



Implementation of the Action Plan for the Conservation of Marine Mammals (MMAP) in the Wider Caribbean:

A SCIENTIFIC AND TECHNICAL ANALYSIS

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July 2021

EXECUTIVE SUMMARY

Marine mammals hold a unique place in the collective psyche and economies of the Wider Caribbean Region (WCR). As a breeding and calving ground for some whale species, the warm waters of the Caribbean see the perennial return or residency of a diversity of majestic marine mammal species that serve as a boost for tourism and source of inspiration for some, or a valuable natural resource to be consumed or utilized by others.

Many of the marine mammal species within the WCR are highly migratory, and are therefore a shared natural heritage among all Specially Protected Areas and Wildlife (SPA) Contracting Parties. All marine mammal species are technically protected under the SPA Protocol. The drafters of the SPA Marine Mammal Action Plan (MMAP) recognized the aesthetic, cultural and economic value of these species when they drafted the foundations of the Action Plan in 2005. Subsequently adopted by Parties in 2008, the plan was meant to guide and inspire national species recovery plans and regional cooperation to protect marine mammals and their habitat in the WCR.

All marine mammal species are currently listed on Annex II of the SPA Protocol.¹ Listing on Annex II requires the total protection of these species,

including from all activities listed in Articles 11(1)(b) of the Protocol.²

After more than a decade of MMAP-related programmatic work under the SPA Protocol, this report compiles and reviews the status of major threats to marine mammals of the region, and aims to assess progress by countries towards achieving implementation of the MMAP since its adoption in 2008. A qualitative and quantitative assessment by country was conducted primarily to guide future action for continuing efforts towards the conservation and sound management of marine mammals in the Region. The assessments focused on the 11 primary categories of issues and threat indicators, including: fisheries interactions; habitat degradation and coastal development; pollution and marine mammal health; protected areas and other management regimes; research; whale watch and associated activities; marine mammal strandings; marine mammals in captivity; acoustic disturbance and underwater noise; vessel strikes; and climate change. A regional threats analysis and a summary review of the work of the SPA Programme in support of MMAP implementation was also completed.

Through person-to-person interviews, surveys, and consolidation of current literature and available data,

the resulting assessments are neither intended to be punitive nor meant to compare country responses or initiatives, but rather highlight areas in need of attention and collaboration. As such, an evaluation of the efficacy of protective measures, programmes, and initiatives was beyond the scope of this report.

To further this aim, a series of recommendations stemming from this technical review are offered, providing a blueprint for future action. These recommendations are presented and organized under each of 11 categorical threats as identified within the original MMAP. Highlights from the report's regional threats analysis served to guide final recommendations for the Region, with the hope that tangible actions can be prioritised and resources mobilized as interest and focused directives for conserving precious marine mammal resources are renewed through the distribution of this technical report.

Some of the report's high-level recommendations include:

- **Establishment of a regional coordinative mechanism³ that will serve to coalesce and connect expertise, resources, and data to promote long-term capacity building for marine mammal conservation in the WCR;**
- **Development of a model national Marine Mammal Action Plan that can guide SPAW Contracting Parties towards developing their own national strategy and frameworks for marine mammal conservation;**
- **Enlistment of collaboration with the existing global bycatch mitigation initiatives, and**
- enhancement of coordination with regional fisheries bodies to track and mitigate marine mammal bycatch;**
- **Enhancement of joint programming among regional organisations for implementation of planning strategies to protect marine biodiversity and coastal ecosystems;**
- **Establishment of sampling programmes for emerging contaminants (heavy metals, micro and nano-plastics and associated chemical residues) in fish, sargassum and marine mammal resources that are harvested for human consumption;**
- **Development of marine protected area management plans that include marine mammals;**
- **Enhancement of outreach and distribution of the SPAW regional marine mammal viewing guidelines;**
- **Development of marine mammal research protocols for the WCR;**
- **Creation of a centralized strandings database and reporting mechanism;**
- **Creation of national marine mammal inventories to track and manage the health and welfare of captive marine mammals;**
- **Development of regional guidelines for seismic survey operations;**
- **Identification and implementation of a centralized platform for reporting vessel strikes data;**
- **Integration of marine mammal considerations into national climate change action plans and strategies.**

DISCLAIMER

The views expressed in this report are the authors and do not necessarily reflect the views or policies of the Specially Protected Areas and Wildlife Regional Activity Center (SPAW-RAC), UN Environment Programme - Caribbean Environment Programme (CEP), or Member States. The presentation of material and information in this report does not imply the expression of any opinion, endorsement or recommendations on the part of CEP or the UN Environment Programme.

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The CARI'MAM is a cooperative project funded by the European INTERREG programme. Encompassed in the objectives of the Wider Caribbean Region Marine Mammal Action Plan (MMAP, UNEP 2008) and the current SPAW workplan, its purpose is to implement the recommendations of the MMAP by strengthening managerial capacities and developing common tools for conservation and evaluation purposes. Drafted under the CARI'MAM Project, this technical analysis is intended to enable Contracting Parties to the SPAW Protocol to review the MMAP and design future actions to better conserve marine mammals according to their national commitments under the SPAW Protocol.

Various representatives of governments, non-governmental and governmental organisations, and issue-area experts have contributed to this report through questionnaires and interviews, and by sharing their recommendations and expertise. These contributions and discussions serve as the foundation of this report.

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Image courtesy of Eric Ramos. Bottlenose dolphins in Belize.

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Acronyms and Abbreviations

ACS	Association of Caribbean States
ALDFG	Abandoned, lost or discarded fishing gear
AMEP	Assessment and Management of Environmental Pollution Programme
AUTEC	Atlantic Undersea Test and Evaluation Center, The Bahamas
BES Islands	Bonaire, Sint Eustatius and Saba
BOPEC	Bonaire Petroleum Corporation N.V
BORCO	Bahamas Oil Refining Company International
BMMRO	Bahamas Marine Mammal Research Organization
BPC	Bahamas Petroleum Company
CCI	Caribbean Challenge Initiative
CAMPAM	Caribbean Marine Protected Area Management Network and Forum
CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community
CARICOMP	Caribbean Coastal Marine Productivity Program
CARI'MAM	Caribbean Marine Mammals Preservation Network Project
CARMABI	Caribbean Research and Management of Biodiversity
CBF	Caribbean Biodiversity Fund
CCCCC	Caribbean Community Climate Change Centre
CEBSE	Center for the Conservation and Ecological Development of the Bay of Samaná and its Surroundings, Dominican Republic
CEP	Caribbean Environment Programme
CERMES	Centre for Resource Management and Environmental Studies
CDM	Clean Development Mechanisms
CIMAB	Centro de Ingeniería y Manejo Ambiental de Bahías y Costas [Center of Engineering and Environmental Management of Coasts and Bays], Cuba
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLME	Caribbean Large Marine Ecosystem
CLME +	Sustainable Management of Shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems Project
CMS	Convention of Migratory Species of Wild Animals
COP	Conference of the Parties
CRFM	Caribbean Regional Fisheries Mechanism
DAT	Dolphin Assisted Therapy

DCNA	Dutch Caribbean Nature Alliance
DCNN	Dutch Caribbean Cetacean Network
EBM/DSS	Ecosystem-based Management/Decision Support System
ECMMAN	Climate Resilient Eastern Caribbean Marine Managed Areas Network Project
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
EIS	Environment Impact Statement
FAD	Fish Aggregating Device
FAO	The Food and Agriculture Organization of the United Nations
FUNDEMAR	Fundación Dominicana de Estudios Marinos, [Dominican Foundation for Marine Studies], Dominican Republic
GCFI	Gulf and Caribbean Fisheries Institute
GGGI	Global Ghost Gear Initiative
GHG	Greenhouse Gases
ICZM	Integrated Coastal Zone Management
IFREMER	Institut français de recherche pour l'exploitation de la mer [French Research Institute for the exploitation of the sea], France
IMMA	Important Marine Mammal Area
INVEMAR	Instituto de Investigaciones Marinas y Costeras "José Benito Vives de Andrés," [Institute of Marine and Coastal Research], Colombia
IUCN	International Union for Conservation of Nature
IUU	Illegal, unreported and unregulated fishing
IWC	International Whaling Commission
LBS	Land-based Sources of Pollution
LifeWeb	UNEP/Spain Project 'Broad-scale Marine Spatial Planning of Mammal Corridors and Protected Areas in Wider Caribbean and Southeast & Northeast Pacific'
LME	Large Marine Ecosystem
MamaCocoSea	Marine Mammal Conservation Corridor for Northern South America Project
MSC	Marine Stewardship Council
MMAP	Action Plan for the Conservation of Marine Mammals in the Wider Caribbean Region
MONAH	More North Atlantic Humpbacks Project
MPA	Marine Protected Area
NBSAP	National Biodiversity Strategy and Action Plan
NBSLME	North Brazil Shelf Large Marine Ecosystem
NDC	Nationally Determined Contributions
NGO	Non-governmental Organisation
OECS	Organisation of Eastern Caribbean States

OSPESCA	Central America Fisheries and Aquaculture Organization
PAM	Passive Acoustic Monitoring
RAC	Regional Activity Centre
RAN	Regional Activity Network
REDD+	Reducing Emissions from Deforestation and forest Degradation
REMPEITC	Regional Marine Pollution Emergency, Information and Training Centre – Caribe
SAP	Strategic Action Plan
SBNMS	Stellwagen Bank National Marine Sanctuary, USA
SIDS	Small Island Developing States
SLNT	The Saint Lucia National Trust
SMMRD	Santuario de Mamíferos Marinos de la República Dominicana [Marine Mammal Sanctuary of the Dominican Republic]
SCCN	Southern Caribbean Cetacean Network
SOCAR	State of the Convention Area Report
SOLAMAC	Society of Latin American Specialist in Aquatic Mammals
SOME	State of the Marine Environment and associated Economies
SOMEMMA	Mexican Society for Marine Mammalogy
SPAW	Specially Protected Areas and Wildlife
SPE-PRMS	Society of Petroleum Engineers - Petroleum Resources Management System
STAC	Scientific and Technical Advisory Committee
STENAPA	Sint Eustatius National Parks
STINAPA	Bonaire National Parks
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOPS	United Nations Office for Project Services
UWI	University of the West Indies
WCR	Wider Caribbean Region
WECAFC	Western Central Atlantic Fishery Commission
WHO	World Health Organisation
WWF	World Wild Fund for Nature
YoNAH	The Years of the North Atlantic Humpback Whale Project

OVERVIEW

In July 2005, a regional workshop of experts was convened to assist in the development of a Marine Mammal Action Plan (referred to hereafter as MMAP) for the Wider Caribbean under the auspices of the Specially Protected Areas and Wildlife (SPAW) Protocol of the Cartagena Convention. The envisioned purpose of this Plan was to guide the development and implementation of marine mammal focused initiatives by SPAW Contracting Parties and to assist in the prioritization of marine mammal protection and the development of national recovery plans.

The global experts assembled for the workshop in 2005 subsequently became an *ad hoc* marine mammal electronic working group that convened primarily over email. This expert group worked collaboratively with the SPAW Secretariat and the Regional Activity Center for SPAW (SPAW-RAC) in Guadeloupe to develop a draft marine mammal action plan that could serve as a roadmap for Contracting Parties to prioritize and focus marine mammal protection regionally and nationally. That *ad hoc* working group has since dissolved over

time—not through directive or mandate, but rather through natural attrition and retirement or passing of members, competing priorities, and limited capacities within the CEP and RAC (the SPAW Programme) to coordinate such a working group.

Over the course of several years of review, this draft plan was revised in order to prioritize key elements of the larger action plan.⁴ This revised MMAP pragmatically focused on a subset of priority actions that was presented to the full Conference of the Parties (COP5) for endorsement in September 2008 in St. John's, Antigua and Barbuda as the Action Plan for the Conservation of Marine Mammals in the Wider Caribbean Region (MMAP).⁵

Specifically, the MMAP aims to prioritize issues and threats to aid the development and implementation of national recovery plans through five areas of targeted action:

1. increased scientific knowledge;
2. enhanced public understanding;

■ Figure 1. A pod of sperm whales rests in Haiti. Image courtesy of Malcom Wright.



3. implementation of protective measures;
4. development of policy; and
5. improvements in law and its application.

Within the framework of the adopted MMAP, these five target areas guide the recommendations that are represented within the original 11 primary categories of issues and threat indicators, including:

1. fisheries interactions;
2. habitat degradation and coastal development;
3. pollution and marine mammal health;
4. protected areas and other management regimes;
5. research;
6. whale watch and associated activities;
7. marine mammal strandings;
8. marine mammals in captivity;
9. acoustic disturbance and underwater noise;
10. vessel strikes; and
11. climate change.

Upon endorsement at the fifth Conference of the Parties (COP5) in 2008, the Contracting Parties also established priority actions to be implemented during the next biennium and subject to the availability of funding, including expansion of the existing electronic Marine Mammals Expert Group; organization of workshops to respond to marine mammal strandings; development of workshops on viewing marine mammals in the wild and best practices; prioritization of a workshop on pollutants and contaminants; and harmonization of reports regarding the capture and targeted take of marine mammals in fishing operations.⁶ Some of these activities have come to fruition, and others have not.

These and other activities were identified—and some of them implemented—over the course of the last decade since the adoption of the MMAP and under the SPAW Biennium Work Programme, subject to and facilitated by, funding by interested Contracting Parties and entities supportive of the Programme's mission, including non-governmental organisations (NGOs).

OBJECTIVES

Reports provided by the SPAW Secretariat and from partners of the SPAW Programme have occurred periodically to update Contracting Parties on activities occurring under the auspices of the MMAP, but a comprehensive overview or assessment of overall implementation of the MMAP has not occurred since its inception and adoption in 2008.⁷

Approximately 12 years since the adoption of the MMAP, the overall objective of this review is to assess current threats to marine mammals in the region, evaluate the progress of Parties towards achieving the objectives of the MMAP, and provide recommendations for enhanced regional cooperation.

The primary aims of this report include:

- a. A country-by-country assessment of national capacities for marine mammal protection, including an assessment of the status of implementation of MMAP priorities, and the development of national marine mammal action plans (the primary objective of the original MMAP as adopted in 2008);
- b. A synthesis of existing scientific and technical data on marine mammal populations in the WCR;
- c. A gap analysis of regional data requirements relevant to marine mammal protection;
- d. An evaluation of current and historical threats to marine mammals in the WCR within the framework of those original threats noted by the MMAP;
- e. A roadmap for recommended actions and next steps for future implementation of the 2008 MMAP.



Figure 2. Short-finned pilot whales (*Globicephala macrorhynchus*) in St. Vincent and the Grenadines. Image courtesy of Fundación Cethus.

METHODOLOGY, FRAMEWORK AND ASSESSMENT

Data Collection

The recommendations and outcomes presented in this report are based on the collection, synthesis, and evaluation of a diverse array of data, not only pertaining to the 17 countries which are Contracting Parties to SPAW, but also including more broadly the entire WCR. Data points were collected from the following sources, including but not limited to:

- Scientific and technical literature, including websites of relevance and other grey literature;
- SPAW focal point interviews and/or questionnaires;
 - 12 SPAW Focal Point Interviews were successfully conducted out of 17 Contracting Parties (see *Annex II*);
- Regional expert interviews and/or questionnaires;
- Non-profit and other organisational interviews;
- SPAW Programme National Capacities Report (2009);⁸
- Data collected from CARI'MAM surveys on national legislation and whale-watching regulations;
- UNEP/Spain LifeWeb Project “Broad-scale Marine Spatial Planning of Marine Mammal Corridors and Protected Areas in Wider Caribbean and Southeast & Northeast Pacific” data summaries;
- CEP reports and recommendations, including SPAW Programme meeting and other programmatic information documents;
- Outputs from the UNDP/UNOPS Sustainable Management of Shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems project (CMLE+), including State of the Convention Area Report (SOCAR) and State of the Marine Environment and Economies (SOME);
- International Whaling Commission (IWC) reports and papers;
- TransAtlantic Marine Protected Areas tracking tool responses; and
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention of Migratory Species of Wild Animals (CMS) reports and papers.

Framework

Formal interviews were scheduled with SPAW focal points, experts, and other collaborative organisations over the course of several months between the months of February 2020 to May 2020. A questionnaire was drafted in English, French and Spanish to guide these interviews to solicit information relating to country-specific measures, regulations, and programmes pertaining to marine mammal protection. The questionnaire was drafted to incorporate categorical elements (threats), including actions and indicators (i.e., outputs) of progress noted in the 2008 prioritised MMAP, to provide a basis for comparative evaluation against original MMAP priorities and national effort.

This questionnaire was meant to guide focal interviews, but did not limit the discussions to only those topics or questions outlined in the survey. Some focal points completed the questionnaire electronically, choosing to respond via email rather than a scheduled teleconference call.

Interviews were conducted via SKYPE or other teleconferencing tools. Interviews lasted on average between 30 minutes to 1.5 hours. The interviews also served as an opportunity to gain feedback from governments and experts relating to issues of importance to marine mammal management in the WCR, inform focal points of marine mammal resources and the MMAP, as well as to solicit recommendations regarding the future development and implementation of the MMAP and/or national action plans and needs. Some Contracting Parties provided feedback on draft country assessments that were sent to them for review to ensure author accuracy.

Assessment

MMAP EVALUATION TOOL

In an attempt to provide a visual tool to represent relative progress towards the implementation of the MMAP, a set of indicators was devised to establish a pool of criteria that could be used to qualitatively evaluate progress towards the primary goal of implementing MMAP objectives as presented in the original MMAP. Given the relative lack of consolidated or harmonized regional data, the challenges inherent

to summarizing and evaluating trends and progress should be acknowledged and considered as a limitation of this study. Furthermore, assessment of the adequacy or effectiveness of measures, initiatives, or programmes reviewed was beyond the scope of this study. However, this review was able to identify gaps and general trends, and highlight recommendations to further marine mammal protection in the WCR. In addition to the 11 primary categories of threat indicators identified in the MMAP, an additional two categories were included to create a pool of 13 indicators or evaluative markers by which to assess progress towards implementation of MMAP objectives.

Indicators and definitions. These 13 indicators include:

1. The 11 categorical issues (threat indicators) identified within the original SPAW MMAP;⁹
2. The existence of national legislation relating to marine mammal conservation and/or welfare;
3. The existence of marine mammal species-specific recovery plans and/or a national marine mammal action plan (a primary objective of the SPAW MMAP) by a given country;

Threat levels. Each threat category was assigned a color based on the relative level of intensity as defined below.

Threat levels were assigned a relative **high** ●, **medium** ●, **low** ● or **unknown** ● designation based upon:

- State of knowledge about a regional threat since the adoption of the MMAP in 2008; whether it may be increasing, decreasing or unknown/unchanged;
- Assessments available at a national level derived from all available data sources;
- General scientific consensus for a more wide-spread or impending threat (e.g., climate change).

● **Unknown/Data Deficient:** This designation is awarded if there is no country-specific information or data available, regarding the occurrence or a record of a particular threat affecting marine mammals [at the individual or population levels];

● **Low threat:** A low threat is awarded if the threat in question has been recognized or identified, and its magnitude is relatively low, e.g. sporadically or infrequently reported or documented [through qualitative or quantitative data], and may or not cause injury, removal or mortality in relatively small numbers, and does not affect vital activities and critical habitats essential to the health or survival of marine mammals [at individual and population levels];

● **Moderate threat:** A moderate threat is awarded if the threat in question is sporadically or frequently reported or documented [through qualitative or quantitative data] and causes marine mammal injuries, removal or mortality which are relatively small and/or localized and do not appear to directly compromise marine mammal populations or significantly affect vital activities and critical habitats essential to their health and survival [at individual and population levels];

● **High threat:** A high threat is awarded if the threat in question is frequently reported or documented [through qualitative or quantitative data] and causes marine mammal injuries, removal or mortality which are relatively high and/or wide-spread in scope and have a high likelihood to compromise marine mammal populations [directly or indirectly] or significantly affect vital activities and critical habitats essential to their health and survival [at individual and population levels].

***Note: In some instances, a high level was awarded region-wide (e.g., climate change) in the absence of country-level data as a result of the preponderance of general or regional scientific data or consensus supporting a precautionary approach.*

Country response levels. A similar color scheme was utilized to represent a country's response to that threat.

Country responses were assigned a relative **high** ●, **medium** ●, **low** ● or **unknown** ● designation based upon:

- A country's state of knowledge and preparedness about a regional threat since the adoption of the MMAP in 2008;
- A country's response at a national level derived from all available data sources relating to initiatives, plans, programmes, intentions, or actions designed to address that threat;

***Note: Country responses were not judged based on whether a country should have measures in place based in the relative presence or absence of specific threats, but rather the degree to which the threat—if present—is being addressed.*

● **Unknown/Data Deficient:** This designation is awarded if there is no information available regarding a country's response to a threat, or the status of a country's response is unknown or unchanged.

● **Low country response:** A low response is awarded if a country has not recognised or identified the threat in question, and has no programmes or initiatives to address the threat;

● **Moderate country response:** A moderate response is awarded if a country recognises the threat, and is addressing the threat through documented dialogues, workshops or other initiatives, or has developed a specific programme or collaborative effort in response to the threat;

● **High country response:** A high response is awarded if a country has developed and implemented a documented policy, strategic and/or programmatic response to the threat, has allocated budgetary or staff resources to address the threat, or has taken substantive measures to mitigate or eliminate the threat.

The table on the following page provides additional details specific to each indicator.

THREAT INDICATOR	DESCRIPTION Designation of [LOW], [MODERATE] AND [HIGH] country response levels
National legislation [Yes or No]	The national legislation indicator is designated a 'Yes' if a country has enacted national legislation, such as a law, decree or act, that is solely dedicated to the conservation, protection, and management of marine mammals. Regulations refer to the process of implementing, monitoring and enforcing such legislation. General overarching environmental, fisheries, or biodiversity legislation, even if these included provisions pertaining to marine mammals, while noteworthy, were not considered as a country having dedicated national legislation focused on marine mammal conservation, and was assigned a 'No' during the evaluation process. However, while a 'No' might be assigned in the absence of dedicated marine mammal protection legislation, efforts to integrate ecosystem-based policies relating to marine mammals in fisheries or other ocean resource legislation were acknowledged and reflected in a country's response level summaries.
Species specific recovery or management plans [Yes or No]	Species recovery and management plans are strategic tools and dynamic documents that can be modified over time, identifying and prioritizing threats and actions, and including information about the status of marine mammals. They are usually constructed through a participatory multi-stakeholder process and may go hand-in-hand with the implementation of legislation. If a country has prepared and adopted such plans for a specific species, or at the national level for all marine mammal species (national marine mammal action plan), then a 'Yes' was assigned. Otherwise a 'No' was assigned.
Fisheries interactions	[Low/Red] Indicates there is little country effort to document or acknowledge bycatch, entanglement of marine mammals, or directed take in fishing operations, irrespective of fishing gear type; [Moderate/Yellow] indicates bycatch and fisheries interactions are being sporadically monitored and reported or programmatically addressed; or [High/Green] indicates continuously monitored, reported and mitigation measures implemented; [Unknown/Gray] If no information or data is available regarding country programmes or response.
Habitat degradation and coastal development	[Low/Red] Indicates that coastal developments are unplanned, undocumented, conducted by landowners or commercial entities without an environmental review process and resulting in significant degradation; [Moderate/Yellow] Indicates coastal developments have undergone some environmental review or concluded with moderate degradation or loss of critical marine mammal habitat; and a national process (e.g. integrated coastal zone management) to consider the environmental costs and impacts of planning and development is in place; [High/Green] indicates <i>thoroughly</i> planned, documented, in progress or concluded developments with minimal degradation or loss of critical coastal and marine habitats with full environmental review (e.g. Environment Impact Assessment-EIA or Environment Impact Statement-EIS) process in place addressing or including infrastructure expansion and urbanization, land-based and marine-based tourism, fishing and harvesting of living resources, mining, fossil fuel exploration and development, waste disposal, shipping, and agriculture expansion. [Unknown/Gray] If no information or data available is available regarding country programmes or responses.
Pollution and marine mammal health	[Low/Red] Indicates the absence of programmes to address pollution and marine mammal health; [Moderate/Yellow] indicates plans or programmes in development to address the impacts of such pollutants and their sources; [High/Green] indicates documented implementation and programmatic response and mitigation efforts (e.g. continuous monitoring programmes) regarding land-based and marine-based pollutants that impact marine mammal health, including including excessive nutrient loads, solid waste, wastewater, oil pollution, marine debris, maritime traffic, persistent organic pollutants, mercury and other heavy metals; [Unknown/Gray] If no information or data is available regarding country programmes or response.

