatic habitats and ecosystems (per Law 150, article 48(g)). MINAL also is given explicit

authority to regulate fishing gear and fishing practices in order to maintain aquatic biodiversity and ecosystems (per Law 150, article 48(d)).

Law 129/2019 — Fishing

This law sets 4 principles for the management of fishery resources based on Cuba's national and international commitments (Law 129/2019, article 6). These are: conservation and sustainable use[1]; the precautionary approach[2]; application of scientific and technological criteria[3]; and protection of the marine, fluvial, and lacustrine ecosystems[4] (per Law 129/2019, article 6). Law 129/2019 grants MINAL authority to implement the State fisheries policy, direct rational use and preservation of fishery resources in Cuban waters, and grant, renew, amend and cancel fishing authorizations (per Law 129/2019, art. 5).

Law 129/2019 also establishes the Fisheries Advisory Committee[5], which is responsible for proposing management measures for sustainable use of marine resources, including fishing zones, quotas, closed seasons, and species sizes (per Law 129/2019, article 20). The Committee is chaired by the Minister of MINAL, and its permanent members include representatives from CITMA and the Ministry of Interior and the Revolutionary Armed Forces (per Law 129 Regulation, article 26). Advice of the Committee can be enacted in binding form through resolutions or instructions or be applied as recommendations issued by MINAL (per Law 129 Regulation, article 28).

A fishing authorization is necessary for anyone who wants to fish in Cuban waters (Law 129/2019, article 7), except individuals fishing from the coast or bank using rods, reels, twine and hooks without flotation aids (per Law 129/2019, article 8.1). This exemption does not apply in fishing zones declared to be of high environmental and historical/cultural significance or in reservoirs of State importance (per Law 129/2019, article 8.2)[6]. Certain areas are set aside for commercial fishing based on economic value (Law 129/2019, article 18.1). These zones can be further sub—divided into areas where fishing activities are limited or prohibited in the interests of national defense or environmental protection (per Law 129/2019, article 19).

Four types of fishing are recognized under article 13 of Law 129/2019: commercial, sport (fishing in tournaments), recreational (fishing for leisure), and research. Commercial fisheries are further subdivided based on ownership and objectives (per Law 129/2019, article 1.1). To manage these, 3 types of authorizations are available to MINAL: licenses, concessions, and permits (Law 129/2019, article 11.1). Law 129 – Fishing Regulation, discussed below, and MINAL Resolution 18/2020 provide the requisite details for obtaining authorizations.

Decree No. 1 of the Council of Ministers (2019) – Fishing Regulation

This law prohibits the use of set nets and trawls, as well as chemical and explosive substances (Fishing Regulation, article 25). State fisheries may be given permission to use set nets to fish for Bar Jack (*Caranx ruber*) and Yellow Jack (*Caranx bartholomaei*) during certain times of the year (per Fishing Regulation, article 25). For commercial fisheries, methods and gear specifications have to meet standards set by MINAL (per Fishing Regulation, article 12), although these details are not provided in Law 129. Sport and recreational fishing may be practiced using rod and reel as well as hook and twine (per Fishing Regulation, article 15.1[7]), but not pots, gillnets, and longlines (per Fishing Regulation, article 15.2). There are also restrictions on spearfishing (per Fishing Regulation, articles 16 and 17).

To engage in fisheries research, both domestic and foreign institutions have to obtain authorizations from CITMA and MINAL, and follow instructions provided by these 2 agencies (Fishing Regulation, article 20). MINAL has the power, in exceptional circumstances and in coordination with CITMA, to issue an authorization to conduct research fishing for threatened species (per Fishing Regulation, article 23). In such cases, the applicant needs to apply first for an environmental license from CITMA and then a fishing license from MINAL. The MINAL fishing license must be in line with the conditions set by CITMA in the environmental license (per Fishing Regulation, article 23).

Article 32.2 of the Fishing Regulation also lists marine species for which capture, take, landing, transport, processing, and trade are prohibited unless exempted for research purposes. No selection criteria for the listed species are provided. The 15 species on the list include manatee, several species of sea turtles, bottlenose dolphin, and black coral, but not sawfish. Commercial state fisheries are prohibited to capture, take, land, transport, process, and trade a separate list of species without authorization (per Fishing Regulation, article 32.3). These 9 commercial species include lobster, American Eel (*Anguilla rostrata),* and sea cucumbers. There is a $5,000 peso fine for violating these provisions (per Fishing Regulation, article 34.1(1)), the highest penalty provided under the Fishing Regulation. A

[1]Sustainable use is defined in section 10, Annex I, Law 129/2019. It means the use of biodiversity components in a manner and at a rate that does not lead to long-term reductions allowing them to maintain their potential to meet the needs and aspirations of the present and future generations.

[2]The precautionary approach is defined in section 5, Annex I, Law 129/2019. It means taking protective measure if there is serious risk to public health, the environment or hydrobiological resources even if definitive scientific proof of such risk is lacking.

[3]This is further explained in section 6, Annex I, Law 129/2019. It means fisheries management measures have to be based on scientific results.

[4] Conservation and protection of marine ecosystems is defined as the management by humans of the uses of organisms or ecosystems with the purpose of ensuring its sustainability. This includes sustainable controlled use, protection, restoration and increases of populations and all resources. See section 4, Annex I, Law 129/2019.