Whale watch and associated activities	[Low/Red] Indicates the absence of any voluntary guidelines or best practices to regulate, monitor, and mitigate impacts from marine mammal viewing activities; [Moderate/Yellow] indicates existence or active development of voluntary guidelines, best practices, or similar measures; [High/Green] indicates the existence and monitoring of implementation of guidelines and/or regulations aimed at managing marine mammal viewing and associated activities (e.g., swimming, use of drones, etc.), including intensive, persistent, and unregulated vessel traffic associated with short and long-term impacts. [Unknown/Gray] If no information or data is available regarding country programmes or response. *Note: No assessment of effectiveness or compliance with regulations or guidelines was attempted.
Protected areas and other management regimes	[Low/Red] Indicates the absence of protected areas; [Moderate/Yellow] indicates existence of protected areas; [High/Green] indicates marine protected areas of relevance to marine mammal populations or protected areas created and managed primarily for the conservation of marine mammals, or with protected area management plans that include marine mammals. [Unknown/Gray] If no information or data is available regarding country programmes or response. *Note: No assessment of the management effectiveness of such protected areas was attempted.
Research	[Low/Red] Indicates the absence or occasional, short-term marine mammal research projects or programmes; [Moderate/Yellow] indicates the existence of sporadic research efforts or projects limited by capacity or funding; [High/Green] indicates prioritised, long-term national or collaborative marine mammal research programmes; [Unknown/Gray] If no information or data is available regarding country programmes or response.
Strandings	[Low/Red] Indicates absence of organized stranding response or data collection from strandings; [Moderate/Yellow] indicates the existence of a stranding response which includes protocols for data collection and/or management of live strandings (through informal or formal network); [High/Green] indicates an organized stranding response network to assess mortality by strandings, including protocols and techniques for data collection and management of live strandings, an emergency response team, and a veterinary component; [Unknown/Gray] If no information or data is available regarding country programmes or response.
Captivity	[Low/Red] Indicates the absence of regulations or guidelines pertaining to the acquisition, care and maintenance of marine mammals in captivity; [Moderate/Yellow] Indicates the existence of guidelines or policies governing the acquisition, care, and maintenance of marine mammals in captivity, including facility requirements and specifications; [High/Green] indicates the existence of legislation and/or regulations governing the above; [Unknown/Gray] No information or data is available regarding country programmes or response.
Acoustic disturbance	[Low/Red] Indicates the absence of regulations, guidelines or programmes to address or mitigate acoustic disturbance in the marine environment; [Moderate/Yellow] indicates the existence of guidelines, best practices, or programmes to address acoustic disturbance; [High/Green] indicates the existence of regulations to mitigate or eliminate the levels, persistence, or intensity of acoustic disturbance associated with sonars, maritime/coastal vessel traffic, seismic, research activities, or development projects that affect marine mammal health and welfare. [Unknown/Gray] No information or data is available regarding country programmes or response.
Vessel strikes	[Low/Red] Indicates the absence of regulations, guidelines, or programmes to address vessel strikes; [Moderate/Yellow] indicates the existence or active development of guidelines or best practices to mitigate or eliminate the occurrence of injury/mortality to marine mammals caused by collisions with vessels; [High/Green] indicates regulations and long-term programmes to mitigate or eliminate injury or mortality caused by collision with vessels; [Unknown/Gray] No information or data is available regarding country programmes or response.

Climate change	[Low/Red] Indicates the absence of national climate mitigation or monitoring measures or programmes; [Moderate/Yellow] indicates active planning, consultations, and other initiatives to develop mitigation strategies and measures; [High/Green] indicates national mitigation and monitoring measures, programmes, strategies, and national commitments to address effects of climate change. [Unknown/Gray] No information or data is available regarding country programmes or response. <i>*Note: While many WCR countries have strong responses to climate change, the authors' evaluation of climate change preparedness did not include whether marine mammal considerations were included because the authors found very few specific consideration for marine mammals in even the most comprehensive climate change strategies. Responses such as GHG reduction commitments, fortification of coastlines and buffers (e.g. coral reef or mangrove protection), and monitoring of sea level rise are elements generally applicable to the marine environment, and by extension, marine mammals, their prey and vital habitats.</i>
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Analysis. These markers enabled us to comprehensively define and assign the relative levels of intensity and level of response from a country pertaining to its initiatives, programmes, and actions relating to marine mammal protection within the context of the MMAP.

Understanding it was beyond the scope of this report, and the role of the authors, to evaluate the adequacy or effectiveness of any marine mammal focused programmes, initiatives, or national legislation as identified by countries, a visual representation was produced utilizing the guidelines below, and assessing both quantitative and qualitative data available through all modes of data collection identified above.

Given the nature of the visual tool to represent relative progress towards the implementation of the MMAP, differing amounts of information available for country assessments, and the varying levels of responses and reviews received from Contracting Parties regarding these assessments, the results of the present analysis may best serve as an evolving tool that can be used to update future country assessments and track progress.

The results from this analysis include a variety of color combinations along a spectrum of high to low response when mapped against various threat levels, as shown in the table to the right.

Interpretation. It should be noted that the authors refrained from making assumptions regarding threat

THREAT (INTENSITY)	COUNTRY RESPONSE
Low	Low
Moderate	Moderate
High	High
Unknown	Unknown

levels where data were scarce. However, in the absence of local data, some reasonable assumptions based in a precautionary approach (e.g., where there is high vessel traffic, the threat of a ship strike is likely higher) were made, especially where regional data or scientific consensus around an issue supported an assumption of relative risk levels.

Similarly, where country response was low, the authors could not necessarily make the assumption that the threat level was therefore higher (as a result of inaction). These correlations between country response and intensity of a threat level would be dependent not only on the availability of data to support such a correlation but other factors, such as political will, and financial and institutional capacity and are therefore beyond the scope of this report.

Rather, the interpretation of these data is meant to focus and prioritize areas of high threat which may

necessitate a response under the MMAP and by individual countries. Understandably, a country may not have the capacity to actively address a threat, regardless of its perceived or actual intensity, thereby resulting in a low response designation. Similarly, a country might not be expected to *preemptively* respond to an indicator that is not *currently* a local threat, and would similarly receive a low response designation (e.g., if there are no captive marine mammal facilities or intention to pursue captive programmes, a country would not reasonably be expected to have captive marine mammal regulations as part of its legislation). Proactively addressing all of the threats identified in the original MMAP is a desirable goal of a national marine mammal action plan, but is not an expectation upon which the indicators were measured.

In addition, and perhaps most importantly, this review was not intended to single out insufficient country effort or response. Its purpose is to help to identify areas that could benefit from attention and focus, or perhaps a coordinated national response, consistent with the spirit and intent of the MMAP and the precautionary principle.

As a result, the utility of this analysis will be prioritizing action around, in particular, assessments that suggest high intensity threats and low country responses, and high intensity threats and unknown country responses.

THREAT (INTENSITY)	COUNTRY RESPONSE
High	Low
High	Unknown

COUNTRY BY COUNTRY ANALYSIS

A summary of the implementation of the SPAW MMAP by the current (17) Contracting Parties to the Protocol is presented in this section, with emphasis on status and major findings since the adoption of the SPAW MMAP in 2008. While recognising that several countries have both Caribbean and Pacific coasts and may be Parties to UN Environment Regional Seas Conventions in both regions, the country analyses focus on the Caribbean Sea.¹⁰ Given that all species of cetaceans and sirenians are included in the SPAW Protocol (Annex II) and the neotropical otter in Annex III, the scope of the MMAP is not strictly limited to marine species, but also includes those that inhabit estuarine waters and beyond to the limits of freshwater and ecologically-connected watersheds.

The Bahamas

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
Bahamas Marine Mammal Protection Act (Bahamas MMPA); ¹¹ Bahamas Marine Mammal Protection Act (updated in 2010; into effect in 2006); mainly covers permitting requirements for captive facilities, scientific research, permit for operating a vessel, importing/exporting of a marine mammal; no regulations regarding acquisition from the wild or fisheries operations. Illegal to take, harass, hunt or kill any marine mammal.		
Species specific recovery or management plans	No	
No species-specific management plans.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Fisheries interactions		
Bycatch data is scarce (one stranded whale in the last 12 years had evidence of entanglement); no directed hunts of marine mammals; Bahamas fisheries reviews ¹² do not include any references to marine mammals; long liners are banned in The Bahamas since 1993, but illegal foreign fishing occurs within country's EEZ. Fisheries Act does not allow drift netting or trawling methods. ¹³ Part VII (Marine Mammals) of the Fisheries Regulations prohibit fishing for, molesting, or interfering with a marine mammal. Marine mammals may be captured for scientific, educational or exhibition purposes. ¹⁴ Overall fisheries interactions likely to be low given the nature and location of fisheries (commercial fishing methods primarily diving, lobster traps, and hand lines for target species of queen conch, lobster and reef fishes). Recreational fishing with mobile lines potentially a larger threat. ¹⁵		
Habitat degradation and coastal development		
Cruise ship and commercial shipping traffic; underregulated tourism; over-fishing; coastal development; oil exploration; Lighthouse point and expansive coastal areas have been approved for development by cruise companies more recently. ¹⁶ Specifically in Bimini, cruise ships are intermittent, generally anchoring just west of the channel between North and South Bimini. New cruise ship pier (Resorts World Bimini) is meant to accommodate new Virgin Voyages ship, followed by other ships. South of Bimini, "Ocean Cay" has recently been developed as private island for MSC ships. National integrated coastal zone management (ICZM) policy framework in place but implementation is weak. Increasing motorized water sport activity in coastal waters giving rise to more potential interactions with marine mammals. ¹⁷		
Pollution and marine mammal health		
Cruise ship and commercial shipping traffic; licenses issued to Bahamas Petroleum Company (BPC) in October 2019; initiated drilling for oil in March 2020; ¹⁸ There are considerable oil storage and transshipment facilities, most notably the Bahamas Oil Refining Company International (BORCO) facility in Grand Bahama, the largest in the Caribbean region, and global in scale. ¹⁹ Freeport Container Port on Grand Bahama largest commercial transshipment facility in the region. ²⁰ Toxic algal blooms not known to be present; Petroleum legislation modernized and updated; ²¹ sewage and waste water dumped directly into ocean without treatment. National oil spill contingency plan in place since 1998 but no implementation. ²² Solid waste disposal consists of open pit burning in "landfills", including hazardous materials.		
Whale watch and associated activities		
Bahamas MMPA regulations require a licence/permit for operators to engage in observation or interaction with wild marine mammals (Form 9, regulation 6(1), Chapter 244A), but compliance is very low; ²³ no documentation of harassment of cetaceans in the wild which likely represent low levels of monitoring; total number of operators unknown; two operators on Bimini agree to a voluntary code of conduct for swim-with-dolphins programmes. ²⁴		
Protected areas and other management regimes		
Minister of Environment announced new marine protected areas in 2015; ²⁵ joined Caribbean Challenge Initiative in 2008 and committed to protecting at least 20% of marine environment by 2020; extension of MPA system of Bahamas with a target of 2.5M hectares, including increase in budget for Bahamas National Trust; ²⁶ no management plans for MPAs; currently no marine mammal focus but new proposed MPAs under review include some areas of preferred habitat for marine mammals; MPAs include Central Andros National Park, Little Inagua National Park, Moriah Harbour Cay National Park (Great Exuma). ²⁷		
Research		
Existence of long-term research; collaboration with U.S. researchers; BMMRO, Wild Dolphin Project, Dolphin Communication Project.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Strandings		
High threat from naval base on Andros Island,²⁸ and seismic/oil development. The Bahamas Marine Mammal Research Organization (BMMRO) runs the stranding network (Charlotte Dunn, Diane Claridge). Collects some contaminants data from stranded animals. Reports from BMMRO reveal that between 2008 and 2020, at least 61 marine mammals stranded either alive, or dead in Bahamian waters. Of these, all but two were cetaceans.²⁹ Of those stranded, only one Bryde's whale showed direct evidence of entanglement in fishing gear, while moderate or advanced decomposition prevented the definitive evidence of human interaction with the other carcasses that were retrieved. Of the 12 individuals that stranded alive, six were rescued and refloated or rehabbed and/or released.³⁰ In mid-March 2000, a multi-species stranding of 17 cetaceans (four species included Cuvier's beaked whales, Blainville's beaked whales, minke whales and a spotted dolphin) was discovered in the Northwest Providence Channels of the Bahamas Islands. Based upon necropsies, it was determined that these strandings occurred as a result of acoustic impulse trauma produced by mid-range frequency sonars deployed by U.S. Navy ships during training exercises.³¹ Other mass stranding events in the Caribbean region have coincided with naval operations, including seven separate beaked whale mass strandings between 1991 and 2000 in the regions of the Caribbean in which the U.S. Navy has conducted training, including Puerto Rico, Jamaica, U.S. Virgin Islands, and the Bahamas.³² Although no mass strandings events in the Caribbean have been linked to naval sonar activity since the 2000 stranding event in the Bahamas, researchers have concluded that there is a significantly higher stranding rate during periods of naval sonar activity for the Caribbean region.³³		
Captivity		
License/permit required to operate a captive marine mammal facility (Form 11) regulation 7(1), Chapter 244A; Regulations governing captive care and maintenance of marine mammals implemented (Section 18 of Bahamas MMPA); 4 facilities operating with over 81 individual dolphins.		
Acoustic disturbance		
Oil and gas exploration—Bahamas actively seeking oil and signed first agreements with Seadrill;³⁴ Testing and exploration for oil drilling underway; first wells were set to be drilled in April 2020 but were stalled because of Covid-19; Seismic testing between Cuba and western Bahamas; cruise ship and commercial shipping traffic in NW Providence Channel, an international shipping lane; construction of cruise ship terminal in Bimini in 2016³⁵ and other coastal dredging and development projects. Multi-ship antiwarfare submarine exercises are conducted at Atlantic Undersea Test and Evaluation Center (AUTC) twice a year. Any mitigation at AUTC is "voluntary" on the Navy's part and not mandated by the Bahamian government. Because AUTC is outside the U.S., they are not required to do monitoring of impacts on local populations. No resources from the Bahamian government to fund any monitoring efforts. U.S. Navy has recently agreed to fund monitoring work at AUTC which is a step towards regulating activities in the future. Seismic guidelines in place under the 2007 Petroleum Resources Management System (SPE-PRMS).³⁶		
Vessel strikes		
Oil and gas exploration; cruise ship and commercial shipping traffic; under-regulated tourism; increasing smaller, fast private vessel traffic as well; data on numbers of vessel collisions with marine mammals unknown/unreported with the exception of manatees which are regularly hit by boat propellers. The Bahamas region is crossed by many international shipping lanes, the Old Bahama Channel alone carrying three million barrels (over 120 million gallons) a day, which is only likely to increase with the expansion of the Panama Canal (completed in 2016) and with access to the deep-water port at Grand Bahama. Regular inter-island transport carries fuel through narrow, shallow seaways. There is considerable existing oil production activity and associated refining and terminal capacity. Lastly, in The Bahamas, there is considerable storage and transshipment facilities, most notably the BORCO facility in Grand Bahama the largest in the Caribbean region, and global in scale. Government response is unknown.		
Climate change		
Oil and gas exploration; Party to UNFCCC;³⁸ Intended Nationally Determined Contribution (NDC) issued in 2015³⁹ calling for 30% renewables by 2030; 80% of commonwealth is within 3 feet (0.9m) of mean sea level; developed a National Climate Adaptation policy (2016) but no implementation; no reference to marine mammals.		

Barbados

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
No budgetary allocation for marine mammals; no national legislation related to marine mammals, no marine mammal provisions within fisheries or biodiversity legislation.		
Species specific recovery or management plans	No	
No recovery plans or management plans.		
Fisheries interactions		
Fisheries interactions reportedly low, very small incidental catch, but no local consumption; No species is legally protected, but they are not hunted for local fisheries. Anecdotal reports of hooking pilot whales on longlines but none landed, except one false killer whale was landed at Bridgetown Fish Market in 2009 (which was misidentified as a pilot whale); marine mammal occurrence off Barbados inconsistent and infrequent, except for humpbacks which although infrequent are consistently seen in February to April; difficult to identify fisheries interactions from stranded animals (bycatch levels not documented); drifting FADs (no FAD fishing in Barbados) and fishing gear washing up on east coast; Drifting FADs with satellite-linked beacon buoys are reported to the Caribbean FAD Tracking Project; ⁴⁰ fisheries legislation does not include reference to fishing methods harmful or relevant to marine mammal bycatch ⁴¹ Evidence that marine mammals are occasionally accidentally killed or injured in fishing gear in Barbados (see above). ⁴² Rare dolphin captures in Barbados are limited to accidental nettings—primary use of nets by Barbadian fishers is to catch flying fishes for which specialized gill nets are used. ⁴³ Fisheries Division collects and monitors fisheries data of over 3,000 active fishers in six main fisheries; ⁴⁴ promotion of responsible fishing practices.		
Habitat degradation and coastal development		
Coral reef degradation and coastal erosion high; development risk high; erosion control, wastewater programme improvements, coastal restoration projects in motion. Sargassum influx high but sporadic; Reported high levels of coral reef degradation over the span of 20 years; primarily caused by inadequately treated sewage; disposal of solid waste; diving near shore; tourism development; poor erosion and sedimentation policies. ⁴⁵ Coastal Zone Management Unit employs integrated approach, including the Coastal Risk Assessment and Management Program, including monitoring and diagnostics. ⁴⁶ ICZM plan currently undergoing revision.		
Pollution and marine mammal health		
High risk from oil development/transit; historical land-based oil extraction goes back a century; oil development governed by the Offshore Petroleum Act Cap. 282 A, Offshore Petroleum (Taxation) Act Cap. 80, Offshore Petroleum (Amendment) Act 2012, Offshore Petroleum (Taxation)(Amendment) Act 2012 and the Offshore Petroleum Regulations 2013; new licenses issued for offshore oil and gas exploration, and environmental assessment (EA)s accepted in January 2020. ⁴⁷ Some contaminant testing of stranded marine mammal tissues.		
Whale watch and associated activities		
Irregular but increasing sightings of mostly humpback whales; there may be potential for collisions with boats seeking to get closer to get a better view of whales, but there is only informal whale watching on Barbados; no regulations but guidelines exist on Barbados Marine Mammals Facebook page.		
Protected areas and other management regimes		
Barbados has an MPA at Folkestone and on designated at Carlisle Bay. They are not focused on marine mammals, but have no catch zones; marine mammals are transitory in Barbados waters but do come close to shore. These are multiple-use protected areas, and no management plans exist.		
Research		
No longterm marine mammal research; but interest in PAM and seeking to participate in the Caribbean Marine Mammals Preservation Network (CARI'MAM) acoustic monitoring programme; Fisheries Division collects and monitors fisheries data of over 3,000 active fishers in six main fisheries; promotion of responsible fishing practices.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Strandings		
Moderate strandings; some associated with sargassum; oil and gas exploration increasing; 12 dead stranded cetaceans since 2010; 30 individuals live stranded and pushed back to sea in 2013; informal but cohesive stranding response team coordinated by Julia Horrocks (UWI), vet Gus Reader, and Nikola Simpson (Sustainable Caribbean).		
Captivity		
No captive facilities and no plans for captive facilities on Barbados; no regulations.		
Acoustic disturbance		
Potential for acoustic disturbance high with increasing oil and gas exploration; no information regarding government measures to address this threat.		
Vessel strikes		
No data exists; cruise ship traffic is intense; potential increase in vessel traffic with increasing oil and gas exploration activity commencing in 2020, marine mammals transitory through Barbados.		
Climate change		
Coral reef degradation and coastal erosion high; high vulnerability of coastal tourism resorts located within 1km of shoreline (90% located within this zone); mitigation plans and strategy in place; ⁵⁰ Barbados' nationally determined contribution to Paris Agreement/UNFCCC is a 44% reduction in greenhouse gases by 2030; 37% by 2025. ⁵¹		

Belize

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
All marine mammals protected under new Fisheries Act (February, 2020); ⁵² drafting of specific marine mammal implementing regulations underway and involving multi-stakeholder participation. Legislation prohibiting the use and possession of gillnets in EEZ passed in November 2020.		
Species specific recovery or management plans	Yes	
National manatee recovery plan (since 1998); national manatee working group; national manatee rescue protocols; manatee rehabilitation center; ⁵³ An update of the Manatee Recovery Plan will be completed in 2021. ⁵⁴		
Fisheries interactions		
Decreasing (poaching or intentional take); few entanglements of dolphins and manatees are recorded (one incident of gillnet entanglement of humpback that stranded dead in 2016, but not clear whether entanglement was pre or post stranding; ⁵⁵); some incidental bycatch of manatees has been reported; ⁵⁶ but new data suggests incidents of manatee entanglements may be declining; ⁵⁷ avenues of communication established with local fisher communities, including the submission of fish catch data; ⁵⁸ poaching incidents prosecuted. A moratorium on the issuance of gillnet licenses was enacted in 2019; ban on the possession and use of gillnets in Belizean waters (Statutory instrument 158 of Fisheries Resources Regulations) passed in November 2020. This legislation renders all gillnet licenses as invalid. A transition programme to assist gillnet fishermen has been established.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Habitat degradation and coastal development		
Increasing; increase in tourism and population of Belize City with corresponding land development; ⁵⁹ rapid coastal development (mangrove clearing, dredging, and overdevelopment) has been identified as a severe threat to the ecological integrity of Turneffe Atoll ⁶⁰ and other areas, such as Placencia Lagoon, and around Belize City from cruise tourism (e.g., Stake Bank). Integrated Coastal Zone Management Plan developed by Coastal Zone Management Authority; Department of Environment oversees projects and developments, but private landowner activities have little oversight; offshore oil and gas exploration halted; integrated coastal zone management plan developed in 2016. ⁶¹ Department of Environment oversees developments.		
Pollution and marine mammal health		
Increasing; marine debris influx from the south; cruise tourism and boat traffic; oil and gas exploration moratorium currently in place; ⁶² heavy metals found in high concentrations in manatees; ⁶³ lobomycosis skin disease found in coastal bottlenose dolphins; ⁶⁴ marine pollution levels high in Corozal Bay area caused by the dumping of sewage waste in Chetumal Bay, and in New River; oil spill contingency plan in place. ⁶⁵		
Whale watch and associated activities		
Increasing; several tour companies offer opportunities for tourists to swim with dolphins, although this activity is not legal in Belize; ⁶⁶ whale watching low level in 2006 (less than 400 whale watchers and one operator ⁶⁷) but has grown to at least 10 whale watch and manatee viewing operators, although official numbers of operators is not clear because a variety of boats conduct opportunistic marine mammal viewing; ⁶⁸ no regulations implemented yet, but being drafted; low compliance with vessel speed restrictions/no wake zones. Responsible viewing guidelines developed by conservation organizations that are utilized in boater and tour-guide trainings.		
Protected areas and other management regimes		
Almost 1/3 of Belizean territorial area is protected by at least 103 protected areas; ⁶⁹ 30MPAs; ⁷⁰ restricted activities including manatee no-wake zones, but enforcement and compliance limited, and permits required for research; management plans for wildlife sanctuaries include manatee management plans; ⁷¹ three SPAW listed protected areas (Glover's Reef Marine Reserve, Hol Chan Marine Reserve, Port Honduras Marine Reserve).		
Research		
Manatees and bottlenose dolphins ⁷² are highly studied. Manatees focus of bi-annual capture and tagging studies since 1997. ⁷³ ⁷⁴ FINS (nonprofit organization) compiling bottlenose dolphin photo identification and sightings catalogue and engaged in long term research on dolphins and manatees. ⁷⁵ Over two decades of long-term dolphin and manatee studies conducted by Oceanic Society. ⁷⁶ Most of the marine mammal research is conducted in collaboration with many NGOs, including Toledo Institute for Development and Environment (TIDE), Wildlife Conservation Society (WCS), Sarteneja Alliance for Conservation and Development (SACD), ECOMAR, Clearwater Marine Aquarium, and Turneffe Atoll Sustainability Association (TASA).		
Strandings		
Increasing for manatees; unknown for strandings of cetaceans which are sporadic, and not often found as they may wash up in inaccessible or uninhabited cayes and coastline; manatee strandings are frequent (425 confirmed incidents between 1995–2020); ⁷⁷ it is estimated that at least 50 manatees strand per year; ⁷⁸ manatees and dolphins periodically get stranded in canals near Belize City; ⁷⁹ collaborative stranding network established with local experts (Belize Marine Mammal Stranding Network), including a manatee rehabilitation facility.		
Captivity		
No captive facilities exist on Belize. A swim-with-the-dolphin project was proposed in 2004. A facility was established for a short time at Spanish Bay Caye (Hugh Parkey). No regulations in place. A manatee rehabilitation facility exists in Sarteneja, Belize.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Acoustic disturbance		
Increasing; coastal development is increasing; tourism is increasing with a correspondence in increasing boat traffic; ⁸⁰ oil and gas exploration now prohibited (moratorium issued in 2015); no monitoring of sound or noise in the marine environment.		
Vessel strikes		
Increasing; watercraft collisions are the leading source of human-caused manatee mortality in Belize; ^{81, 82} potential displacement, disturbance, and reduction in bottlenose dolphin population in some areas; ⁸³ no wake zones implemented under manatee action plan, other measures needed (e.g. mandatory propeller guards).		
Climate change		
Coral restoration projects for the past decade; some private landowners are undertaking mangrove restoration; Belize Barrier Reef designation as a World Heritage Site in Danger removed in June 2018; ⁸⁴ Law protecting grazing reef fish (e.g. parrot fish), which in turn protects coral reefs; ⁸⁵ communication with FAO and participation in FAO disaster risk management and climate change adaptation workshop; ⁸⁶ Current national climate change strategy and action plan.		

Colombia

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
No national legislation specifically focusing on marine mammals exist but several pieces of legislation exist that are of general relevance to the conservation of marine mammals. ⁸⁷		
Species specific recovery or management plans	Yes	
National Programme for the Conservation and Management of the manatees in Colombia. ⁸⁸ Proposed Conservation Management Plan South America River Dolphins including Governments of Brazil, Colombia, Peru and Ecuador. ⁸⁹ A National Action Plan for the Conservation of Aquatic Mammals of Colombia is being updated and developed, expected to be finalized by the end of 2020. ⁹⁰ National Plan for Migratory Species. ⁹¹		
Fisheries interactions		
Incidental mortality or bycatch in a variety of nets has not been systematically monitored in all areas but is known to be a long-standing major threat for the Guiana and bottlenose dolphins; ⁹² efforts are on-going to address bycatch and direct takes with support of national and regional government offices and international organisations. Need to consolidate a national database with data on incidental captures. Fisheries interactions identified as a priority in the short-term in 2014 by the National Action Plan (NAP). The use of river dolphin as bait for Piracatinga fishing continues, although Colombia was formerly main market but for 2008–2014, Piracatinga also sold increasingly in Brazil. Captures of West Indian manatees and Neotropical otters are reported as threats. A mass stranding of Atlantic dolphins in Santa Martha region reported due to fishing with explosives. ⁹³		
Habitat degradation and coastal development		
Habitat alterations and loss from infrastructure development; river dams in the Amazon; sedimentation. Several projects and programmes of different organisations, such as INVEMAR, Fundacion Omacha, and academia (e.g. Universidad de los Andes, Universidad Jorge Tadeo Lozano) indicate that there is a collaboration among relevant authorities and stakeholders at the national level. Colombia maintains various regulations, policies, action plans and related programmes which address biodiversity and ecosystem services, including sustainable development of oceans, coastal and insular zones. A National Restoration Plan was formulated for the restoration and rehabilitation of degraded areas. ⁹⁴		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Pollution and marine mammal health		
In the Amazon and Orinoco basins, mercury has been released from artisanal and industrial gold mining since Colonial times, ongoing deforestation and burning of primary forest releases natural deposits of methyl mercury, affecting the local aquatic vertebrate fauna.⁹⁵ Despite challenges with important industries, e.g. oil and gas, and contamination of water bodies with wastewater (industrial and domestic) and agricultural run-off,⁹⁶ Colombia has extensive policies, programmes, and instruments addressing marine and land-based pollution, through the Ministry of Environment and Sustainable Development⁹⁷ and through technical institutions such as INVEMAR.⁹⁸ National effluent and water quality standards and monitoring programmes are in place. A holistic programme on trash management based on a circular economy approach has been adopted, supported by Colombia's National Policy for the Integrated Management of Solid Waste and a Zero Waste Systems Certification. Under the GEF-REPCar "Reducing Pesticide Runoff to the Caribbean Sea" demonstration projects, a significant reduction (up to 50% in some cases) was achieved in the use of synthetic pesticides on banana and plantains in Colombia.		
Whale watch and associated activities		
Guide for responsible viewing of aquatic mammals was published in 2017.⁹⁹ Over the course of the last eight years, guidelines for responsible observation of aquatic mammals have been adopted to achieve sustainable operations and develop the industry also as alternative livelihood for fishers with associated training and have contributed to the efforts of the International Whaling Commission (IWC) on the subject.¹⁰⁰		
Protected areas and other management regimes		
Colombia has a comprehensive system of marine protected areas with about 14% of national marine territory protected; 25 MPAs in the continental and insular Caribbean, three of which are listed under the SPAW Protocol: Sanctuary Ciénega Grande de Santa Marta; Regional SeaFlower Marine Protected Area; and Regional Natural Park of Wetlands. A 2016–2023 Action Plan for the Subsystem of Marine Protected Areas for the regions of the Caribbean and Pacific,¹⁰¹ recognises the importance of increased collaboration at the regional level.¹⁰² No specific marine protected area has been designated solely with conservation objectives for marine mammals in the Caribbean Region; but a portfolio of 100 priority conservation sites exists. On the Pacific-side, the Parque Nacional Natural Gorgona has a Management Programme for Marine Mammals.		
Research		
A national diagnostic of all aquatic mammals of Colombia was carried out in 2013,¹⁰³ outlining status of populations, major threats and conservation needs for the Caribbean, Pacific and Orinoco. Research in Colombia has developed over the last 25 years, especially with humpbacks in the Pacific, river dolphins in the Amazon and Orinoco; manatees in the Caribbean/Amazon; and coastal dolphins, <i>Tursiops</i> and <i>Sotalia</i>. <i>T. manatus</i>, has been subject to research and conservation initiatives for the last 20 years, which includes environmental education and releasing of animals that were in semi-captivity, with conventional and satellite tracking. To a lesser degree, this has also been done for the neotropical otter. Relevant topics are genetics, fisheries interactions, responsible tourism, reproduction programme of giant river otter and implementation of the National Manatee Management Plan. Different levels of data and knowledge for each species.		
Strandings		
A Guide covering aspects of strandings was published in 2007. There is no formal stranding network established in Colombia. Through research and monitoring programmes, strandings are reported; about 15 stranding events are recorded in the published literature for a mix of species associated with anthropogenic activities, between 1990's and 2012. A compilation of known unpublished records of strandings in Colombia from 1990 to 2016 which includes 53 individual strandings of mixed species of cetaceans and the West Indian manatee for both the Caribbean and Pacific regions.¹⁰⁴ Fishing with explosives has been implicated in a mass stranding of Atlantic dolphins in Santa Marta region.¹⁰⁵		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Captivity		
Two facilities offer dolphin shows with <i>Tursiops</i> , Oceanarium Rosario Islands in Isla San Martin de Pajarales, Rosario Islands and Acuario El Rodadero in Santa Marta, the latter including Swim-with-dolphin programmes [<i>Sotalia</i> and <i>Tursiops</i>] and Dolphin Assisted Therapy (DAT). ¹⁰⁶ A 2020 compilation by Cetabase ¹⁰⁷ indicates that these two facilities combined hold about 10 bottlenose dolphins and three Guiana dolphins. A programme to release manatees kept in semi-captivity for more than 15 years in the Caribbean region; released nine individuals between 2009–2011 and monitored by conventional and satellite telemetry. ¹⁰⁸ Operating licenses are required and monitoring visits carried out by government authorities. Bottlenose and Guiana dolphins maintained in aquaria and subject to behaviour studies. ¹⁰⁹		
Acoustic disturbance		
Seismic guidelines adopted. Areas of marine mammal watching are yet to be consolidated in the Caribbean region and noise associated with boat traffic not persistent but potential for expanding; acoustic disturbance from coastal development likely increasing. Guidelines for surveys of seismic operations exist but are not official and have not yet been adopted at a national level by government. ¹¹⁰ The industrial marine traffic in Santa Marta Bay, where an international shipping port is located, and the vicinity of the airport, with a coal- and oil-supply wharf are additional sources of noise pollution. ¹¹¹		
Vessel strikes		
Information on vessel activity and data availability low; identification of high-risk areas and assessment of magnitude to manage effects of vessel traffic required. ¹¹²		
Climate change		
The National Policy of Climate Change was established since 2014, with efforts developed especially since 2011 with the Colombian Strategy for Low Carbon (Estrategia Colombiana de Desarrollo Bajo en Carbono –ECDBC), the National REDD+ Strategy, the National Plan for Adaptation to Climate Change (el Plan Nacional de Adaptación al Cambio Climático –PNACC) among other initiatives to implement commitments to the Paris Agreement. The National System for Climate Change (SISCLIMA) was established by Decree 298 of 2016, and articulates national, regional and local levels responsible for climate change management. A Climate Change Intersectoral Commission developed an action plan (2019–2020) to address among others the implementation of short-term targets in terms of mitigation, adaptation and risk management in the National Action Plan. Internationally, updating the INDC to comply with the Paris Agreement, complements the long-term strategy towards achieving a low carbon economy by 2050.		

Cuba

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
No national legislation specifically focusing on marine mammals exist but a Resolution ¹¹³ on provisions for the control and protection of special significance to biological diversity in Cuba is in place, which includes all species of cetaceans and the manatee. Several pieces of legislation exist that are of general relevance to the conservation of marine mammals. ¹¹⁴		
Species specific recovery or management plans	No	
There is a National Programme for the Study and Conservation of Manatees ¹¹⁵ but not a specific recovery plan.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Fisheries interactions		
Captures of manatees are now prohibited in Cuba. Cuba maintains a direct live capture fishery for bottlenose dolphins via annual quotas which are assigned to dolphinariums of various countries within the regulations established by the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES).¹¹⁶ Anthropogenic threats have been reported to have had detrimental effects on manatees since 1970, with a major factor being illegal hunting.¹¹⁷ From 2001 to 2015 more than 50 manatee carcasses were found in various locations attributed to the poaching for the use of meat or drowning in fishing gears such as trawling nets (chinchorros).¹¹⁸ The Center for Marine Research (CIM) of the University of Havana suggests the actual number of mortality events is greater.¹¹⁹ Information regarding fisheries interactions with cetaceans remains very limited as no concerted monitoring or long-term research efforts are in place.		
Habitat degradation and coastal development		
The main factors impacting coastal ecosystem degradation, including coral reefs, sea grass beds, mangroves and beaches, are agricultural use, urbanization and tourism development. Loss of biodiversity is associated with pollution (domestic waste included), overfishing, uncontrolled extraction of marine species.¹²⁰ Legislation¹²¹ and tools for integrated coastal management are available, including land-use planning, environmental impact assessment and licensing processes. The Center of Engineering and Environmental Management of Coasts and Bays (CIMAB) of Cuba act as RAC for LBS Protocol; services include audits; EIAs; permits for industrial construction; feasibility studies for tourism and port facilities; management of wastes.		
Pollution and marine mammal health		
CIMAB is conducting ecotoxicology tests and bioaccumulation studies. A National Plan to Combat oil spills has been elaborated.¹²²		
Whale watch and associated activities		
No organised industry or guidelines adopted.		
Protected areas and other management regimes		
National System of Protected Areas (SNAP), two MPAs listed under SPAW-Parques Nacionales Guanahacabibes and Cayos de San Felipe; 105 MPAs have been proposed; MPAS cover 25% of the Cuban insular shelf. Of these, 57 have been legally incorporated into the system and 13 more are being managed to its standards; a total of 70 have some degree of implementation. About 30% of the Cuban coral reefs, 24% of the seagrass beds, and 35% of mangroves are legally protected by SNAP. Challenges include insufficient financing and the difficulty of reinvesting profits generated within these areas. Prohibited fishing practices and capture of protected species are the principle issues that affect MPAs.¹²³		
Research		
There has been very little published research on marine mammals in Cuban waters, while focus on the manatee has increased.¹²⁴ Reviews of 659 published and unpublished sighting, stranding, capture, and tagging records, reveal that only two species that are seen regularly and considered common in Cuban nearshore waters are the bottlenose dolphin and the West Indian manatee (<i>Trichechus manatus</i>).¹²⁵ Some research being conducted collaboratively with the Sarasota Dolphin Research Program regarding population and health assessments of bottlenose dolphins,¹²⁶ and separately assessing skin lesions in bottlenose dolphins.¹²⁷ The Acuario Nacional have conducted studies on bottlenose dolphins in the Archipiélago de Sabana Camagüey region to better understand the populations from which dolphins are captured for live display.		
Strandings		
No formal stranding network; strandings infrequent and low incident. A compilation of strandings and sightings of baleen whales,¹²⁸ (1922–2002) revealed six strandings involving <i>Balaenoptera borealis</i> (sei whale), <i>B. physalus</i> (fin whale) and <i>M. novaeangliae</i> (humpback whale), and eight sightings of humpbacks, 1932–2006. The highest percentage of reports was found in the north coast of Cuba in the months between December and July. Similar work on sperm whales compiled 10 strandings and three sightings between 1978–2009, with no causes of death established.¹²⁹		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Captivity		
The Acuario Nacional have conducted studies on bottlenose dolphins in the Archipiélago de Sabana Camagüey region to better understand the populations from which dolphins are captured for live display. The Acuario Nacional researchers have captured, measured, and released bottlenose dolphins off Varadero, Isabela de Sagua, and Caibarién. ¹³⁰ Several companies offer packages to swim with bottlenose dolphins ^{131, 132} in Rancho Cangrejo, off Varadero. A 2020 compilation by Cetabase ¹³³ indicates that 11 facilities hold about 86 bottlenose dolphins in Cuba.		
Acoustic disturbance		
Maritime traffic may be a source of noise pollution but no data available/country response unknown.		
Vessel strikes		
No information on the occurrence of collisions/country response unknown.		
Climate change		
The National Environment Strategy 2007/2010 is the guiding document for Cuban environmental policy. It defines the five main environmental issues (land degradation, factors affecting forest coverage, pollution, loss of biological diversity and water scarcity) and proposes the policies and instruments for their prevention, solution or minimization. Cuba has established the National Climate Change Group to bring together all the relevant governmental and non-governmental institutions. The Group is led by the Climate Centre under the Institute of Meteorology of the Ministry of Science Technology and Environment. ¹³⁴		

Dominican Republic

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
National legislation addressing marine mammals. ¹³⁵ <i>Trichechus manatus</i> is the only mammal with endangered status (Resolución No. 16/2011). Sperm whale <i>Physeter macrocephalus</i> (Vulnerable).		
Species specific recovery or management plans	Yes	
Management Plan for the Marine Mammal Sanctuary of La Plata and Navidad Banks. ¹³⁶ A Manatee Conservation Plan has been drafted by a private organisation and has not been adopted by the Ministerio de Medio Ambiente (MARENA).		
Fisheries interactions		
Entanglements, bycatch, abandonment of nets and nets that do not meet legal standards have been reported. In the case of manatees: the excessive speed of boats resulting in collisions with animals is the primary threat. Humpbacks (2009, 2017) and sperm whales (2018) have been reported entangled with nets, as well as manatees. Entanglement response training conducted with IWC in Samaná Bay in 2014. ¹³⁷ Efforts to address this threat include data compiled by the Vice-Ministry of Coastal and Marine Resources, as well as those initiated by the NGO FUNDEMAR. Campaigns are also carried out with fishermen regarding removal of derelict fishing gear. ¹³⁸		
Habitat degradation and coastal development		
National Plans for different themes concerning ocean and coastal protection. 'Estrategia de Desarrollo' 2030 includes protection and sustainable development. Protocols for monitoring of beaches, mangroves, sea grasses and coral reefs. Ecosystem-Based Management/Decision Support System (EBM/DSS) tools employed.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Pollution and marine mammal health		
In the Senate, the Coastal and Marine Zone and its Resources Law is under revision; and the Solid Waste Law has Regulations for the prevention of contamination. In 2019, a pilot project 'SnotBot' was launched on marine mammals and contaminants. Less than 15% of sewage from coastal areas is treated. ¹³⁹		
Whale watch and associated activities		
Whale watching activities are regulated in detail ¹⁴⁰ in Samaná Bay and La Plata and Navidad Banks (as of 2020, 56 operators/ companies in Samaná Bay and three in La Plata Bank); swimming with whales is prohibited in Samaná Bay. ¹⁴¹ Signature of an agreement between entities involved and MARENA occurs every year for the forthcoming whale watching observation season. Manatee watching occurs from shore and captive dolphin swimming programmes; permitting and regulations in place.		
Protected areas and other management regimes		
As part of national biodiversity conservation policies, there is a National System of Protected Areas (SINAP) made up of 127 conservation units, defined by various legal instruments. In these conservation units, representative samples of a large part of the main ecosystems are protected, and more than 90% of the endemic flora and fauna species reported in the country. Four MPAs are listed under SPAW: National Parks Jaguará, Sierra de Bahoruco and Haitises; la Caleta submarine park; a management plan for the Marine Mammal Sanctuary of La Plata and Navidad Banks was adopted in 2015; A Management Plan ¹⁴² and a Business Plan ¹⁴³ were adopted for the Marine Mammal Sanctuary of Estero Hondo, where there is the largest reported wild population of manatees.		
Research		
In 2002, residents of the village of Bayahibe, concerned about their local dolphin population when eight bottlenose dolphins were captured for a Dominican dolphinarium within a national park. The Project 'Amigos de los Delfines' initiated conservation efforts and in 2007, a survey of tourists in Bayahibe was conducted indicating that they would rather see wild than captive dolphins. ¹⁴⁴ CEBSE and FUNDEMAR have a long-standing sighting data collection programme. Monitoring protocols for marine mammals and birds.		
Strandings		
Process of developing a marine mammal stranding programme (workshops, review of protocols and response to strandings). On average, five strandings/year with mortalities caused by diseases, impacts by boats, capture, or illegal hunting. ¹⁴⁵ The Ministry of Environment responds to stranding reports together with the Center for Rescue and Rehabilitation of Aquatic Species (CERREA) of the National Aquarium, which deals with strandings following a protocol and with rescue of marine mammals and sea turtles throughout the country.		
Captivity		
Resolución No. 20/2018, prohibits the capture, importation, exportation and commerce of dolphin species in all national territory for five years. Marine mammals in captivity include bottlenose dolphins and two pinnipeds (in six facilities – 2020) ¹⁴⁶ and are regulated by the Regulation on the Holding, Management and Exhibition of Marine Mammal Species in the Dominican Republic (Resolution No. 01/2008). In the National Aquarium there are three manatees in captivity that were taken to the aquarium for rehabilitation, two in 2012 and one in 2018. A Ministerial programme is being implemented for their release to their natural habitat.		
Acoustic disturbance		
Oversight of seismic operations in specific cases by Ministry of Defense/Army. Plans with Spanish cooperation since 2015, although no dedicated guidelines in place.		
Vessel strikes		
High threat for manatees due to aquatic activities in touristic areas, despite decades of efforts in conservation of this species and being nationally listed as 'critically endangered.'		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Climate change		
Several policies and instruments adopted. ¹⁴⁷ Submitted national communications to the United Nations Framework Convention on Climate Change (UNFCCC). Land use change and forestry are large contributors to GHG emissions within the sector. Several reforestation programmes have been initiated. The Dominican Republic implements Clean Development Mechanisms (CDM) projects in the agricultural sector; thus carbon trading opportunities can be explored. Agriculture is highly vulnerable to extreme weather events, coupled with land degradation. ¹⁴⁸ Wind power projects are ongoing.		