[5]MINAL's Resolution 23/2020 enacts the Fisheries Advisory Committee Regulation which outlines in detail the composition and functions of the committee.

[6]Resolution 20/2020 lists reservoirs of national significance.

[7]Resolution 21/2020 sets maximum allowable catches for sport and recreational fisheries.

repeat offender may be liable for a fine double the amount, as well seizure of their boat and gear (per Fishing Regulations, articles 34.3 and 34.4).

Resolution 252/14 – Shark Finning

This law prohibits shark "finning", which is described as removing the fins and discarding the rest of the animal's body at sea. All sharks landed in Cuban ports must be landed with their fins attached to the body (per Resolution 252/14, paragraph 2). The National Office of Fisheries Inspection, part of MINAL, is charged with ensuring compliance with this Resolution (per Resolution 252/14, paragraph 3). Whether or not this law can be applied to prevent finning of sawfish is unclear as "shark" is not defined. Whereas the United Nations (UN) Food and Agriculture Organization (FAO) International Plan of Action for the Conservation and Management of Sharks (IPOA—Sharks) defines "shark" to include all chondrichthyan fishes, including sawfish and all other rays, national finning bans vary in this respect.

National Plan of Action for Conservation and Management of Chondrichthyans in the Republic of Cuba

Cuba developed a National Plan of Action (NPOA) pursuant to the 1999 FAO IPOA—Sharks (MINAL 2015). Cuba's NPOA—Sharks, released in 2015 and adopted as a legal policy instrument by MINAL (per MINAL Resolution 25/15), aspires to rational use, conservation, and sustainable fishing of Cuba's chondrichthyans. The NPOA was developed by a working group consisting of representatives from MINAL, CITMA, the Ministry of Interior, and other agencies along with participation from international organizations and scientists. The working group is now tasked with annual review of the implementation of 5 priority actions: 1) biological and fishery research; 2) socio—economic research; 3) development of a fishing code containing best practices; 4) effective enforcement; and 5) education. The document mentions that sawfishes are protected species under the soon—to—be—repealed Resolution 160/11, but does not identify specific activities aimed at their conservation. New protections for sawfish should be put in place under the new law before repealing the old one.

Opportunities for Cuba's Sawfish Protection

Environmental protection is a fundamental pillar of the Cuban government and legal system, as evidenced by its inclusion in the Constitution. Guided by its international law commitments, the responsibility for biodiversity protection extends to all State agencies as well as to private enterprises and citizens. Whereas Cuban law emphasizes sustainable use, there is also recognition that threatened species require special protections.

The new Law 150 presents an opportunity for strong domestic measures and international leadership to protect the Critically Endangered Smalltooth Sawfish. CITMA has a clear legislative mandate to conserve biodiversity and ensure its sustainable use, which includes recovery of threatened species. Based on the criteria outlined in the new law, Smalltooth Sawfish should qualify for the proposed Red List listing. This would be a welcomed step, but by itself, it is not enough to reverse this species' declines. Recovery plans and actions are needed to address the key threat of overexploitation through bycatch. This requires interagency cooperation between CITMA and MINAL since the 2 agencies share the responsibility for threatened marine species, while MINAL has exclusive regulatory authority over fishing practices. The Fisheries Advisory Committee provides a mechanism for such cooperation.

There is also no legal necessity to wait for the development of the Red List before adopting measures to protect sawfish. The species is listed on Appendix I of the Convention for the Conservation of Migratory Species of Wild Animals (CMS) and Annex II of the Specially Protected Areas and Wildlife (SPAW) Protocol which creates binding obligations under international law for the Parties to enact strict protections at the national level. Law 150 indicates that species protected by Cuba's international agreements should qualify as "species of special significance" and gives ORSA the authority to enact regulations for their conservation in an expeditious manner. Recent inclusion of actions damaging to biodiversity under the Penal Code punishable by significant fines and potential jail terms (per Law 151— Penal Code, article 254.1) further enhances the opportunity for immediate and effective measures.

Recommendations for Improving Sawfish Protection in Cuba

Smalltooth Sawfish are in urgent need of the strictest protections possible in Cuba, as every individual matters to the Western Atlantic's Critically Endangered population. Effective rebuilding efforts have the potential to make the country a rare "lifeboat" for the species and a model for action by other countries in the WCR. To that end, we offer the following recommendations for action by the Cuban government:

1. Under Law 150's regulations, clearly and specifically prohibit killing and harassment of sawfish, and require that incidentally captured individuals are released promptly and carefully to minimize harm.
2. Through the Fisheries Advisory Committee and in concert with sawfish experts, develop a strategy to effectively implement the safe sawfish release regulation described above, including fisher outreach and education programs.
3. Through the NPOA—Sharks, specifically promote sawfish research, protection, and education programs, including outreach to the broader public and a national system for centralized reporting and monitoring of sawfish encounters.
4. Consistent with the Constitution and Law 150, lead initiatives toward meeting sawfish protection commitments at international forums, particularly through the SPAW Protocol.
5. In concert with university scientists, prioritize and facilitate research into Cuban sawfish abundance, habitat use, and connectivity with neighboring countries, particularly the Bahamas and United States.

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