Dutch Caribbean: Aruba, St. Maarten, Curaçao (Caribbean countries of the Kingdom of the Netherlands)

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
The Nature Conservation law prohibits any action that is prohibited by SPAW Protocol according to the relative Annex that the species is listed on. Thus, all cetaceans are fully protected and are not allowed to be kept in captivity (unless an exemption is presented to the STAC for consideration). Aruba has its own legislation, but currently no separate marine mammal legislation exists.		
Species specific recovery or management plans	No	
A dolphin-focused policy implemented in 2005 is still in place, regarding no further development of captive dolphin facilities and relating to Curaçao's original exemption under SPAW for its captive dolphin programmes (Curaçao Seaquarium/Dolphin Academy ¹⁴⁹).		
Fisheries interactions		
In Aruba, a high incidence of external injuries reported for spotted, bottlenose dolphins and false killer whales caused by fishing gear; ¹⁵⁰ no reported bycatch or directed take; entanglement and death of two sperm whales documented in 2013, and one adult sperm whale in 2003. ¹⁵¹ No reports from St. Maarten or Curaçao.		
Habitat degradation and coastal development		
Comprehensive ocean policy adopted in November 2017. Under this plan, 30% of water will be designated as protected; decree not drafted yet. Will restrict fisheries and other activities. Plan to create a sanctuary similar to Yarari Marine Mammal and Shark Sanctuary. ¹⁵² St. Maarten: marine protected areas, management plans and patrols by Nature Foundation mandated; but low capacity (3–4 staff members); High volumes of vessel traffic; recent development of mega piers to accommodate larger cruise ships; reportedly no EIA/EIS process on St. Maarten, Curaçao or Aruba but officially, an EIA should be requested if SPAW protected species may be impacted by development; Sewer flow into ocean causing 'black band' and other disease in coral ¹⁵³ on all islands; coral communities on Aruba and St. Maarten threatened by intensified tourist activity and polluted rainwater runoff (from construction, land clearances and household waste). ¹⁵⁴		
Pollution and marine mammal health		
Only 20% of homes are on sewage system; most have septic tanks that overflow and cause flow indirectly into ocean; hotels claim that wastewater is treated, however this is often not controlled and dumping into ocean occurs; Heavy cruise ship traffic (up to 7 x a day) on St. Maarten; Sewer flow into ocean enhancing diseases in coral ¹⁵⁵ on Curaçao; nutrient pollution in some places on Curaçao ¹⁵⁶ and a problem on all islands; water pollution by Isla Oil Refinery (Schottegat Bay) and Aqualectra (Curaçao) ¹⁵⁷ and GEBE on St. Maarten; Oil spill contingency plan established in 2013. On Aruba, three public sewage outlets release directly into the ocean; ocean plastic debris floats onto land from windward coastal shorelines; garbage dump is located at the shoreline.		
Whale watch and associated activities		
No organized commercial whale watch in Dutch Caribbean.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Protected areas and other management regimes		
Comprehensive ocean policy adopted in November 2017 (Curaçao). Under this plan, 30% of water will be designated as protected; decree not drafted yet but will restrict fisheries and other activities. Curaçao plans to create a sanctuary similar to Yarari Marine Mammal and Shark Sanctuary. ¹⁵⁸ St. Maarten: marine protected areas, management plans and patrols by Nature Foundation mandated; but low capacity and understaffed (3–4 staff members). New MPA gazetted for Aruba, including MPA Arikok, Sero Colorado, Mangel Halto, and Oranjestad Reef Islands. ¹⁵⁹		
Research		
Curaçao Seaquarium is supposed to provide an annual report of its research activities; started a preliminary bottlenose dolphin ID programme, not clear whether that continues. Some dolphin-focused research occurring, primarily related to dolphin health and behavior in captivity; some aerial surveys conducted in 2013; ¹⁶⁰ St. Maarten, some reporting of live animals to Observado. org platform: no analysis, data limited. No special budget for marine mammal research; no monitoring of marine mammal species, very limited incidences of marine mammals, may see whale now and then and dolphins quite often; low awareness; No substantive research on St. Maarten, Curaçao or relating to marine mammal distribution, abundance or threats. Some research relating to cetacean distribution around Aruba; ¹⁶¹ including an opportunistic sightings and scar database; Nature Foundation St. Maarten has been conducting passive acoustic monitoring and collecting sightings by dive centers, yacht companies, marinas and private individuals. ¹⁶²		
Strandings		
An active stranding network initiated in 1999; relative isolation and reportedly lack of collaboration with neighboring islands, but incidences of strandings low; strandings infrequent, but a few documented on Aruba; ¹⁶³ Aruba Marine Mammal Foundation, Sint Maarten Nature Foundation, and Curaçao Seaquarium and CARMABI collaborate loosely to respond to strandings. The Dutch Caribbean has not seen few strandings in the last five years. ¹⁶⁴ A spinner dolphin reportedly stranded in 2016, and was released back to the sea. ¹⁶⁵ Dead strandings in Aruba include: Gervais' beaked whale (2); Bryde's whale (4, 2 with broken jawbones); Sperm whale (4, 3 entangled); Pilot whale (2, 1 with orca bite marks); Rough toothed dolphin (2); Striped dolphin (4, 1 with skull fracture); Spotted dolphins (3). Live "in distress/near beaching" incidents include: <i>Pseudorca</i> (1); <i>Kogia breviceps</i> (1); and multiple incidents each of <i>Tursiops</i> , <i>Steno</i> , <i>S. Attenuata</i> , <i>S. Frontalis</i> , <i>S. coeruleoalba</i> , and <i>S. longirostris</i> .		
Captivity		
One captive facility on Curaçao; pressure to develop a captive dolphin facility on St. Maarten; no care and maintenance regulations; but policy against further facilities or expansion of captive dolphin programmes (original policy established by the Netherlands Antilles).		
Acoustic disturbance		
Extensive cruise and maritime traffic; no longer oil tankers from Venezuela; no seismic guidelines for oil and gas exploration.		
Vessel strikes		
High cruise traffic, so potential threat present; government response unknown; 20% of spotted dolphins, bottlenose dolphins and false killer whales shown to have injuries and 13% caused by propeller hits. ¹⁶⁶		
Climate change		
Threat level is high for entire Caribbean and SIDS ^{167, 168} —hurricane vulnerability, bleaching events, national ocean policy in motion may deal with climate change issues; no planning or dialogue around the issue of climate change on St. Maarten; Aruba is working to become 100% dependent on renewable energy sources by 2020 (in June 2016 was 20% renewable energy use); one of the first waste-to-energy plants in the Caribbean is being operated by private company in Aruba. ¹⁶⁹ The Ministries of Agriculture, Nature and Food Quality, Infrastructure and Water Management and Interior recently published a Nature and Environment Policy Plan for the Caribbean Netherlands (2020–2030) which calls out the need to build resilience against effects of climate change. ¹⁷⁰		

Dutch Caribbean: Bonaire, Eustatius, Saba (Caribbean Netherlands)

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
No specific dedicated marine mammal legislation, but like Curaçao and St. Maarten, the Caribbean Netherlands inherited the Netherlands Antilles law, the Nature Conservation law prohibits any action as prohibited by SPAW Protocol according to the relative Annex that the species is listed on. Thus, all cetaceans are fully protected and are not allowed to be kept in captivity (unless an exemption is presented to the STAC for consideration). Also, under the Fisheries Decree (original Netherlands Antilles legislation 1992), ¹⁷¹ it is prohibited to fish with bait consisting of meat from marine mammals (Article 2) or gillnets of more than length 2.5km; illegal to fish (capture/kill) for marine mammals.		
Species specific recovery or management plans	No	
Yarari Marine Mammal and Shark Sanctuary management plan in development; Nature Policy Plan for the Caribbean Netherlands prioritizes marine mammal protection and planning; New Nature and Environment Policy Plan for 2020–2030 has been adopted.		
Fisheries interactions		
No data or evidence of marine mammal bycatch; Fisheries Decree prohibits use of gillnets of 2.5km or longer or use of marine mammals as fishing bait and is currently being amended; some FADs are deployed in Saba fisheries; ¹⁷² longline and tuna purse seines outside EEZ are not adequately regulated and illegal fishing by Venezuelan vessels is a recurrent problem. ¹⁷³ Relatively low fishing activity and low gear densities. Organized outreach to fisheries associations on Saba and Bonaire.		
Habitat degradation and coastal development		
Cruise tourism is biggest economic driver on Bonaire with vast expansion of tourism industry and infrastructure, but number of cruise ships docking has decreased. ¹⁷⁴ Most not on central sewer system despite construction of a waste water treatment plan on Bonaire; ¹⁷⁵ some algal blooms in the south of Bonaire; Salt production plant on Bonaire anecdotal impacts on water quality but data lacking; Nature and Environment Management Plan for 2020–2030 recently adopted and includes provisions on spatial planning, coastal development, and waste water management.		
Pollution and marine mammal health		
Oil contamination from St. Eustatius; oil terminal and refinery on Bonaire; Oil transshipment facilities exist in Dutch Caribbean. On Bonaire, petroleum products are bunkered at BOPEC and St. Eustatius at NUSTAR; regular small-scale spills, major spills in 2002 (Tanker Paulina) and in 2009 (Tanker Vallombrosa); the shores of the Dutch Caribbean are variously contaminated with tar. ¹⁷⁶ Impacts from spills originating in Venezuela. Ingestion of anthropogenic debris has so far only been documented in two stranded beaked-whale specimens. ¹⁷⁷ Incident Control Plan for oil spills in place. Lack of sewage and wastewater treatment of many areas; Bonaire reefs are at thresholds of polluted values at 10 sites due to wastewater pollution (nutrients, bacteria, organic matter); wastewater disposal a problem on Saba, as well. ¹⁷⁸ Little to no contaminant testing conducted.		
Whale watch and associated activities		
Statia National Marine Park (MPA) has guidelines/code of conduct relating to responsible tourism; prohibiting contact with marine mammals or disruption of their behaviors; guidelines are under development and will be based on SPAW Guidelines; currently no speed restrictions; currently snorkeling with whales is allowed, but no touching or disturbance of dolphins; whale watching is opportunistic and involves recreational and commercial power vessels but no organized whale watch operators targeting mostly humpback whales; some data collection occurring from marine park managers. There are no commercial tour operators in the Caribbean Netherlands.		
Protected areas and other management regimes		
Yarari Marine Mammal and Shark Sanctuary established in 2015; Management plan in development encompassing the EEZ surrounding the Islands of Saba/Saba Bank/Bonaire/St. Eustatius; Bonaire, Saba and Eustatius have designated national parks with dedicated marine park management [Saba Conservation Foundation/Saba Bank Management Unit; St. Eustatius National Park Foundation (Stenapa); National Park Foundation Bonaire (Stinapa)], and encompassing all waters surrounding the islands and to the depths of 60m on Bonaire and Saba, and to 30m on St. Eustatius; Saba Bank National Park (2010) received Sensitive Sea Area status in 2012. ¹⁷⁹		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Research		
Saba and STINAPA participating in CARI'MAM PAM deployment; some acoustic monitoring and sightings work carried out by national parks (STENAPA and STINAPA) in collaboration with Dutch Caribbean Nature Alliance (DCNA); some sampling of species occurrence conducted through fishermen surveys/port sampling for BES Islands, ¹⁸⁰ Dutch Caribbean Cetacean Network (DCNN) established; some aerial surveys and acoustic monitoring. ¹⁸¹		
Strandings		
Informal stranding network exists (SCCN no longer active) via Dutch Caribbean Cetacean Network (DCCN) and via Google Group and park management authorities of Saba Conservation Foundation, Stinapa Bonaire, and Stenapa St. Eustatius along with Directorate of the Environment; some strandings reported for Bonaire. Cuvier beaked whale strandings documented in 2017 by Stinapa. ¹⁸² Sporadic, but few, strandings, including pygmy sperm whale (<i>Kogia breviceps</i>), Cuvier's beaked whales (<i>Ziphius cavirostris</i>), Gervais beaked whales (<i>Mesoplodon europaeus</i>), Dwarf sperm whales (<i>Kogia simus</i>), and Sperm whale (<i>Physeter macrocephalus</i>). ¹⁸³ Few strandings documented by STENAPA; three short-finned pilot whales stranded dead in 2011 on St. Eustatius. ¹⁸⁴		
Captivity		
No captive facilities; Netherlands Antilles Dolphin Policy still stands and prevents development of further dolphin facilities..		
Acoustic disturbance		
Shipping reportedly a low threat; ¹⁸⁵ but shipping traffic reported as a concern by Debrot et al (2017); Seismic surveys do occur with a most recent example being the survey conducted by the Texas university in November 2014 in the coastal waters around Bonaire. ¹⁸⁶ St. Eustatius is the second busiest port in the Kingdom of the Netherlands due to presence of oil terminal.		
Vessel strikes		
Shipping reportedly a low threat; ¹⁸⁷ however, high levels of shipping traffic reported by Debrot et al. (2017). Tourism (cruise) levels high. Government response unknown.		
Climate change		
Netherlands is a party to the UNFCCC ¹⁸⁸ and submitted its first NDC (Nationally Determined Contributions) in 2017 under the Paris Accord and United Nations Framework Convention on Climate Change. ¹⁸⁹ The submission, on behalf of all EU member states, calls for a 40% reduction in greenhouse gases by 2030. ¹⁹⁰ The Ministries of Agriculture, Nature and Food Quality, Infrastructure and Water Management and Interior recently published a Nature and Environment Policy Plan for the Caribbean Netherlands (2020–2030) which calls out the need to build resilience against effects of climate change. ¹⁹¹ Currently the BES-islands are working on island specific implementation agendas.		

France [French Guiana¹⁹², Guadeloupe, Martinique, Saint Barthélemy, and Saint Martin]

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
Order of July 1, 2011 recently modified by the order of September 3, 2020, establishing the list and terms of marine mammals protected in national territories. This order prohibits destruction, mutilation, capture, intentional disturbance, including approach within 100 m in marine protected areas, chasing and harassment of marine mammals in the wild.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Species specific recovery or management plans	Yes	
AGOA sanctuary established in 2012, with the entire EEZ encompassed by the French Antilles (including Martinique, Guadeloupe, Saint Martin, and Saint Barthélemy) designated as a Sanctuary for marine mammals; a manatee reintroduction plan undertaken with two captive-born manatees relocated to Guadeloupe in 2016, with the project suspended in 2018 and eventually abandoned in 2019. National action plan for the protection of cetaceans adopted in 2019. A red list of marine mammal species was established in 2017 for French Guiana and in 2019 for Martinique. The Guiana dolphin (<i>Sotalia guianensis</i>), and the manatee (<i>Trichechus manatus</i>) were assessed as 'Endangered' and the sperm whale as 'Vulnerable.' Although many actions have been conducted to improve knowledge of <i>Sotalia</i> and the manatee, no formal dedicated action plans have been implemented.¹⁹³		
Fisheries interactions		
An entanglement response workshop was conducted in November 12–14, 2013 in St. Martin, run jointly by the IWC and SPAW-RAC, and followed by additional training for Guadeloupe and Martinique in 2015.¹⁹⁴ Entanglements reported for Guadeloupe and Martinique with rescue efforts attempted. Prohibition of certain fishing gears and practices to limit bycatch. A stranding network exists in all French territories, coordinated at the national level by the Pelagis Observatory (France). A field guide can be found online.¹⁹⁵ One of the objectives of the network is to report bycatch marks on stranded individuals. In French Guiana, since 2014, each year between one and eight stranded <i>Sotalia</i> showed bycatch marks mainly attributed to coastal nets.¹⁹⁶ Some bycatch are also known to occur in the shrimp pelagic trawl fishery but numbers seem to be low. Mitigation measures are tested such as traps for pelagic trawls, as well as light and alternative fishing gears for coastal set nets. These projects are conducted by the Comité régional des pêches (CRPMEM) and the World Wild Fund for Nature-WWF. In the French West Indies, a programme is proposed to acquire knowledge on incidental catches including analysis of fishing activity on fish aggregating devices (FADs) and the impact of FAD ropes on the entanglement of large cetaceans (especially sperm whales). In French Guiana, a reinforcement of knowledge programme on fishing activities involved in bycatch include: Analysis of the evolution of fishing effort and fishing strategy with IFREMER, WWF and CRPMEM; Identification of the French and foreign fleets involved in incidental catches in partnership with the armed forces, the Direction de la mer (DM), the Action de l'état en mer (State action at sea), IFREMER, Centre National de la Recherche Scientifique (CNRS), CRPMEM; Analysis of cetacean stranding data from the French Guiana stranding network in conjunction with the French National Stranding Network-RNE, in order to better understand the interaction between the fishing fleets and small cetacean populations.		
Habitat degradation and coastal development		
Manatee and Guiana dolphin conservation efforts increasing in French Guiana to address habitat degradation.¹⁹⁷ On Martinique and Guadeloupe, expansion of marine hub and increasing marine traffic, increasing geophysical mapping and exploration with sonar being deployed (e.g. underwater cables for internet); St. Bart and St. Martin high coastal development. Increasing degradation of coral reefs and poor water quality on west side of Guadeloupe (three of eight beaches closed to swimming in 2019); increase in leisure boats and recreational activities.¹⁹⁸		
Pollution and marine mammal health		
Mercury is discharged from artisanal mining operations in the Amazon basin, including French Guiana, flowing into the Caribbean basin from the region's major drainage basins.¹⁹⁹ A preliminary contaminants study was conducted on <i>Sotalia</i> in French Guiana based on the biopsies collected by the stranding network. It showed a low contamination of the species by POPs and mercury.²⁰⁰ Significant pollution of kepone (chlordecone/organochlorine pollutant) in French Caribbean (Martinique and Guadeloupe), with large parts of the island waters closed for fisheries.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Whale watch and associated activities		
St. Bart and St. Martin, occasional whale watching, but large numbers of operators in Martinique and Guadeloupe: approximately 30–40 boats operating legally, but other operators conducting activities illegally. The evolution of numbers of commercial operators in Guadeloupe, Martinique and St. Martin indicates operators increased from one operator in 2002 to 70 operators in 2020, generating over two million Euros per year in 2015.²⁰¹ Guidelines are reportedly not enforced. Concerns about vessel operations have been reported to the CSRPN (Conseil Scientifique du patrimoine naturel de la Guadeloupe) to limit numbers of whale watching operators, recreational boats interacting with humpbacks and other cetaceans, including swim-with activities. At the national level, the order of July 1, 2011 that lists all marine mammal species entirely protected in French territories, was modified by order of September 3, 2020 that now prohibits marine mammal approach within 100 m in marine protected areas, including the AGOA Sanctuary (French Caribbean waters). In addition, in the AGOA Sanctuary, marine mammal viewing operators have to attend a dedicated course on sustainable whale-watching and to comply with a code of conduct in order to approach marine mammals within 300 m (Arrêté n° R-02-2017-03-15-003 réglementant l'approche des cétacés dans les eaux sous juridiction française aux Antilles).		
Protected areas and other management regimes		
Eight MPAs are listed under SPAW. AGOA Sanctuary participates in the Sister Sanctuary agreement, adopted a management plan in 2012, and is among the eight MPAs listed under SPAW.		
Research		
AGOA research campaigns include acoustic monitoring and population estimates. Enhanced efforts on <i>Sotalia spp.</i> in French Guiana following the Marine Mammal Conservation Corridor for Northern South America and recent opportunistic surveys, confirming humpback mother/calf pairs and other delphinids;²⁰² In French Guiana, Groupe d'étude et de protection des oiseaux de Guyane (CEPOG) has conducted aerial transect surveys, along with training in biopsy techniques, disentanglement, strandings response and acoustic monitoring (2011–2012). In Martinique and Guadeloupe, several NGOs have been conducting cetacean surveys: for example, Société pour l'Etude, la Protection, et l'Aménagement de la Nature à la Martinique (SEPANMAR) has been conducting cetacean inventories since 2003, including aerial line surveys, photo identification, and acoustic studies. Observatoire des mammifères marins de l'Archipel Guadeloupéen (OMMAG) has been working actively on different surveys, including photo identification. Association Evasion Tropicale (AET) been active in marine mammal conservation, including disentanglement efforts, for at least several decades. AET's report of 20 years of census and monitoring data on the west coast of Guadeloupe is in progress.²⁰³ The NGO MEGAPTERA, together with the nature reserve of Saint Martin organizes the Megara Survey (visual observation, biopsy, and ARGOS tagging) almost every year since 2014. St. Bart hydrophone test and data analysis conducted under CARIMAM. The REMMOA project was conducted in 2008 and 2017 by the Pelagis Observatory and the French Biodiversity Office, with an aerial survey conducted all over the EEZ of each territory. It focused on marine mammals, seabirds and large pelagic fish and threats (marine traffic, nets, FADs).²⁰⁴ In 2018, boat surveys dedicated to cetaceans and seabirds were conducted on the continental slope of French Guiana EEZ by the Ocean Science Logistic (OSL) NGO (Cetaceans at Sea Campaign).²⁰⁵ Relaunch of the monitoring campaigns at sea of the AGOA Sanctuary (2012–2014) by visual observation transect and listening points (annual or semi-annual) under the CARIMAM project, contributing to the improvement of knowledge on sperm whales (seasonality, functional zones, diet) in French West Indies waters; Greenpeace 2019 Campaign – Megafauna offshore with focus on the humpback whale; Supervision of research campaigns at sea with the promotion of the ObsenMer tool to the local scientific community and citizen scientists, but also internationally, to acquire observation data on marine fauna, including cetaceans. GEPOG Project (2011–2012), six missions at sea with catamaran to study pelagic ecosystem.²⁰⁶ Project COAST (2016–2019) on <i>Sotalia</i> conservation and fishing in French Guiana.²⁰⁷		
Strandings		
The French Guiana stranding network is an integral part of the French National Stranding Network (RNE) that is coordinated by Pelagis Observatory (France). Protocols are similar and all data collected in French Guiana are centralized by Pelagis. The remaining French Caribbean territories also have stranding networks that work under the supervision of Pelagis and the national stranding network: Association Evasion Tropicale is responsible for Guadeloupe and Martinique; the Réseau d'Observation des Cétacés Échoués à la Martinique (ROCEM) coordinates field work. In French Guiana between 1997 and 2015, 68 strandings were recorded, including 62 (<i>Sotalia guianensis</i>), four (<i>Trichechus manatus</i>) and one (<i>Tursiops truncatus</i>). In French Guiana, the REG network [Réseau de suivi des Échouages de mammifères marins et de tortues marines de Guyane], operating in partnership with local Government-DEAL, recorded 12 strandings 2014–2015, all of <i>Sotalia guianensis</i>.²⁰⁸ On Guadeloupe, more entanglements have been reported in the last ten years than the ten years prior; analysis of 20 years of stranding data (71 events) indicate 14 events involve anthropogenic cause (entanglements).²⁰⁹		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Captivity		
No captive facilities in French overseas countries and territories (OCTs), but in mainland (three facilities). In September 2020, France issued a prohibition on captivity and existing facilities can no longer breed or import cetaceans. ²¹⁰		
Acoustic disturbance		
A 2015 review of seismic mitigation measures along northern South America was carried out by Green Heritage Fund Suriname and WWF Guianas. ²¹¹ In 2016, guidelines were developed in French Guiana to limit the impact of anthropogenic noise on cetaceans. ²¹² At the national level, guidelines have recently been published. ²¹³ In 2020, adoption of national guidelines on underwater noise. ²¹⁴ Through the CARIMAM project, implementation of acoustic monitoring by fixed hydrophones throughout the Caribbean will be carried out, allowing a more detailed knowledge of species and their seasonality. This acoustic monitoring will also be used to study the level of noise pollution in all waters of the AGOA Sanctuary in a second phase (from 2021). An increase in maritime traffic suggests the potential for increased noise levels.		
Vessel strikes		
Environmental codes and legislation articles aiming at avoidance of ship collisions with cetaceans (applicable to AGOA and Pelagos Sanctuaries) Article L334-2-2; created by Law n°2016-1087; 8 Aug 2016 - art. 106 (V); Article L334-39; created by Law n°2017-300; 8 March 2017 - art. 1. Since 2017, all French vessels beyond 24 m in length have to be equipped with the REPCET device in AGOA sanctuary (Arrêté du 11 décembre 2017). A project on mapping of high collision risk areas in the French West Indies is being carried out, aiming at adaptation of the REPCET tool to local species and to vessels used locally, with implementation of mitigation measures (including speed limits). Some strikes reported by sailing boats (under 27m); concern over jet boat races in French West Indies and Regatas on St. Martin and St. Bart. ²¹⁵		
Climate change		
Funding climate change adaptation and mitigation is a priority for France. Overseas countries and territories (OCTs) in the Caribbean are involved in three INTERREG transnational cooperation programmes. The Caribbean Area cooperation Programme 2014–2020 involves Guadeloupe, French Guiana, Martinique and St. Martin, and around 40 other countries and OCTs in the Caribbean basin. It is run in partnership with the three regional economic organizations, i.e. the Caribbean Community (CARICOM), the Association of Caribbean States (ACS), and the Organisation of Eastern Caribbean States (OECS). The Caribbean Community Climate Change Centre (CCCCC) was established as a reference point for research on climate change impacts and adaptation strategies in the region. The programme is structured in two components: (1) cross-border cooperation between Guadeloupe, Martinique and the OECS countries, and (2) transnational cooperation involving Guadeloupe, French Guiana, Martinique and St. Martin and the other participating countries and territories.		

Grenada

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
No national Legislation ²¹⁶ relating to marine mammals. National Land and Marine Management Strategy (2011); National Biodiversity Strategy and Action Plan (2016–2020).		
Species specific recovery or management plans	No	
No recovery or management plans.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Fisheries interactions		
No current data is available on the occurrence of bycatch of marine mammals despite considerable attention provided to fisheries by policies and programmes currently existing in Grenada. ²¹⁷ No evidence had been found of marine mammals caught intentionally or incidentally, in a review/interviews with fishermen published in 2000. ²¹⁸ The FAO Fisheries and Aquaculture Country Profile (May 2019) ²¹⁹ indicates that over the past decades the fishing industry in Grenada has evolved from one that was essentially artisanal to a more commercialized fishery, harvesting a tropical multispecies stock. The principal resource is yellowfin tuna, which according to the Chief Fisheries Officer is not overexploited.		
Habitat degradation and coastal development		
Vulnerable to extreme weather events; coastal land development has increased with massive rebuilding efforts post-hurricanes (as in 2004–2005) coupled with increased tourism-based activities, including development of marinas and other coastal construction. Grenada relies upon policies and instruments for the management of coastal and marine ecosystems. ²²⁰ Relatively weak planning control and weak enforcement and monitoring for compliance within the EIA process. ²²¹		
Pollution and marine mammal health		
No data is available on the interactions/impacts of pollutants on marine mammals. Marine Pollution strategies and policies are in place to address oil spills, waste management/plastic litter. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) ²²² GmbH has committed to tackling marine litter and instruments are being addressed. ²²³ The waste produced on the islands is managed through a well-organised collection service that claims a coverage rate above 98%. No spills have been reported to Rempeito-Carib since 1999. A National Contingency Plan has been drafted. ²²⁴		
Whale watch and associated activities		
Marine mammal watching is present, ^{225,226} although not extensively organized, with few operations off Grenada and Carriacou. No guidelines/regulations have been adopted. One operator is reportedly following the guidelines of the former CaribWhale (Caribbean Whale Watch Association that is no longer active). ²²⁷		
Protected areas and other management regimes		
Grenada has pledged to protect 25% of their nearshore and coastal habitat by 2020 under the Caribbean Challenge Initiative. To date, Grenada has declared 4 MPAs and has proposed a fifth 'Levera Marine Park'. ²²⁸ Molinere-Beausejour MPA is the only one listed under the SPAW Protocol. ²²⁹ Participation in the Climate-Resilience Eastern Caribbean Marine Managed Areas Network (ECMMAN) Project contributed to the establishment of Grand Anse MPA. A Grenada Marine Protected Area Network has been established as a Government organisation. ²³⁰ No MPAs with marine mammal conservation in their objectives.		
Research		
Little research has been carried out on marine mammals in Grenada. Earlier work has provided insights on historical exploitation, when whaling ships visited Grenada in the 19 th century and a short-lived whaling industry was established in the 1920's, mostly for humpback whales and occasionally sperm whales. The diversity of marine mammals seems to be relatively low in Grenadian waters and includes the 'black fish' (short-finned pilot whale and similar species) that have been identified through interviews with fishermen. ²³¹ A compilation of marine mammal records was published in 2002 recording 11 species of marine mammals, with the humpback whale being the most commonly reported mysticete and several odontocetes being also frequently reported. ²³² The Nature Conservancy has supported high-end technology use to map habitats and coastal environments, including on Grenada, producing coral reef report cards. Drones, cameras, satellites and aerial mapping have been utilized. ²³³ No specific data on marine mammals has yet been reported.		
Strandings		
No stranding data for marine mammals reported. Government response is unknown.		
Captivity		
No marine mammals in captivity. Government response is unknown.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Acoustic disturbance		
Grand Anse waterfront includes hotels, restaurants, dive shops and homes, while hosting hundreds of visitors and up to 140 yachts per day. Fishermen also frequent the area. Without a coordinated strategy, such high traffic can leave the area vulnerable to overuse and pollution. ²³⁴ There is no data specific to the effects on marine mammals.		
Vessel strikes		
Data on numbers of vessel collisions with marine mammals unknown/unreported.		
Climate change		
The impacts of climate change, ²³⁵ loss of biodiversity and land degradation are viewed as the most important environmental issues facing Grenada and constitute the greatest threats to the economic well-being and livelihood of the population. Initiatives include the elaboration of the National Biodiversity Strategy and Action Plan, the National Capacity Self-Assessment, the National Climate Change Policy, the Pilot Program on Climate Resilience, the Sustainable Land Management Policy, the National Hazard Mitigation Policy and the National Environmental Management Policy, Strategy and Action Plan, as well as the Integrated Climate Change Adaptation Strategies (ICCAS) project designed to provide a holistic approach to climate change adaptation and mainstreaming in Grenada, with the support of the German Development Cooperation (GIZ) and UNDP. This project has generated important institutional and operational frameworks and outputs, ²³⁶ including a community-based climate fund.		

Guyana

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
Wildlife Conservation and Management Act of 2016; ²³⁷ but no specific marine mammal provisions or regulations; however species of whales and dolphins are listed on Schedule 1 and 2 (corresponding to CITES Appendix I and II species) requiring compliance with CITES permitting procedures for import or export; Fisheries Act of 2002 (refers to marine mammals as bycatch).		
Species specific recovery or management plans	No	
No budget for marine mammals, and no management plans.		
Fisheries interactions		
Fisheries interactions unknown; none reported; no directed take reported; industrial fishery in Guyana based in Georgetown consists of at least 129 trawl vessels; potential impact of Brazilian gillnet and Venezuelan trawl net fleet. 48% of trawl fleet is foreign owned. ²³⁸ Hook and line red snapper fishery (at least 38 vessels); some 1300 artisanal fishers; Fish is main source of animal protein in Guyana; some education programmes for fishers exist; ²³⁹ little collaboration between Wildlife Commission and Fisheries; marine mammals not mentioned on Ministry of Agriculture & Fisheries website; only fish bycatch considered; 3 fishery sectors: subsistence, artisanal, and industrial. ²⁴⁰ Data supplied to FAO include only commercial landings and rarely account for subsistence catches, IUU and discarded bycatch figures. Bycatch (turtle) reduction devices are utilized in some fisheries (seabob industry; to attain Marine Stewardship Council certification) ²⁴¹ Marine Stewardship Council (MSC) certification review suggests little interaction between marine mammals and at least one Guyana fishery (seabob—bottom shrimp trawls used); no incidents of captures of Guiana dolphins; no reported manatee bycatch in shrimp trawls. ²⁴²		
Habitat degradation and coastal development		
90% of population lives in coastal zone; ²⁴³ integrated coastal zone management policy, but lack of coordination among agencies; coastal mangrove swamps drained for agriculture and industry; tourism not as developed as Caribbean neighbors; mainly ecotourism in hinterland (except for Shell Beach which is major tourist attraction). ²⁴⁴		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Pollution and marine mammal health		
High risk from oil development/transit; little to no contaminant testing; oil spill contingency plan in place; no training, no marine mammal observers; Guyana poised to be the next largest producer of oil in the Caribbean; Other companies are exploring and finding hydrocarbon resources—Tullow in the Orinduik Block ; oil companies expected to be active in Guyana for at least 20 years. ²⁴⁵		
Whale watch and associated activities		
No organized whale watching or regulations, although ecotourism and birding is primary tourism in Guyana. ²⁴⁶		
Protected areas and other management regimes		
No marine protected areas.		
Research		
No short or longterm marine mammal research.		
Strandings		
Threat might increase with increasing oil production/vessel traffic; currently strandings low = 9 over the course of 10 years; informal response network.		
Captivity		
No facilities on Guyana, but a proposal to capture and export bottlenose dolphins was issued by several exporing companies in 2004. The proposals were ultimately denied. Guyana captured bottlenose dolphins in May 2004. 10-14 animals were exported to Venezuela and seized by Venezuelan government officials. It is believed that most were subsequently released.		
Acoustic disturbance		
Oil production increasing; government response low.		
Vessel strikes		
No strikes reported; It is likely that the occurrence of ship strikes in the Caribbean region is highly underreported. With increasing oil production, threat increases to moderate. Government response is unknown.		
Climate change		
Assume threat level is high for entire Caribbean and SIDS—hurricane vulnerability, bleaching events. Government has reported emissions commitments (intended nationally determined commitments), forecasting 100% renewable energy by 2025. Guyana has an elaborate mitigation and renewables commitment and strategy, including prioritization of forest management—Guyana has maintained one of the lowest deforestation rates on Earth. ²⁴⁷		

Honduras

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
Specific legislation concerning the manatee ²⁴⁸ and locally Decreto Ley No. 134-90, establishes that each municipality provides protection to marine mammals and marine protected areas; General Law on forestry, protected areas and wildlife, art. 316, NO.3-conservation and sustainable management of species and ecosystems that are found in protected areas; ²⁴⁹ Ley general del ambiente. (general environment law); Manual de normas tecnicas para la vida silvestre (technical manual for wildlife).		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Species specific recovery or management plans	No	
No specific recovery or management plans.		
Fisheries interactions		
The Antillean manatee, <i>T. manatus</i> , is among the most threatened mammals in Honduras. Data from aerial, boat, and interview surveys were compiled between 2005–2007. The major cause of known mortality from 1970–2007, based on 26 records, was due to entanglement in fishnets. Despite local and federal protection, ²⁵⁰ manatees are still poached and opportunistically caught in fishing nets. ²⁵¹		
Habitat degradation and coastal development		
Increased coastal population and tourism, agricultural run-off and overfishing are issues impacting the Mesoamerican Barrier Reef system. Environmental licensing system is in place and other principles and regulations exist on protection, conservation, recovery, and sustainable use of water resources. General Water Law approved in 2009. Honduras drafted the Country Vision 2010–2038 and National Plan 2010–2022 which pursues the sustainable management of natural resources and reduction of the environmental vulnerability, proposing the restoration of one million hectares, abating deforestation, consolidation of protected areas, and establishment of payment for ecosystem services (PES) mechanisms to finance protected area management. CleanSeas Campaign launched in 2017 by UN Environment, aims at engaging stakeholders in addressing marine litter and Honduras adopted Guatemala's bio-fences made from recovered plastic debris in rivers across the country to trap and collect macro-plastic waste. An Integrated Ridge-to-Reef Management of the Mesoamerican Reef project (MAR2R) seeks to consolidate regional coordination and capacities for a harmonized approach to contribute to the conservation and sustainable use of shared freshwater, coastal and marine resources of the transboundary MAR ecoregion. ²⁵²		
Pollution and marine mammal health		
Plastics pollution has been documented in the Gulf of Honduras. ²⁵³ Implementation of national contingency plan for oil spills and hazardous substances and Functional Guide for local contingency plan for companies with risk of oil spills. ²⁵⁴ Through the UN Environment CleanSeas Campaign, launched in 2017, stakeholders are engaged in addressing marine litter, including the installation of bio-fences to trap plastic waste in rivers and similar projects. ²⁵⁵ Management of marine debris an issue. A 2018–2019 beach clean-up project identified foam as a major component of beach litter in the Gulf of Honduras. ²⁵⁶		
Whale watch and associated activities		
No organized industry; no regulations or guidelines.		
Protected areas and other management regimes		
Honduras has approximately 1000 km of coast (both Pacific and Caribbean). A total of 95 protected areas in Honduras are registered members of the SINAPH (Honduras National System of Protected Areas). ²⁵⁷ NGOs (e.g. Ecological Association for the Conservation of Pico Pijol (Aecopijol), Association for the Ecological Conservation of the Bay Island (BICA), Cayos Cochinos Foundation, Cuero y Salado Foundation (Fucsa), Parque Nacional Nombre de Dios Foundation (Fupnand), Calentura Guaimoreto Foundation (Fucagua), Foundation for the Protection of Lancetilla (Prolansate), Parque Nacional Pico Bonito Foundation (Fupnapib) have signed protected areas management agreements with the government of Honduras since 1996. In the context of the Mesoamerican Barrier Reef, the Bay Islands is defined as a high priority area for its rich biodiversity Refugio de Vida Silvestre Cuero y Salado, a Ramsar site which provides full protection for manatees, along with other Ramsar sites. A Marine Project, implemented by the Ministry of Environment, with UNDP and GEF funding is contributing to improve management and supporting co-management as governance mechanism.		
Research		
In 1990, the Institute of Marine Science was created as a private initiative on Roatan Island and has conducted rescues and recorded sightings of marine mammals since 1993. ²⁵⁸ Collaboration with non-governmental organisations such as Maralliance, BICA, CEM, Fundacion Cayos Cochinos; Listing of marine mammal species on-going with the support of IUCN and WCS. ²⁵⁹		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Strandings		
No stranding network established ²⁶⁰ but 'whales' included in the category of species involved in 'strandings of unknown reason' being assigned a moderate level of threat impact. ²⁶¹		
Captivity		
Captive facilities offer various programmes (encounter, action swim, snorkel, dive) coordinated by the Roatan Institute for Marine Sciences with bottlenose dolphins—while permits are issued they are not revoked for non-compliance; at least 17 dolphins at the Roatan facility; ²⁶² No exemption sought under Protocol.		
Acoustic disturbance		
Threat unknown; boat traffic persistent, so potential threat present; government response unknown.		
Vessel strikes		
No documented reports; no manatee mortality has resulted from boat collisions and no manatees have been reported with propeller scars in Honduras. ²⁶³ Government response unknown.		
Climate change		
A National Climate Change Strategy is being prepared as well as set of policies aimed at generating mitigation and adaptation options at the national and local level for three priority sectors: energy (transportation), land use change and forestry (LUCF), and water resources. ²⁶⁴ A policy for adapting to the effects of climate change in the Honduran Caribbean Coastal Area was established in 2014, which includes vulnerability and adaptation measures, with specific adaptation plans for at least two protected areas in the MAR region have been developed: the Bay Islands and Cayos Cochinos. ²⁶⁵		

Panama

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
National legislation of relevance to marine mammals ²⁶⁶ and specifically focusing on marine mammals exist; ²⁶⁷ Established measures to reduce the risk of injuries and mortality of marine mammals in fisheries operations. ²⁶⁸		
Species specific recovery or management plans	No	
No specific recovery or management plans.		
Fisheries interactions		
The Guiana dolphins' home range involve coastal waters of Gandoca-Manzanillo (Costa Rica) and Changuinola (Panama) where they are commonly exposed to illegal fishing nets aimed at trapping sea turtles. Lack of data on cetacean mortality in fisheries interactions and direct takes as bait for shark fisheries. Gear and tools have been donated to assist whales entangled in fishing nets with the support of the National Coast Guard of Panama. IWC has conducted entanglement response training in 2012 (held in La Paz, Mexico), but focused on the Pacific coast.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Habitat degradation and coastal development		
Estimates are that in the last 50 years more than half of mangrove coverage has been reduced from 360,000 hectares in 1969 to 170,000 ha in 2007. Major issues are intensive use of land for agriculture, urban expansion, extension of shrimp farming, run-off of contaminants, untreated wastewater, unsustainable fisheries (including industrial fisheries on the Pacific coast).²⁶⁹ Panama hosts the Smithsonian Tropical Research Institute, for over a century, supporting research and conservation initiatives, including marine ecosystems in the region and Panama. A National Marine Litter Action Plan [September 2020]²⁷⁰ is under public consultation. Through the 'Trash Free Waters Partnership,' communities engaged in implementing marine litter projects, also with the support of the UN Environment Regional Office for Latin America and the Caribbean (ROLAC), based in Panama City. The Ministry of the Environment in partnership with the NGO ANCON, installed trash booms on two major rivers in Panama City and conducted awareness raising campaigns in nearby schools.		
Pollution and marine mammal health		
National contingency plan for oil spills in place. Since the expansion of the Panama Canal in 2016, maritime transport in the Caribbean is expected to increase ship sizes and changes in shipping line patterns with associated and various pressures including potential shipping disasters and others chronic such as oil discharges, loss of containers, garbage, sewage, air pollution, noise, anti-fouling treatments and invasive species.²⁷¹		
Whale watch and associated activities		
Whale watching in the Caribbean coast concentrates in the Archipelago Bocas del Toro,²⁷² in the northern part of Panama, where bottlenose dolphins are residents and are the main target. Despite official regulations²⁷³ and guidelines, engine and propeller noise are the principal causes of disturbances.²⁷⁴ A recent study²⁷⁵ revealed that in the presence of tour boats, dolphins were less likely to stay socializing and were more likely to begin traveling, and less likely to begin foraging while traveling. Boat operator compliance with Panamanian whale watching regulations is urgently needed to minimize potential long-term impacts on this small, genetically distinct population and to ensure the future viability of the local tourism industry.		
Protected areas and other management regimes		
Panama has a National System of Protected Areas (SINAP), which covers approximately 32% of the land area and 12% of the marine areas of the national territory. Three protected areas in the Caribbean, including Parque Nacional Isla Bastimento. No listing of MPAs under the SPAW Protocol.		
Research		
The most commonly observed species in both Panama and Costa Rica Caribbean coast is the bottlenose dolphin, being observed throughout the Caribbean coast, while the Guiana dolphin appears to be only found in nearshore waters of Gondoca-Manzanillo and in the Changuinola area in the Panama side.²⁷⁶ The NGO PANACETACEA has actively engaged in research since 2009.²⁷⁷		
Strandings		
No formal stranding network is in operation, but protocols are being developed to create a national network to respond to strandings. Formal collection of data begun in 2009. Most efforts are located in the Pacific region.²⁷⁸ A field guide on marine mammals and reptiles was published In 2014 with data collection information.²⁷⁹		
Captivity		
No captive animals; A proposed capture programme for up to 80 dolphins over the course of five years was opposed and abandoned in 2007.²⁸⁰		
Acoustic disturbance		
Maritime and intense boat traffic during dolphin watching in Bocas del Toro.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Vessel strikes		
The most common stranded species in the Caribbean coast is the bottlenose dolphin due to collision with dolphin watching boats. A sperm whale stranded on the Caribbean entrance of the Panama Canal also died due to boat collision (unpublished data cited by May-Collado et al. 2018). ²⁸¹ Panama has implemented time-area speed restrictions when humpback whales are present. ²⁸² In 2014, IWC and SPAW partnered with Panama to host a workshop on ship strikes, with a focus on the Pacific.		
Climate change		
Panama is developing a National Climate Change Strategy with the establishment of periodic update of the national communications, a national climate change mitigation and adaptation strategy, as well as a programme fostering national scientific research on climate change. ²⁸³		

St. Lucia

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
Not specific legislation pertaining to marine mammals. ²⁸⁴		
Species specific recovery or management plans	No	
No specific recovery or management plans.		
Fisheries interactions		
St. Lucia maintains a hunt for pilot and other whales and dolphins, including pygmy and false killer whales (<i>Feresa attenuata</i> and <i>Pseudorca crassidens</i> respectively), bottlenose dolphins (<i>Tursiops truncatus</i>), Atlantic and pantropical spotted dolphins (<i>Stenella frontalis</i> and <i>Stenella attenuata</i>), Fraser's dolphins (<i>Lagenodelphis hosei</i>), melon-headed whales (<i>Peponocephala electra</i>), killer whales (<i>Orcinus orca</i>), and striped dolphins (<i>Stenella coeruleoalba</i>). ²⁸⁵ The export of pilot whale meat from St. Lucia and St. Vincent to Antigua and Barbuda and the United States has been documented for personal and commercial use as recently as 2016. ²⁸⁶ The hunt is unregulated and no catch data are recorded by the government but is estimated to number in the hundreds a year. No information on entanglement or bycatch in fisheries is available. No exemption under the SPAW Protocol has been taken for these activities.		
Habitat degradation and coastal development		
Through OECS (Organisation of Eastern Caribbean States), a number of policies and strategies are being put forward such as the Eastern Caribbean Regional Ocean Policy (ECROP) and Strategic Action Plan which were adopted by the Heads of Government in 2013. The drivers of ecosystem degradation are activities associated with poorly-planned coastal and urban development, unsustainable tourism, land based and marine sources of pollution, over-exploitation of living resources, removal of keystone species and the proliferation of invasive species. The development of a National Ocean Policy, a coastal masterplan and marine spatial plan have been initiated (2019) to support the promotion of Blue Economy.		
Pollution and marine mammal health		
The island's reefs are subject to impacts from land-based pollutants and sedimentation, which has threatened near-shore fisheries. Sites with a higher proportion of terrigenous sediment were associated with lower coral and higher macroalgal covers and greater coral decline. An initial assessment by the Basel Convention Regional Centre (BCRC-Caribbean) identified major sources of mercury releases and their potential pathways to the ocean. Solid waste management, especially from the tourism industry, aimed at reducing the consumption and disposal of plastics in the Caribbean Sea is on-going through the development of sustainable alternatives. ²⁸⁷ Government response unknown.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Whale watch and associated activities		
St. Lucia is among the countries with the largest growth in whale watch activities between 1998 and 2008. ²⁸⁸ CaribWhale, ²⁸⁹ an association of whale watchers in the Caribbean formed in 2000 but officially incorporated in 2007, held its last general assembly in St. Lucia in May 2010, but has not convened a meeting since. At least two-three active operators offer marine mammal viewing as the basis of operations. No guidelines have been adopted, but operators may be following former Caribwhale guidelines.		
Protected areas and other management regimes		
A 2017 study commissioned by the Caribbean Biodiversity Fund (CBF) indicates that Saint Lucia needs to triple the size of its current marine protected areas if it is to meet its 20% conservation goal. ²⁹⁰ The Saint Lucia National Trust (SLNT), in conjunction with the Government of Saint Lucia through the Department of Fisheries, implemented the Project 'Strengthening of the Pointe Sable Environmental Protection Area along the South-East Coast of Saint Lucia,' as part of SPAW-CaMPAM efforts under the project 'Climate Resilient Eastern Caribbean Marine Managed Areas Network (ECMMAN):' St. Lucia is working to execute legal, regulatory, financial, policy and communications strategies to implement the Saint Lucia's Systems Plan for Protected Areas, with support of IUCN's Biodiversity and Protected Areas Management (BIOPAMA) programme. ²⁹¹		
Research		
No established research programme under Government auspices and/or by non-profit organisations.		
Strandings		
Strandings data unknown. No formal network established or strandings reported.		
Captivity		
A proposal was put forward (2017) for a dolphin facility by Discovery Dolphin Group in Pigeon Island. No facilities currently in place or regulation/legislation to address captive marine mammals.		
Acoustic disturbance		
Threat unknown; boat traffic as a potential threat present; government response unknown.		
Vessel strikes		
No documented reports, threat unknown; government response unknown.		
Climate change		
St. Lucia developed a National Adaptation Plan (NAP) ²⁹² defined as a 10-year process consisting of priority cross-sectoral and sectoral adaptation activities, complemented with Sectoral Adaptation Strategies and Action Plans (SASAPs) and guidelines (2018). The Government has secured a second round of funding through the United States In-Country NAP Support Program through the NAP Global Network under which various SASAPs, including a Resilient Ecosystems Adaptation Strategy and Action Plan will be developed as a priority in consultation with the National Climate Change Committee.		

St. Vincent and the Grenadines

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
Fisheries legislation does not address marine mammals. No stand-alone legislation to protect marine mammals. Regulations to manage the humpback whale fishery were finalized in 2003. ²⁹³		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Species specific recovery or management plans	No	
Marine mammals (cetacean spp.) hunted with no baseline research or management plan.		
Fisheries interactions		
Interactions high with directed take (hunting), low fishing density; no entanglement/bycatch data; Recently published catch data from 1949–2017 identifies the annual take of an average of 142.5 pilot whales (<i>Globicephala macrorhynchus</i>) and 210.6 “other dolphins” out of Barrouallie. ²⁹⁴ Killing of orcas not recorded before 2007, but since then at least 60 have been taken, including at least three in 2018 ²⁹⁵ and one in 2019. ²⁹⁶ According to local records, at least nine orcas and nearly 200 pilot whales were taken in 2017. ²⁹⁷ Fishermen out of Bequia may take up to four humpback whales annually. The export of pilot whale meat from St. Vincent to Antigua and Barbuda and the United States has been documented for personal and commercial use as recently as 2016. ²⁹⁸ No exemptions for these activities sought under SPAW Protocol.		
Habitat degradation and coastal development		
More than 90% of the infrastructural development of St. Vincent and the Grenadines lies on a narrow coastal belt less than eight meters above sea-level; Watersheds have also been affected by land degradation due to “squatting, mono-cropping with poor agricultural techniques ²⁹⁹ ; sewage dumped straight to sea.		
Pollution and marine mammal health		
Increasing attention and concern on high levels of heavy metals in small cetaceans that are consumed by local communities on Barrouallie that exceed FAO/WHO Hg advisory levels for consumption. ^{300, 301} In many cases extreme variations were seen between maximum and minimum concentrations of mercury and selenium in the same tissue type, and further sampling and testing is necessary. Some data provided to emerging regional data collection programme under the Minamata Convention (for heavy metals, such as mercury). Collection and disposal aside, collected sewage is not treated in any manner. St. Vincent and the Grenadines does not possess comprehensive wastewater legislation. ³⁰² Oil spill contingency plan in place. ³⁰³		
Whale watch and associated activities		
Informal whale watching opportunistically conducted during ‘nature tours’ or private charters. More recently, a few nature tours conducting whale watching have stopped operations when orcas were killed in front of tourists in 2017. ³⁰⁴ Whale watch operations may be threatened by active whale fishery. ^{305, 306} No guidelines established.		
Protected areas and other management regimes		
The country has started to promote itself as a dive destination and has signed on to the Caribbean Challenge Initiative (CCI) with the pledge to protect 20% of its near shore marine and coastal resources by 2020. ³⁰⁷ St. Vincent has 8 managed marine areas ³⁰⁸ under Marine Parks Act of 1991, one proposed (South Coast Marine Park). St. Vincent and the Grenadines’ government has proactive programmes for marine management, fisheries regulations, youth education and community outreach. Tobago Keys Marine Park protects the largest area (52 km ²) of corals and seagrass. ³⁰⁹ Marine spatial plan for St. Vincent underway via the ECCMAN project (Eastern Caribbean Marine Managed Areas Network). MSP encompasses entire EEZ.		
Research		
No marine mammal research programmes are conducted. No baseline studies have been conducted. No analysis of the sustainability of the small cetacean hunts have been conducted. NGO on Union Island attended CARI’MAM training in Dominican Republic in November 2019 and participated in PAM training for potential deployment in the Grenadines. ³¹⁰		
Strandings		
Strandings data unknown. No formal network established or strandings reported.		
Captivity		
No facilities, no regulations.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Acoustic disturbance		
Cruise tourism to St. Vincent is moderate to intense. ³¹¹ Cruise arrivals are up 7% in 2019. ³¹² No oil and gas exploration.		
Vessel strikes		
Cruise tourism to St. Vincent is moderate to intense. ³¹³ Cruise arrivals are up 7% in 2019. ³¹⁴ No oil and gas exploration.		
Climate change		
Currently no monitoring of sea level, but there is a national Energy Action Plan and Mitigation Assessment, and St. Vincent and the Grenadines commits to achieving a 22% reduction in GHG emissions by 2025, and 15% reduction in electricity consumption through energy efficiency schemes. ³¹⁵ Largest contributor to reducing emissions is the installation of a geothermal electricity generating facility that is forecasted to meet 50% of the country's electricity needs. A series of wells have been drilled, but geothermal facility not completely online yet. ³¹⁶ St. Vincent and the Grenadines has encountered difficulties in establishing a geothermal energy plant at the planned site.		

Trinidad and Tobago

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
Marine mammals are protected locally under the Conservation of Wildlife Act of Trinidad and Tobago. Interacting with or handling these animals without a permit issued by the relevant authorities is an offense punishable by law. ³¹⁷ Environmental Management Act's Environmentally Sensitive Species Rules. The Marine Areas (Preservation and Enhancement) Act [Chapter 37:02] covers fish, coral, turtles, and any species of marine fauna.		
Species specific recovery or management plans	No	
No species-specific recovery or management plans.		
Fisheries interactions		
Trinidad and Tobago continue to opportunistically hunt short-finned pilot whales (<i>Globicephala macrorhynchus</i>), common bottlenose (<i>Tursiops truncatus</i>), spotted (<i>Stenella sp.</i>), and spinner dolphins (<i>Stenella sp.</i>). ³¹⁸ No annual estimates for the numbers of striped or bottlenose dolphins killed annually in Trinidad and Tobago have been documented. ³¹⁹ No exemptions sought under SPAW Protocol.		
Habitat degradation and coastal development		
The majority of mangrove forests are found on the sheltered west coast (Gulf of Paria); which is occupied by more than 70% of the population and that has experienced the most intense development activities within the past five decades. Mangroves have been cleared for housing, industries, agriculture, roads and ports. Turtlegrass dominated seagrass communities are also exhibiting negative changes. Poor water quality due to coastal construction, reclamation and sedimentation from hillside development has been the main factor responsible for the loss of these beds. ³²⁰ In 2012, a multi-sectoral Steering Committee was appointed by Cabinet to develop an Integrated Coastal Zone Management (ICZM) Policy Framework, Strategies and Action Plan. In 2014, a draft ICZM Policy Framework was prepared and in 2018, Cabinet appointed an Inter-Ministerial ICZM Committee chaired by the Ministry of Planning and Development to finalize the ICZM Policy through a public consultative process and oversee its implementation.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Pollution and marine mammal health		
The most industrialized economy in the English-speaking Caribbean. ³²¹ It is the leading Caribbean producer of oil and gas, and its economy is mainly based upon these resources contributing to 40% of GDP and 80% of exports. ³²² Adoption of the National Oil Spill Contingency Plan in 2013 and initially developed with the support of REIMPTEC-Caribe.		
Whale watch and associated activities		
No organized viewing industry, ³²³ but operators offer swim with dolphin tours. ³²⁴		
Protected areas and other management regimes		
The Buccoo Reef, established 1973, is the only MPA in the country. As a RAMSAR site, it is the largest coral reef system in country; including coastal mangroves, lagoons, seagrass beds, reef flats, fore-reefs and back-reefs. Coral cover 19% (2012). National Protected Areas Policy 2011. ³²⁵ Threats from coral bleaching events, land-based pollution, coastal development, tourism, identified in PA Systems Plan in 2018. ³²⁶		
Research		
Research efforts are basically those of the University of the West Indies, School of Veterinary Medicine, emanating from stranding network response, including monitoring and examination of animals. ³²⁷		
Strandings		
There is an active Marine Mammal Stranding Network (TTMMSN) [cetaceans and manatee], The University of the West Indies, School of Veterinary Medicine, Aquatic Animal Health Unit, generating data and working to mobilise communities. Responsible Government Agency: Forestry Division-Wildlife Section, Ministry of Agriculture, Land and Fisheries. A compilation between March 2015 and February 2020 indicates that at least 31 individuals of five species were involved in strandings in Trinidad and Tobago. ³²⁸		
Captivity		
No captive programmes and unknown Government response.		
Acoustic disturbance		
Noise from large vessels and offshore platforms and seismic surveying identified as threats. ³²⁹ Seismic surveys have been carried out since 2001. ³³⁰ There are no legal guidelines for the mitigation of seismic operations.		
Vessel strikes		
No documented reports, threat unknown; Government response unknown. High level of vessel traffic associated with oil industry.		
Climate change		
Largest producer of oil and gas in the Caribbean and its economy is dependent on its energy supplies; it is also the fifth largest exporter of liquefied natural gas (LNG) in the world. Climatic change needs to be factored into water management strategies, drought management vulnerable sectors are the coastal resources, agriculture, forestry, health, and food security. ³³¹ A National Climate Change Policy provides policy guidance for the development of a low-carbon economy and actions to address climate change, including adaptation and mitigation measures, in various sectors with a view towards reducing or avoiding greenhouse gas emissions from all emitting sectors; enhancing carbon sinks, and building resilience of human and natural systems to adapt to the adverse impacts of climate change. ³³²		

United States

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	Yes	
The U.S. Marine Mammal Protection Act (MMPA),³³³ prohibits <i>inter alia</i> the following activities with marine mammals, with limited exceptions: import, export, transport, purchase, sale, and take on the high seas or in waters or on lands under the jurisdiction of the U.S. (including harass, hunt, capture, collect, and kill). Additional protections are provided for marine mammal species listed as endangered or threatened under the U.S. Endangered Species Act (ESA).³³⁴ The ESA prohibits <i>inter alia</i> the following activities with ESA-listed endangered wildlife, with limited exceptions: import; export; take within the United States or the territorial sea of the United States, or upon the high seas (including harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect); possession, sale, delivery, carriage, transport, or shipment, by any means whatsoever, of specimens taken in violation of the ESA; delivery, receipt, carriage, transport, or shipment in interstate or foreign commerce, by any means whatsoever and in the course of a commercial activity; sale or offer for sale in interstate or foreign commerce. The ESA prohibitions for ESA-listed endangered wildlife may also be extended by regulation to ESA-listed threatened wildlife. The Animal and Plant Health Inspection Service, a part of the U.S. Department of Agriculture, is responsible for regulations³³⁵ governing the humane handling, care and transport of marine mammals at public display facilities (i.e., aquaria and zoos) and research facilities, as well as requiring the establishment of Institutional Animal Care and Use Committees under the Animal Welfare Act.³³⁶		
Species specific recovery or management plans	Yes	
Species recovery and/or conservation plans are required for those species listed as depleted, endangered, or threatened under the MMPA or ESA, and requires the designation of critical habitat and research.³³⁷		
Fisheries interactions		
NOAA Fisheries implements the Marine Mammal Authorization Program, which provides exemptions to certain commercial fisheries for the incidental death or serious injury of marine mammals during commercial fishing operations. Under Section 118, Category I and II fisheries are those that frequently and occasionally kill or seriously injure marine mammals, respectively.³³⁸ Category I and II fisheries are subject to fishery observer coverage if requested (observer coverage is historically low in some fisheries); Federally-mandated stakeholder-based take reduction teams recommend measures to reduce bycatch to below a biological reference point; several species of large whales threatened by fisheries entanglements (e.g. North Atlantic right whales on east coast in Atlantic lobster and crab fisheries; humpbacks in west coast crab trap/pot fisheries) and entanglement of bottlenose dolphins in gillnet and crab trap/pot fisheries in the southeast region; the Florida subspecies of West Indian manatees is also taken in crab trap/pot fisheries. MMPA Sec. 101(a)(2) import provision promotes and incentivizes reduction in bycatch via requirements for importing nations to meet U.S. protection comparability standards and utilizing List of Foreign Fisheries reporting;³³⁹ special provisions for dolphin protection within yellowfin tuna fishery;³⁴⁰ the MMPA mandates that all commercial fisheries be classified by the level of incidental marine mammal death and serious injury. The level of marine mammal death and serious injury that occurs incidental to each fishery is reported in annual stock assessments.		
Habitat degradation and coastal development		
The U.S. Army Corps of Engineers has a consultation and environmental impact assessment (EIA) process for any coastal development; habitat degradation significant in southeast region, such as fresh-water intrusion in coastal habitats (e.g. Mississippi Sound) threatening estuarine and coastal dolphin populations³⁴¹ and agricultural runoff and contaminants in coastal waterways (e.g., Indian River Lagoon, where dolphins suffer from a variety of skin lesions and pathologies^{342, 343}); dramatic coastal erosion along U.S. coasts (86% of U.S. beaches at high level of erosion)³⁴⁴ Pelagic and coastal aquaculture proposals increasing (introduction of antibiotics into food chain; risk of invasive species; potential entanglement for marine mammals).		
Pollution and marine mammal health		
Perennial harmful algal blooms contributing to marine mammal Unusual Mortality Events;³⁴⁵ high levels of contaminants and HABs in southeastern U.S. impacting dolphins and manatees;³⁴⁶ impacts of 'cold stress' on manatees; pelagic and coastal aquaculture proposal increasing (introduction of antibiotics into food chain). Recovery from historical oil spills ongoing (Deepwater Horizon in 2010); funding of restoration activities under the provisions of the Oil Pollution Act by the responsible party will expedite recovery timelines.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Whale watch and associated activities		
Intensive whale watch operations in Pacific Northwest targeting Southern Resident Killer Whale populations; ³⁴⁷ Patchwork of regulations and guidelines. ³⁴⁸ Regulations for humpbacks in Alaska and Hawaii, and for Right whales on east coast; elsewhere voluntary regional viewing guidelines and collaborative educational outreach programmes (e.g. DolphinSMART and WhaleSENSE). ³⁴⁹		
Protected areas and other management regimes		
Four SPAW listed MPAs; Stellwagen Bank sanctuary's Sister Sanctuary Program began in 2007 ³⁵⁰ to increase public awareness and help improve recovery of the shared population of humpback whales through joint research, monitoring, education and other programmes (marine mammal focused sanctuary). NOAA's National Marine Sanctuary system is the trustee for a network of underwater parks encompassing more than 600K miles of marine and great lakes waters, including 14 national marine sanctuaries and two marine national monuments. ³⁵¹ Hawaiian Islands Humpback Whale National Marine Sanctuary established in 1992; ³⁵² (management plan adopted in 2002); ³⁵³ participation in SPAW Sister Sanctuary programme with Stellwagen National Marine Sanctuary on east coast. The U.S. also has National Wildlife Refuges and National Parks in the Caribbean Region. ³⁵⁴ The Crystal River National Wildlife Refuge in Florida was created specifically for the protection of manatees.		
Research		
National Marine Fisheries Service (NMFS) has six regional science centers that conduct extensive and ongoing scientific research related to marine mammals (Northeast Fisheries Science Center, Southeast Fisheries Science Center, Southwest Fisheries Science Center, Northwest Fisheries Science Center, Alaska Fisheries Science Center, and the Pacific Islands Fisheries Science Center). There are a number of other federal, state, academic, and NGO scientists conducting marine mammal research (e.g., U.S. Geological Survey, Clearwater Aquarium manatee research, Sarasota Dolphin Research Program). Section 117 of the MMPA requires the development of stock assessment reports utilizing scientific information on a stock's geographic range, abundance, status, and threats. ³⁵⁵ Research on marine mammals requires a permit(s) under Section 104 of the MMPA or both an MMPA Sec. 104 and ESA Section 10(a)(1)(A) permit, depending on the ESA status of the species. ³⁵⁶ Jurisdiction for implementation of the MMPA is split between the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (FWS). Both the FWS (ePermits) and NMFS (Authorizations and Permits for Protected Species (APPS) maintain online and/or hardcopy application systems which include applications for marine mammal research and other activities. ³⁵⁷		
Strandings		
National U.S. stranding network organized into five Regional response networks authorized and overseen by NMFS (Pacific Islands, Southeast, West Coast, Greater Atlantic, Alaska Regional Offices), ³⁵⁸ stranding network comprised of 120+ organizations and agencies including NGOs, research institutions, aquaria, universities, government and tribal agencies (includes SeaWorld, National Aquarium, The Pacific Marine Mammal Center, International Fund for Animal Welfare, Oregon State University, Alaska SeaLife Center, etc), ³⁵⁹ each with a dedicated response area along the U.S. coastline. Basic information on marine mammal stranding events, including findings of human interaction, are compiled into a national database. ³⁶⁰ The U.S. Fish and Wildlife Service has 5 main field offices that work with several partners to respond to injured or distressed marine mammals (e.g., state fish and wildlife agencies, Caribbean Stranding Network, Monterey Bay Aquarium, Alaska SeaLife Center, etc.).		
Captivity		
A permit is required under Sec. 104 of the MMPA to import or capture marine mammals for public display; A public display permit is not required to simply maintain marine mammals that have already been taken under a Sec. 104 permit for public display in zoos and aquariums. Public display permits are not available for species listed as depleted under the MMPA or threatened or endangered under the Endangered Species Act (ESA). Captivity of depleted, threatened, and endangered marine mammals may occur under an MMPA Sec. 104 research or enhancement permit or both an MMPA Sec. 104 and ESA Sec. 10(a)(1)(A) research or enhancement permit, depending on the ESA status of the species. Also, an exhibitor's license or research registration from the U.S. Department of Agriculture/APHIS under the Animal Welfare Act is required for captive marine mammals in zoos, aquariums, and research facilities. The MMPA requires NMFS and USFWS to maintain an inventory of captive marine mammals. ³⁶¹ There are approximately 100 facilities in the U.S. (including one in the U.S. Virgin Islands) holding approximately 1230 marine mammals under NMFS' jurisdiction. ³⁶²		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Acoustic disturbance		
Naval testing and training exercises using active sonar, explosions, and other noise-making military equipment (i.e., U.S. naval submarine test base Atlantic Undersea Test and Evaluation Center-AUTEC in Bahamas), seismic surveys, renewable energy surveys and construction activities (e.g., pile driving), and scientific surveys that unintentionally take marine mammals may require 'incidental take authorizations' under the MMPA;³⁶³ shipping and recreational vessels significant source of noise in the oceans; shipping and cargo vessels; cruise lines. NOAA has an agency-wide Ocean Noise Strategy, which seeks to ensure that NOAA is more comprehensively addressing underwater noise impacts to aquatic species and their habitat.³⁶⁴		
Vessel strikes		
Vessel strikes are a significant threat to several species of marine mammals (e.g., North Atlantic right whales³⁶⁵; manatees) Every year since 2016, the number of manatees killed by boats has increased—despite slow-speed zones being marked.³⁶⁶ The U.S. employs a number of regulatory and non-regulatory programmes to reduce the risk of large whale vessel strikes along the east and west coasts. These actions include the mandatory North Atlantic right whale vessel speed rule (implemented in 2008),³⁶⁷ voluntary dynamic management areas, and ongoing outreach efforts to the maritime community. Additionally, NOAA, in collaboration with the U.S. Coast Guard, modified the shipping lanes off Boston and created recommended vessel routes within core right whale habitats to reduce vessel strike risk.^{368, 369}		
Climate change		
Climate guidance drafted to inform ESA and MMPA actions in light of anticipated future climate conditions; NMFS climate working group.³⁷⁰		

Venezuela

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
National legislation	No	
No marine mammal specific legislation.^{371, 372} Per enacted legislation on the conservation of species and their habitats, a given species may only be exploited or 'used' when the country has enacted exploitation programmes; hence, no marine mammal species are subject to exploitation, which is prohibited, although enforcement remains a challenge.		
Species specific recovery or management plans	Yes	
Action Plan for the Conservation of aquatic mammals of Venezuela; river dolphins, otters and manatees 2017–2027.³⁷³ Species listed in national Wildlife Red Book: Humpback whale (<i>Megaptera novaeangliae</i>), fin whale (<i>Balaenoptera physalus</i>); sperm whale (<i>Physeter macrocephalus</i>), manatee (<i>Trichechus manatus</i>), boto (<i>Inia geoffrensis</i>); Guiana dolphin (<i>Sotalia guianensis</i>).		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Fisheries interactions		
At least 11 species of small cetaceans are targeted in directed hunts; Venezuela is the most important fishing nation in the eastern Caribbean. Between 1995 and 2014 its motorised fleet size has doubled to more than 20 thousand vessels but its total annual catches have roughly halved during the same period.³⁷⁴ Coastal bycatch of small cetaceans in gillnet fisheries is likely, but poorly documented. Venezuela is reported to conduct whale-associated purse seine sets for tuna year-round in the Caribbean. From observer data, between 1991 to 2006 at least nine marine mammal species were found to be incidentally caught by Venezuelan and U.S. industrial pelagic longline fisheries, including common dolphins, long-beaked common dolphins, pilot whales, Risso's dolphins, pygmy sperm whales, beaked whales, right whales, killer whales, pantropical and Atlantic spotted dolphins, and spinner dolphins.³⁷⁵ Venezuela prohibited trawling through law (Ley de Pesca y Acuicultura, Decree 1.408, 13 November 2014, Official Gazette, number 6.150 extraordinary of 18 November 2014), to address predatory practices that damage fauna and endanger marine mammal species protected by the Venezuelan State. The Guiana and bottlenose dolphins are also known to be incidentally captured by gillnets where estimates of 140–180 individuals/year and 3–5 manatees per year are reported in Lake Maracaibo.³⁷⁶ Trawl fisheries have documented the bycatch of bottlenose dolphins.^{377, 378} Together with Center for Shark Research [CIT-Venezuela] a programme has been established to remove phantom nets from coastal and reef areas of importance to both cetaceans and elasmobranchs. Fishing with explosives is common in some areas. Bottlenose and spinner dolphins may be subject to the highest levels of hunting around Margarita Island. From 1990–2008, an estimated 840 botos (<i>Inia geoffrensis</i>) were taken by villages along the Orinoco River. Estimated but unconfirmed figures of small cetaceans hunted per year range from several hundred to 21,000 per year.³⁷⁹ Direct takes are included among main threats for manatees (for meat, skin and bones), Neotropical and Giant otters (for pelts), Guiana dolphin (for meat) and the boto (for use as bait in the fisheries of catfish (<i>Calophysus macropterus</i>)).³⁸⁰ Between 1999 and 2015 most Guiana dolphins captured (intentionally or otherwise) were used for human consumption, shark-bait (artisanal longline fishery), or trade and at least 15 animals per year are intentionally taken in one port.³⁸¹ From 2017 to 2019, an average bycatch of 180 individuals/year was recorded in Lake Maracaibo system.³⁸²		
Habitat degradation and coastal development		
The effects of mining activities in the Orinoco basin requires attention. Inappropriate discharge of untreated wastewater in coastal areas has been identified as a major environmental issue.³⁸³ A “National Water Quality Information System” (SNICA) is currently under development, which aims to compile and standardize information on pollutant loads from land-based sources throughout the national territory. The establishment of inns and hotels in National Parks warrants attention as such developments are in areas of great vulnerability such as in the National Park Los Roques. The Ministry of Popular Power for Ecosocialism (MINEC) executes water quality monitoring programmes in the main basins of the Center and West of the country and has 431 inventoried treatment systems, which include: 257 industrial and municipal wastewater treatment plants, of which 77% are operational and have the Registry of Activities Susceptible to Degrade the Environment (RASDA); 28 anaerobic lagoons; operating 61%; four treatment plants under construction and three being adapted for adequacy; 138 Treatment systems that are under review.		
Pollution and marine mammal health		
In Lake Maracaibo, studies on-going with <i>Sotalia guianensis</i>, to assess levels of mercury, vanadium, cadmium and lead in their tissues and in fish identified in their diet. Plans to replicate the work with <i>Trichechus manatus</i> in the near future.³⁸⁴ A National Oil Spill Contingency Plan is in place but no risk assessments available.³⁸⁵ As a major oil producer, considerable tanker traffic exists and the country has suffered a number of spills in marine and riverine environments. There is a bilateral cooperation agreement with Trinidad and Tobago.³⁸⁶		
Whale watch and associated activities		
No formal industry organised nor officially authorized activities, with sporadic and low demand. At least 2 operators in the State of Anzoátegui (Northeastern Venezuela).³⁸⁷		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Protected areas and other management regimes		
Activities allowed in coastal marine protected areas are established and regulated in their respective management plans and use regulations, according to their characteristics and conservation requirements.³⁸⁸ MPA permits are issued for fishing and recreational activities; not exclusive zones, but within their limits certain practices are controlled. Monitoring and enforcement are a challenge. No specific MPAs created or considering marine mammals, but have been established with other objectives such as protection of mangroves, economic importance of fisheries. Overlap with marine mammal habitat offering a certain level of protection. Through the execution of the Project 'Strengthening the System of Coastal Marine Protected Areas of Venezuela,' a series of proposals were made to increase the coverage of priority ecosystems with coastal marine protected areas and strengthen management of existing areas, through the creation or expansion of Coastal Marine Protected Areas (CMPA) based on their biological and ecological attributes, namely: creation of 5 new CMPA with over 78,500 ha (Montecano Peninsula de Paraguaná Natural Monument, Falcón state; Aquatic Habitat Area for Intensive Use Controlled Gulf of Cariaco, Sucre state; Laguna El Saco Wildlife Reserve, Nueva Esparta state; Macanao Wildlife Reserve, Nueva Esparta state and Punta El Palo Wildlife Reserve, Nueva Esparta state); proposals for the expansion of 3 existing areas (National Parks: Henri Pittier, Paria Peninsula and the Gran Morichal Wildlife Reserve) with 106,462 ha; and the expansion of the Isla La Tortuga Tourist Interest Area with 71,945 ha. Likewise, the development and updating of management instruments (Management Plans and Use Regulations - PORU) for six CMPAs with 505,850 ha, as well as guaranteeing connectivity between CMPAs, through the identification of 4 marine corridors with an area of approximately 5,000,000 ha. These proposals are supported by technical documents duly validated by the communities and authorities of the responsible Ministries and under the process of approval.		
Research		
On-going research programme, 'Proyecto Sotalia' focusing on the Guiana dolphin, <i>Sotalia guianensis</i>, in Lake Maracaibo, with the species also receiving attention in the Gulf of Venezuela³⁸⁹ In general, research, conservation and awareness of aquatic mammals in the country, are also dependent on foreign financial support. A collaborative project is ongoing involving NGOs, universities and governmental bodies to assemble a national database on strandings, yielding more than 600 records (noted below).		
Strandings		
Between 1988–2014, an average of 23 strandings per year were recorded. For the same period, a total of 624 strandings were recorded, with 59% due to fisheries interactions, direct takes and ship strikes.³⁹⁰ In the last three years an estimated 15–20 strandings have occurred, without considering accidental captures, where animals are often discarded at sea by fishermen prior to being recorded. During 2020 (January–September) a total of 9 strandings have been registered (MINEC database). The Ministry of Popular Power for Ecosocialism-MINEC, coordinates a national network of strandings, made up of officials from this Ministry and the National Parks Institute (INPARQUES) with the support of security and civil protection agencies and organized communities. To this end, a stranding care manual and a protocol for data collection were developed, based on the SPAW Stranding guide (MINEC DGDB).		
Captivity		
<i>Tursiops truncatus</i> kept in Waterland, an ex situ conservation center registered and authorized by the MINEC, located in Nueva Esparta state. In this center, 'dolphin assisted therapy' is offered (regulated according to the Law for the Protection of Wild Fauna and its Regulations, Rules for the operation of zoos, aquariums and the like, and the Law for the Management of Biological Diversity).³⁹¹		
Acoustic disturbance		
The main source of noise is vessel traffic (boats, small ships, commercial ships and tankers) and some degree of disturbance caused by dredging and seismic exploration activities. The boto and the manatee are also impacted by boat traffic intensity.³⁹² Oil exploration by Petroleos de Venezuela (PDVSA) is much diminished currently, but daily oil spills are still reported according to research on Guiana dolphins in Lake Maracaibo. There are no adopted guidelines for the mitigation of seismic operations but all the mitigation measures must comply with Presidential Decree 1257 on Norms for environmental evaluation of activities likely to degrade the environment (MINEC DGDB).³⁹³		
Vessel strikes		
Strandings have been attributed to vessel strikes, which are also known to occur with small cetaceans.³⁹⁴ There are no significant records to date (MINEC DGDB). No governmental response.		

INDICATOR	THREAT INTENSITY	COUNTRY RESPONSE
Climate change		
Venezuela has substantial legal and regulatory framework, for the implementation of policies, programmes, plans and projects, and actions aimed at adaptation and mitigation to the effects of climate change, to face conditions of vulnerability, to reduce greenhouse gas emissions, and enhance sinks or improve carbon sequestration sources: In 2019, the General Directorate for Adaptation and Mitigation of Climate Change was created, establishing an institutional framework for climate, in the Ministry of People's Power for Ecosocialism (MINEC) and in the country, including a National Commission on Climate Change; National Inventory of Greenhouse Gases, with emission calculations made for four emission sectors defined by the Intergovernmental Group of experts on Climate Change (IPCC) in its 2006 guidelines: Energy; Processes Industrial and Product Use; Agriculture, Forestry and Other Land Uses; and Waste; Implementation of the National Economic and Social Development Plan, enacted as law referring specifically to climate change in its objective number 5; Development of a series of laws aimed at addressing the existing vulnerability conditions, such as: Coastal Zones Law, Forestry Law, Law of Comprehensive Management of Socio-Natural and Technological Risks and Law of Biological Diversity Management; as well as those related to climate change: Organic Law of the Environment, Penal Law of the Environment, Water Law, Law of Integrated Management of Garbage and Law of Use Rational and Efficient Energy, among others; the results obtained from the application of the various plans, programmes have contributed to climate change adaptation and measures in specific areas, such as human settlements, water resources, health and coastal areas.³⁹⁵		

SUMMARY OF MEASURES ADOPTED BY SPAW CONTRACTING PARTIES

The following table (pages 50–51) provides a visual overview of general benchmark measures implemented in support of the MMAP, and complementary to the country-by-country analysis in the previous section.

These benchmarks are not exhaustive and do not represent all possible measures that could be adopted or implemented by a Contracting Party to address or mitigate a particular threat. These more general benchmarks can be considered recognized milestones of action for each threat indicator or category.

GENERAL MEASURES ADOPTED BY SPAW CONTRACTING PARTIES IN SUPPORT OF MMAP IMPLEMENTATION

CONTRACTING PARTY	BAHAMAS	BARBADOS	BELIZE	COLOMBIA	CUBA	DOMINICAN REPUBLIC	FRANCE	GRENADA	GUYANA
National Legislation on Marine Mammals	✓	No	✓	No	✓	✓	✓	No	No
National Action Plan or Species Recovery, Management Plans	No	No	✓ ⁱⁱⁱ	✓	No	✓	✓	No	No
Bycatch Reduction or MM Component to Fisheries Legislation	✓	No	✓	✓	No	No	✓	No	No
Integrated Coastal Zone Management Plans and Policies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oil Spill Contingency Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓
Responsible Viewing Guidelines	No	No	No ⁱⁱⁱ	✓	No	✓	✓	No	No
MPAS for Marine Mammals	No	No	✓	No ⁱ	No	✓	✓	No	No
Long-Term Research and Monitoring Programme	✓	No	✓	✓	No	✓	✓	No	No
Stranding Network and/or Protocols	✓	✓	✓	✓	No	No	✓	No	✓
Captivity Regulations	✓	No	No	✓	No	✓	✓	No	No
Seismic Guidelines or Mitigation Measures	✓	✓	✓	✓	No	No	✓	No	No
Vessel Strike Mitigation Measures	No	No	✓	✓	No	No	✓	No	No
Climate Change Strategy	✓	✓	✓	✓	✓	✓	✓	✓	✓

CONTRACTING PARTY	HONDURAS	NETHERLANDS (DUTCH CARIBBEAN)	NETHERLANDS (BES ISLANDS)	PANAMA	ST. LUCIA	ST. VINCENT AND THE GRENADINES	TRINIDAD AND TOBAGO	UNITED STATES	VENEZUELA
National Legislation on Marine Mammals	✓	No	No	✓	No	No	No	✓	No
National Action Plan or Species Recovery, Management Plans	No	No	No	No	No	No	No	✓	✓
Bycatch Reduction or MM Component to Fisheries Legislation	No	✓	✓	✓	No	No	No	✓	No
Integrated Coastal Zone Management Plans and Policies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oil Spill Contingency Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓
Responsible Viewing Guidelines	No	No ⁱⁱⁱ	No	✓	No	No	No	✓	No
MPAS for Marine Mammals	No	No	✓	No	No	No	No	✓	No
Long-Term Research and Monitoring Programme	No	No	✓	✓	No	No	No	✓	✓
Stranding Network and/or Protocols	No	No	✓	✓	No	No	✓	✓	✓
Captivity Regulations	No	No	No	No	No	No	No	✓	No
Seismic Guidelines or Mitigation Measures	No	No	No	No	No	No	No	✓	No
Vessel Strike Mitigation Measures	No	No	No	✓	No	No	No	✓	No
Climate Change Strategy	✓	No	No	✓	✓	✓	✓	✓	✓

Figure 3. Table of general measures adopted by SPAW Contracting Parties to implement the objectives of the MMAP. Notes: i. Note that Parque Nacional Natural Gorgona in the Colombian Pacific coast has a Management Programme for Marine Mammals. ii. Panama has implemented time-area speed restrictions in Pacific waters when humpback whales are present. iii. In development

REGIONAL THREATS ANALYSIS

The economic and political pressures that exist in the Wider Caribbean Region (WCR) for the maintenance and expansion of fishing, oil and gas exploration, tourism, and coastal development activities all have the potential to impact negatively on marine mammals and their habitats. The cultures of peoples utilizing living marine resources in the WCR vary considerably. The development of the region and its present and future generations depend on conservation, protection, and sustainable utilization of marine resources.

Where socio-economic pressures often dictate the management of marine resources, collection of data to support marine mammal conservation may not always be a high priority. Although the economic potential of utilizing marine mammals is considered an attractive option by some communities, it is often undertaken in the absence of information needed to conduct these activities sustainably. The challenge of uniting

marine mammal conservation and socioeconomic needs of the peoples of the WCR is intensified by a lack of precise information about current distribution, abundance and utilization of marine mammals, by often underfunded and understaffed national capacities, and by competing priorities.

The Cartagena Convention is the only regional legal framework for the protection and development of coastal and marine resources of the Wider Caribbean. The Convention offers a common foundation on which to build regional collaboration towards better management of coastal and marine resources. The WCR covered by the treaty comprises the Caribbean Sea and the Gulf of Mexico, an area encompassing both island and continental countries and territories, and therefore includes not only the States of the insular Caribbean but also continental Central America as well as the States of the northern coast of South America (Figure 4). The Convention is supported by three technical agreements or Protocols on Oil Spills,



■ Figure 4. Map of the WCR (UNEP 2020).

Specially Protected Areas and Wildlife (SPA) and Land-Based Sources of Marine Pollution (LBS).

Of these Protocols, The Protocol concerning Specially Protected Areas and Wildlife, is the only legally binding biodiversity treaty for the WCR, and the only region-wide environmental treaty that protects critical marine and coastal ecosystems, while promoting regional co-operation and sustainable development.

Marine Mammals in the Caribbean Large Marine Ecosystem

At least 37 species of marine mammals have been documented in the WCR³⁹⁶—seven species of baleen whales (Mysticeti), 26 species of toothed whales (Odontoceti), two sirenians (the West Indian manatee, *Trichechus manatus*; and Amazonian manatee, *Trichechus inunguis*), and three pinnipeds (the now-extinct Caribbean monk seal, *Neomonachus tropicalis*; the hooded seal, *Cystophora cristata*;³⁹⁷ and the California sea lion, *Zalophus californianus*—an introduced species).^{398, 399} At least seven of these species are IUCN Red Listed as critically endangered, endangered or vulnerable, and at least eight are data deficient.⁴⁰⁰ Similarly, several countries including Colombia, France, Dominican Republic and Venezuela have also determined the conservation status of marine mammals under their national jurisdiction, red listing species accordingly (see Figure 5).

The Region serves as primary habitat for marine mammal critical activities such as feeding, mating, and calving. Data concerning the life history and distribution of these species in the Caribbean Sea and Gulf of Mexico are relatively lacking, despite some of these species being intensively studied elsewhere. However, focused regional and local research efforts and initiatives are being launched to address these data gaps.

A literature review conducted under the regional LifeWeb⁴⁰¹ project in the Wider Caribbean, meant to map and analyse essential marine mammal habitats for subsequent transboundary management and

protection, found that most of the existing data in the region focus on four marine mammal species: the humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter macrocephalus*), common bottlenose dolphin (*Tursiops truncatus*), and the West Indian manatee.⁴⁰² More recently, regional research efforts under the Caribbean-wide Orca Project are reviewing the status of the killer whale, minke whale and false killer whale in the WCR.⁴⁰³

The MMAP (2008) recognizes 11 categories of threat or areas of need that could serve as a comprehensive framework for characterizing, evaluating and addressing marine mammal protection in the Region. Ideally, these pressure points would be addressed in the development and implementation of conservation management plans for marine mammals by SPAW Parties, serving as indicators for the prioritization of funding and capacity building at the local, national and regional levels.

A broad and comprehensive visual overview of the threats in the Region can be accessed through the LifeWeb Project portal.⁴⁰⁴ This multi-year Project (2010–2014) developed by UNEP with the funding and collaboration of the Spanish Government resulted in mapping general ranges and distribution for marine mammals and human impacts. Species distribution and richness maps are available for 25 species of marine mammals in the project, along with graphical representations of protection measures that have been put in place for the Region.

Visually, as represented by the LifeWeb Mapping Application, the threats to marine mammals in the region are diverse and intense. Although dated, this information is the most comprehensive data available, but would benefit from supplementation with national data regarding species status and distribution at the local level.

**CONSERVATION STATUS OF MARINE MAMMALS RED LISTED UNDER
NATIONAL JURISDICTION IN THE WCR**

Note: A blank means species not assessed nationally

FAMILY	SCIENTIFIC NAME	COMMON NAME	DATE OF LISTING	IUCN STATUS	COLOMBIA ⁴⁰⁵	FRENCH GUIANA ⁴⁰⁶ [FRANCE]	MARTINIQUE ⁴⁰⁷ [FRANCE]	DOMINICAN REPUBLIC ⁴⁰⁸	VENEZUELA ⁴⁰⁹
Order CETACEA									
Balaenopteridae	<i>Balaenoptera musculus</i>	Blue whale	1991	EN	EN	DD			
Balaenopteridae	<i>Balaenoptera physalus</i>	Fin whale	1991	EN	EN	DD			EN
Balaenopteridae	<i>Balaenoptera borealis</i>	Sei whale	1991	EN	EN				EN
Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback whale	1991	LC	EN	DD	VU	VU	VU
Physeteridae	<i>Physeter macrocephalus</i>	Sperm whale	1991	VU		VU	EN		VU
Delphinidae	<i>Sotalia fluviatilis</i>	Tucuxi	1991	DD	VU				
Delphinidae	<i>Sotalia guianensis</i>	Guiana dolphin	1991	NT	VU	VU			VU
Delphinidae	<i>Tursiops truncatus</i>	Common bottlenose dolphin	1991	LC				NT	
Iniidae	<i>Inia geoffrensis</i>	Amazon river dolphin, Boto	1991	EN	VU				VU
Order SIRENIA									
Trichechidae	<i>Trichechus manatus</i>	West Indian manatee	1991	VU	EN	EN	EN ⁴¹⁰		No

■ Figure 5. Conservation status of marine mammals red listed under national jurisdictions in the WCR.

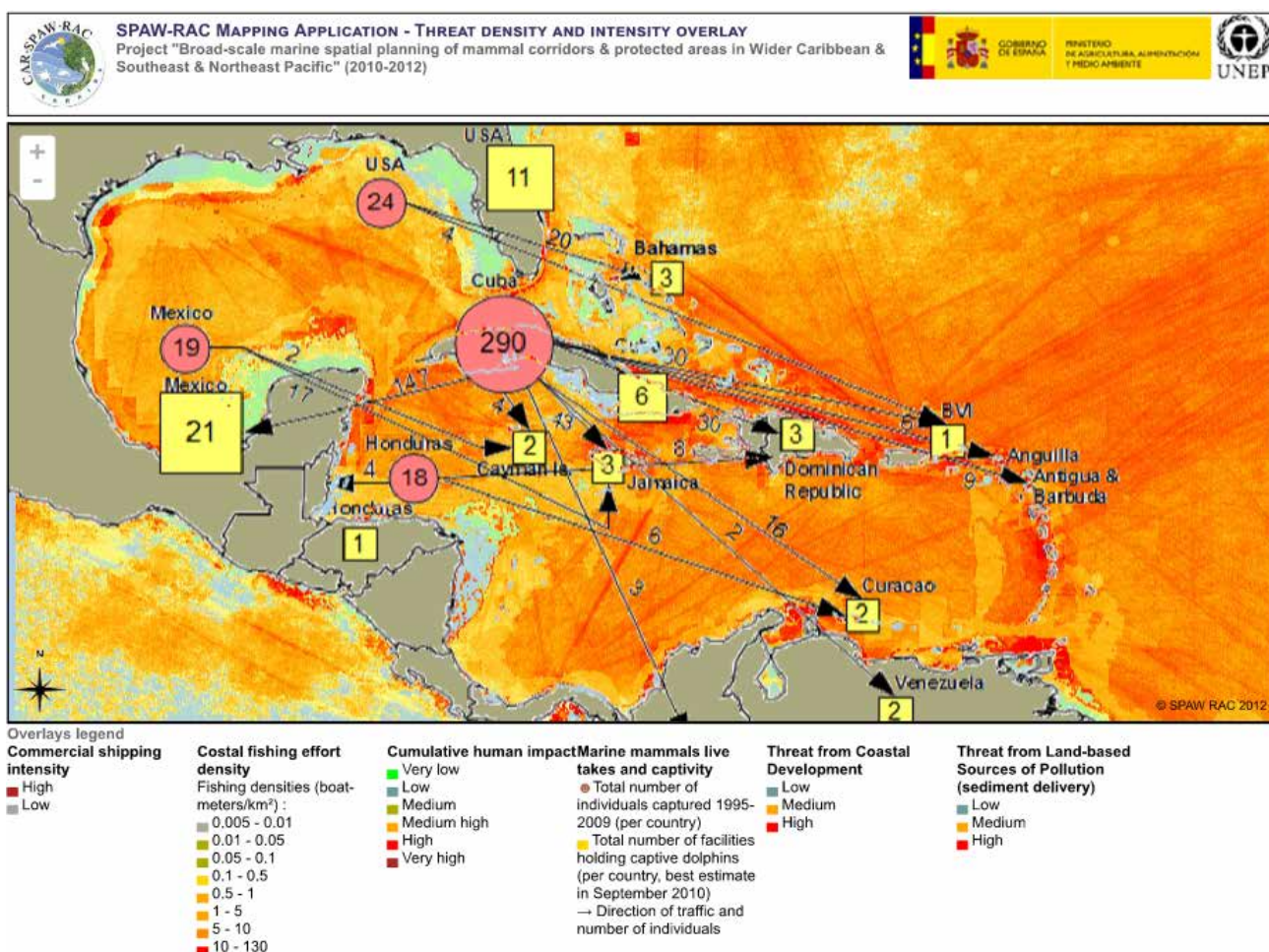


Figure 6. LifeWeb map representing threat density and intensity overlay, and including shipping, coastal fishing, coastal development, pollution, live takes and captivity, and cumulative human impact.

1. FISHERIES INTERACTIONS (INCLUDING BYCATCH AND DIRECTED TAKE)

Entanglement and bycatch

Fisheries of the Wider Caribbean are diverse, multi-species, and predominantly artisanal. In many locations, coastal communities depend upon fisheries for food and income, and small-scale fisheries serve an important role in local economies.⁴¹¹ Finfish and other marine bycatch are widespread and highly variable, but data on marine mammal bycatch is severely lacking.

Globally, bycatch and entanglement remain the greatest immediate and well-documented threat to the survival of some species and populations.⁴¹² Estimates indicate that hundreds of thousands of cetaceans die annually in interactions with fisheries. A review

of available data on interactions with endangered, threatened and protected species (ETP) in global marine commercial and artisanal fisheries includes annual estimates of 650,000 marine mammals.⁴¹³ The gear type contributing the most to annual levels of overall marine life discard and bycatch is the bottom trawl,⁴¹⁴ but gillnets contribute the most to marine mammal bycatch.⁴¹⁵

In the WCR, countries lack the resources, expertise or technology to monitor or manage the bycatch of marine mammals.⁴¹⁶ Of note, in the authors' review of fishery reports from the region, the mention of marine mammals or marine mammal bycatch was completely

absent.⁴¹⁷ However, information on marine mammal interactions with regional fisheries is reportedly sought by the Caribbean Regional Fisheries Mechanism (CRFM) Secretariat from member states, but little information is available. Further, no mention of marine mammals or marine mammal bycatch occurs in the CRFM Strategic Plan 2013-2021 or common fisheries policies, despite there being reference to a code of conduct for responsible fisheries and the reduction of incidental catch of seabirds and bycatch management.⁴¹⁸

Most of the fisheries within the Wider Caribbean have been recognised as fully or overexploited, and the problem of unsustainable fisheries and fishery practices noted.⁴¹⁹ Even in countries where commercial fisheries are not present, inshore fisheries may be overexploited and many nations have sought to increase the use of fish aggregating device technologies (FADs) or longline fishing to improve fishery yields.⁴²⁰ Research into what role the availability of fish and other prey species might play in supporting marine mammal populations in the region have not been undertaken; one study notes that toothed whales may be impacted by fisheries extractions more so than baleen whales that generally do not feed in Caribbean waters.⁴²¹

Generally speaking, the most valuable fisheries are the invertebrate fisheries, including for spiny lobster, Queen conch, and shrimp. Many of these specific fisheries are larger, more commercial operations, and coupled with longline fisheries for tuna and swordfish, comprise the main industrial fisheries in the region outside of the predominant artisanal fisheries.⁴²²

Although most of the artisanal fisheries utilise hook and line, some marine mammal bycatch has been reported in or near FADs, including the entanglement of a sperm whale calf near Guadeloupe in 2013, and a young sperm whale in 2016.^{423, 424} Artisanal FADs and the debris from FADs are noted as the main cause of entanglement for sperm whales. There is growing concern about entanglements in FADs worldwide, as the numbers of FADs is increasing rapidly, along with derelict FADs, whose risk remains virtually the same as 'active' FADs.⁴²⁵ FADs being deployed from Pacific vessels working in the Caribbean or Atlantic have also been reported in Belize.⁴²⁶ The Caribbean FAD Tracking Project hosts a reporting page where individuals can submit data relating to the location and type of FADs that are found in the Region.⁴²⁷ Of additional concern, there have been anecdotal reports of fishermen using gasoline around FADs to deter dolphins.⁴²⁸

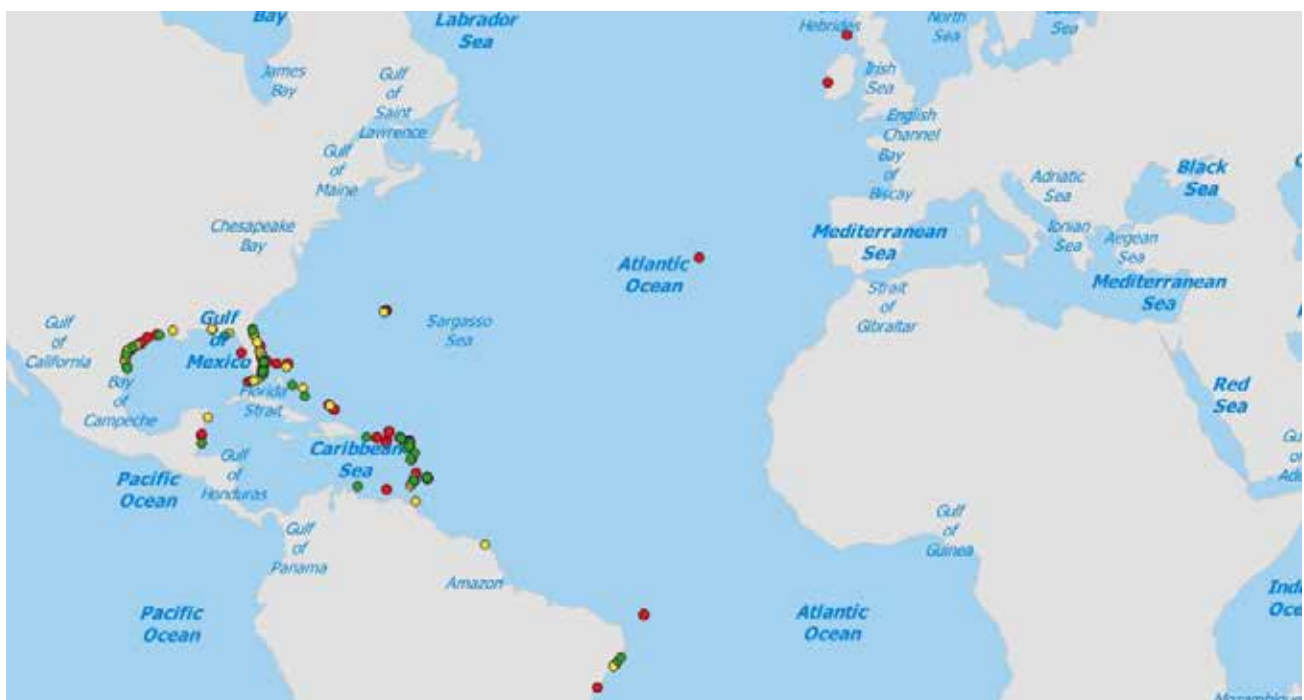


Figure 7. Location of FADs in the WCR as of July 2020. Image courtesy of the Caribbean FAD Tracking Project.

Entanglement of cetaceans in fishing gear, both active and ghost gear, has been noted as an increasing issue of concern for the Wider Caribbean. At least 18 of the marine mammal species that occur in the WCR have been recorded as interacting with fishing gear, and at least 16 species of marine mammals have been documented as bycatch in artisanal and commercial fishing gear, including longlines, gillnets, trawls, beach seines, and traps.⁴²⁹ Of the 16 species reportedly caught in fisheries in the Caribbean Large Marine Ecosystem (CLME), the most frequent interactions include with pilot whales, Risso's dolphins, tucuxi, and beaked whales.⁴³⁰

One report suggests that 20 or more sperm whale entanglements may have occurred in the eastern Caribbean in 2015 alone.⁴³¹ Sperm whale entanglements have also been noted in Aruban waters⁴³² and humpback whales were found entangled in fishing gear off Martinique in 2009 and Guadeloupe in 2010.⁴³³ Humpback whale, sperm whale, and manatee entanglements in the Dominican Republic have been reported.⁴³⁴

On Guadeloupe, there was only one reported case of an entanglement (a pantropical spotted dolphin) between 1998 and 2009; there were at least seven documented cases of whale entanglements (three humpbacks, three sperm whales, one beaked whale) by 2016.^{435, 436} A team from Guadeloupe (Association Evasion Tropicale) who were trained in disentanglement techniques by the IWC, were able to disentangle three of these whales.⁴³⁷

Data compiled under the LifeWeb project reveals that the coastal fishing effort is concentrated in distinct areas of the Caribbean, including in the southern Caribbean on the northern Brazilian shelf. Hot spots have been identified and overlap with sperm whale occurrence, for instance, in several regions of the Caribbean, including around Hispaniola and the eastern and French Caribbean islands.

Documenting entanglements is challenging. If not observed at sea, stranded animals may bear evidence of interactions with fishing gear. However, it is



Figure 8. Sperm whale entangled in a FAD near Guadeloupe in March 2016. Image courtesy of Caroline Rinaldi, Association Evasion Tropicale.

important to note that carcass recovery is historically low in all locales, where a stranded animal may represent only a fraction of entanglements or other fisheries interactions that might occur.⁴³⁸ Estimates place recovery of cetacean carcasses with evidence of fisheries interactions or reports of entanglements as low as 3–10% of total numbers that may be involved in such incidents.⁴³⁹ In the Caribbean, carcass recovery is extremely low where prevailing currents trend westward away from islands, making the stranding of carcasses less likely.⁴⁴⁰ This means that the risk of entanglement may far exceed the reported evidence available to gauge the actual threat posed by entanglement with fishery gear within the Region.

Small cetaceans are also known to become entangled in fishing gear in the region; a photo-identification study of scarring in bottlenose dolphins, Atlantic spotted dolphins, and false killer whales in Aruban waters found that most human-related injuries in the three species were likely due to interaction with fishing gear. Furthermore, major disfigurements were observed in all three species and could be attributed to interactions with fishing gear.⁴⁴¹ The 2010 CEP Regional Management Plan for the West Indian manatee notes that entanglement in fish and shrimp nets is a threat to the species.⁴⁴²

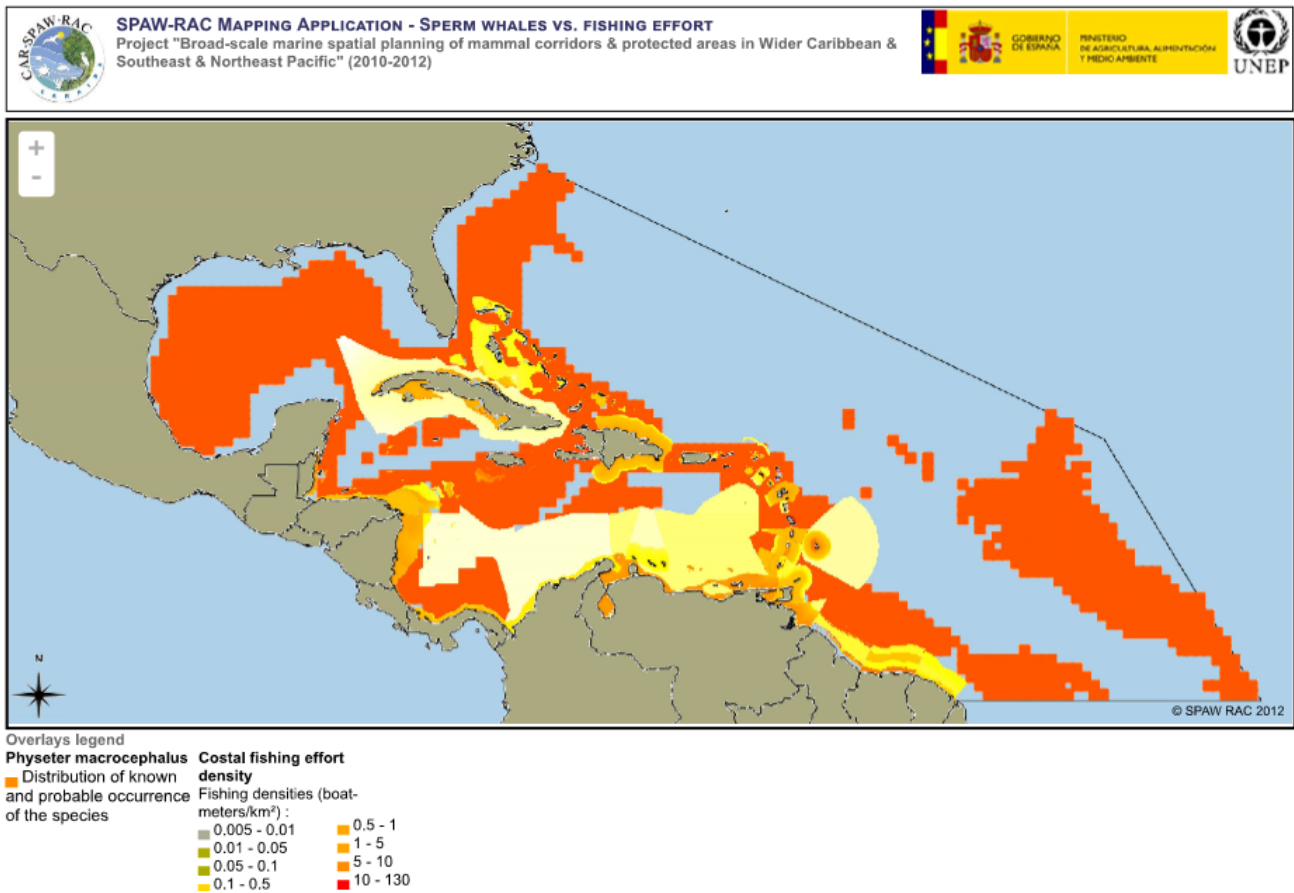


Figure 9. Example of LifeWeb mapping data overlaying sperm whale distribution and fishing effort.

Artisanal hook and line. Information on artisanal hook and line fisheries is limited, although some rapid assessments suggest that several hundred marine mammals may be taken in artisanal gillnet fisheries per year.⁴⁴³ Where bycatch is prohibited, or where protections of cetaceans or other marine mammals are not enforced, under reporting or no reporting hampers the evaluation of the true magnitude of bycatch in the region.

Longlines. In an analysis of observer data from 1991 to 2006, at least nine marine mammal species were found to be incidentally caught by Venezuelan and U.S. industrial pelagic longline fisheries operating in the CLME, including common dolphins, long-beaked common dolphins, pilot whales, Risso's dolphins, pygmy sperm whales, beaked whales, right whales, killer whales, pantropical and Atlantic spotted dolphins, and spinner dolphins.⁴⁴⁴

Globally, longline fisheries account for .4 million tons of discards or bycatch with an average discard rate of 12.3%. Bottom longlines produced the most discards from all longline fisheries.⁴⁴⁵

Gillnets. Marine mammal bycatch in gillnets has been documented in the region, including Belize (West Indian manatee), Colombia (West Indian manatee, cetaceans), Mexico (West Indian manatee and toothed cetaceans), Venezuela (West Indian manatee and cetaceans), and the United States (cetaceans).⁴⁴⁶ Gillnets appear to be major threat to several species in the Region. Although not more recently, Tucuxi (*Sotalia fluviatilis*) have been documented in drift gillnets in western French Guiana,^{447, 448} Nicaragua⁴⁴⁹ and in Venezuela,⁴⁵⁰ while a 2006 study of Jamaican fisheries found that 4% of fishers (n=127) reported bycatch events of bottlenose dolphins, manatees, and spotted dolphins in gillnet fisheries.⁴⁵¹ The Guiana dolphin (*Sotalia guianensis*) and common

bottlenose dolphin are also known to be incidentally captured by gillnets in Colombia and Venezuela where estimates of 140–180 individuals/year and 3–5 manatees per year are reported in Lake Maracaibo.⁴⁵² The major cause of known mortality of manatees in Honduras from 1970–2007, based on 26 records, was due to entanglement in gillnets.⁴⁵⁴ Bottlenose dolphins and other cetaceans are incidentally caught in gillnet and crab trap fisheries in the southeastern United States and Gulf of Mexico adjacent to or part of the Caribbean region. Of the 49 commercial fisheries on the U.S. east coast, 39 have documented bycatch, with the highest numbers of documented bycatch occurring in fisheries in the Atlantic Caribbean, Gulf of Mexico large pelagic longline, and Mid-Atlantic gillnet fisheries.^{455, 456}

An assessment conducted in 2014 of targeted and incidental bycatch of manatees in fisheries suggests that manatees are still hunted, but the incidental bycatch in fisheries is relatively low.⁴⁵⁷ When a manatee is caught on purpose (directed take), some fishermen in the region often eat or sell the animal—but when caught by accident, or incidental to fishing operations, the majority release them or discard (if dead).⁴⁵⁸ However, bycatch of manatees in fisheries was reported in Belize, Brazil, Mexico, Colombia, Haiti, Venezuela, and the Dominican Republic.⁴⁵⁹

Incidental entanglement of both the Giant and neotropical river otter has also been documented in the Brazilian Amazon region.⁴⁶⁰

Globally, gillnet fisheries produced .8 million tons of discards with an average discard rate of about 10.1%.⁴⁶¹

Trawl fisheries. Bottom trawl shrimp fisheries have a high bycatch footprint around the globe, including in the Caribbean where shrimp trawl fisheries are one of the most valuable fisheries in the Colombian Caribbean Sea and Gulf of Mexico.^{462, 463} Globally, about 45.5% (4.2 million tons) of total annual discards were from bottom trawls, with an average discard rate of 21.8%.⁴⁶⁴ However, estimates of the impacts of this fishery in the Caribbean are less clear.⁴⁶⁵ Monitoring and reporting of bycatch are lacking throughout the Caribbean. Beyond causing damage to sensitive seabed habitats,

trawl fisheries have high levels of bycatch of primarily juveniles of targeted species, finfish, sponges and other invertebrates, and non-targeted species such as sea turtles. Trawl fisheries in Venezuela, Suriname, and French Guiana have documented the bycatch of bottlenose dolphins in these fisheries, as well as in the Southeastern United States.^{466, 467}

Outside of these countries, marine mammal bycatch has not been reported in shrimp trawl fisheries in the Caribbean, but because of a lack of monitoring and reporting throughout most of the Caribbean, the lack of evidence of marine mammal bycatch in the literature should not be considered definitive. The ongoing FAO project entitled “Sustainable Management in Latin America and Caribbean Trawl Fisheries (REBYC-II LAC) (2015-2020)” is working to promote sustainable and responsible fisheries, including the reduction of bycatch in the fisheries of target countries, including Brazil, Colombia, Costa Rica, Suriname, Trinidad and Tobago, and Mexico.⁴⁶⁸ However, even the FAO international guidelines to reduce bycatch address fish and sea turtle bycatch, but do not directly address marine mammal bycatch specifically.⁴⁶⁹

FAO recently published Guidelines to prevent and reduce bycatch of marine mammals, outlining a range of possible technical measures including spatial closures, the use of acoustic deterrents or alerting devices, modifications to fishing gear, changes in fishing operations, and other strategies.⁴⁷⁰

Country responses. In the United States, federally appointed multi-stakeholder teams are appointed to evaluate marine mammal bycatch in a variety of fisheries against potential biological removal (PBR) level and recommend measures to reduce bycatch.⁴⁷¹ Take reduction teams operating relevant to the Caribbean are the bottlenose dolphin take reduction team that assesses marine mammal bycatch in fisheries spanning from New York to Florida, and the Gulf of Mexico, and responds to limits set by the U.S. Marine Mammal Protection Act through a variety of measures, including mandated observer programmes, regulatory restrictions on fisheries, area closures, gear modifications, and outreach and education programmes. The U.S. also has

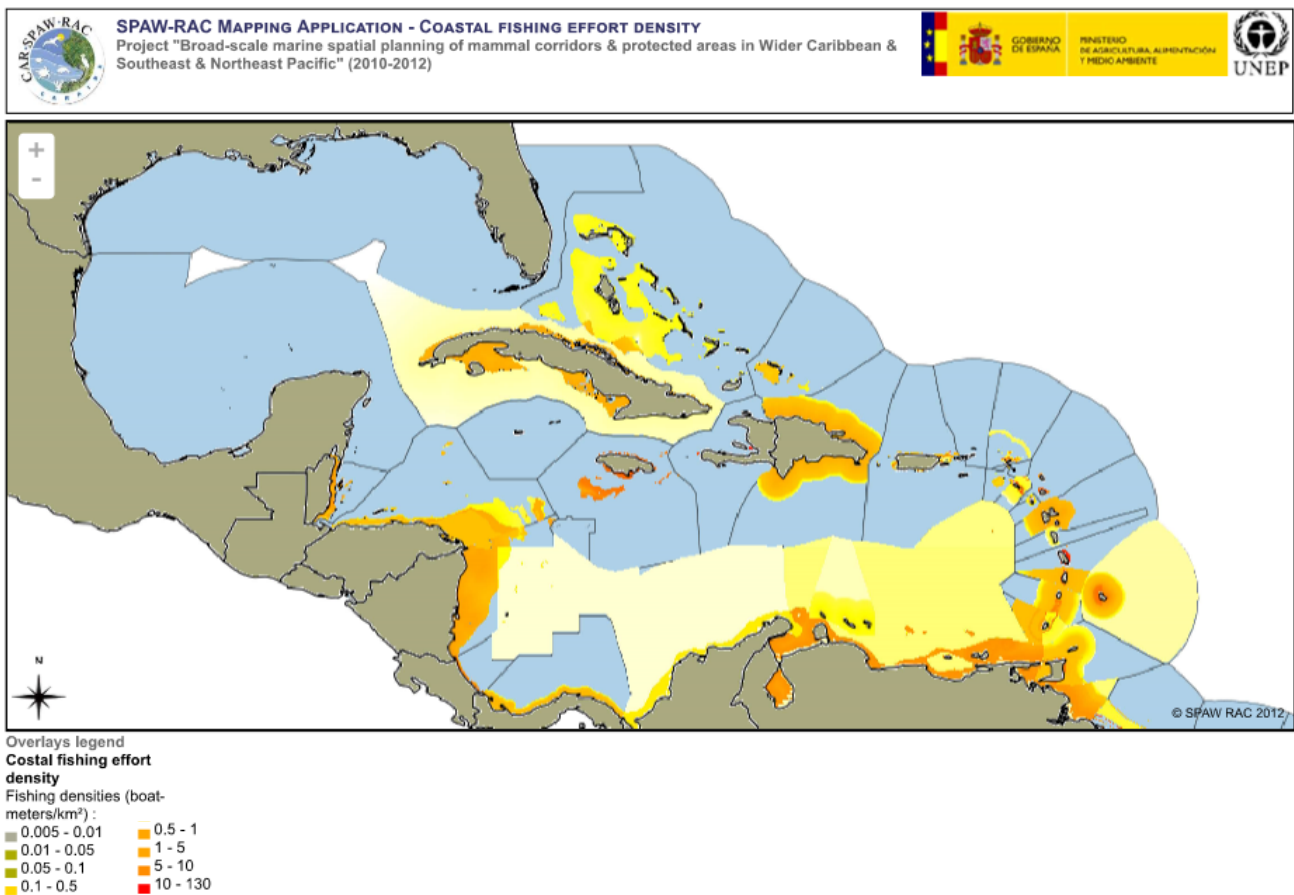


Figure 10. Coastal fishing effort density. LifeWeb Mapping Application output based on data current to 2012.

a robust network of emergency responders to attempt disentanglements of small cetaceans and large whales after observation and assessment to mitigate life-threatening entanglements.

In response to the growing concern about marine mammal entanglements in the Region, the IWC, in collaboration with the SPAW Programme, held training workshops in November 2012 in La Paz, Mexico; September 2013 in Panama; September 2013 on St. Martin; April 2014 in Samana, Dominican Republic; December 2015 on Guadeloupe and Martinique; and in Colombia in September 2017.⁴⁷² Recent guidelines have been put forward under UNEP/CMS on the safe and humane handling and release of small cetaceans accidentally bycaught in fishing gear, recognising that reducing stress and increasing the safe release of animals, and thus potential for survival, are an integral part of sustainable fisheries goals.⁴⁷³ Campaigns for

removal of gear and some training to fishermen is offered in the Dominican Republic and in Venezuela in conjunction with the Center for Shark Research for both cetaceans and elasmobranchs.⁴⁷⁴

In summary, the limited information on marine mammal bycatch and entanglements does not permit more general categorizations as to the severity of this threat in the Wider Caribbean, but there are clear areas of concern (e.g., documented entanglements on Guadeloupe, and along the Brazilian shelf including the Orinoco river delta and Maracaibo Lake where bycatch of tucuxi (*Sotalia fluviatilis*) and Guiana dolphin (*Sotalia guianensis*) occurs).⁴⁷⁵ Fishing with explosives, although illegal in most countries, is common in some areas of the Amazon Basin and in Venezuela, this practice is still in use and has been reported as a threat to botos.⁴⁷⁶

Existing LifeWeb maps may provide a bird's eye view of areas where marine mammal species overlap with high-intensity fishing activity and help to guide local assessments of national fisheries activity and bycatch inquiries, but population assessments of local densities and aggregation patterns are required before this data can be meaningful.

Highlights

- *It is clear from this data that the threat of bycatch and entanglement of marine mammals is a regional issue of significant concern and should be considered a priority in the short-term.*
- *Artisanal and small-scale fisheries comprise the majority of fisheries in the Caribbean region. The importance of near-shore environments for bycatch in coastal fisheries points to the need for a comprehensive regional bycatch assessment and analysis to inform targeted bycatch reduction measures and marine spatial planning, and better understand spatial and temporal bycatch patterns.*
- *Bycatch is a more significant threat for those species that most frequently interact with fisheries, including bottlenose dolphins, pilot whales, Risso's dolphins, tucuxi, Guiana dolphin, and beaked whales. Because of the data deficient status of many of the marine mammal species in the WCR, including cetacean population assessment and habitat use, the full population impact of bycatch remains unknown.*
- *Large whale entanglements do occur in the region, including increasing documentation of entanglements in FADs, highlighting the need for gear marking and disentanglement efforts.*
- *Considering that long-lived and late-maturing marine mammal taxa are vulnerable to population-level impacts from the incidental capture in fisheries, the prioritization of the collection of marine mammal bycatch data by regional fisheries organizations is critical.*
- *The level of engagement from fisheries organisations in the region in addressing marine mammal bycatch is low, despite increased and positive cooperation with the SPAW Programme over the last decade. Marine mammal references and data are missing from regional fisheries reports and action plans.*
- *Despite progress and mandates to strengthen cooperation with fisheries organizations, there is a significant gap that still must be bridged in adopting and implementing measures to reduce bycatch and other threats posed by fisheries interactions.*

Directed take and hunting

Populations of baleen whales and the sperm whale have been systematically hunted to near extinction during the past four hundred years. In spite of decades of global protection by the IWC, some populations have yet to show signs of recovery.⁴⁷⁷ In the WCR, only one country currently conducts 'whaling' with oversight by the IWC where cetaceans are killed for human consumption. Others use great whales for food opportunistically, such as when bycaught or stranded. Small cetaceans, however, are subject to both opportunistic and organized 'takes' (killing or live capture) by seven out of the 17 parties to the SPAW Protocol in their territorial waters.⁴⁷⁸

More specifically, since 2000 five parties have exported parts or products of small cetaceans for commercial

purposes. At least three parties have high levels of hunting, including St. Lucia, St. Vincent and the Grenadines, and Venezuela (see Figure 14). However, opportunistic hunting of some small cetaceans continues to occur throughout the Region.^{479, 480}

The Bequians of St. Vincent are currently authorized by the IWC under its Aboriginal Subsistence Whaling provisions to take up to 28 humpback whales between 2019–2025 provided the meat and products are used exclusively for local consumption in St. Vincent and the Grenadines.⁴⁸¹ Since 2015, fishermen have killed five humpback whales there.⁴⁸²

St. Vincent also hunts small cetaceans, mainly 'blackfish' such as short-finned pilot whales (*Globicephala macrorhynchus*), orcas (also known

as killer whales, *Orcinus orca*) and other dolphin species.^{483, 484} Small cetaceans have been hunted for their meat and blubber in St. Vincent and the Grenadines (SVG) since the early 20th century, exclusively out of the leeward village of Barrouallie. While short-finned pilot whales were originally the primary target, other dolphin species now represent the predominant take, with a peak of over 1,000 killed in 2009. Recently published catch data from 1949–2017 identifies the average annual take of 142.5 pilot whales and 210.6 “other dolphins” out of Barrouallie.⁴⁸⁵

Orcas (*Orcinus orcas*) are also hunted in St. Vincent waters. The killing of orcas is not recorded before 2007, but since then at least 60 have been taken, including at least three in 2018⁴⁸⁶ and one in 2019.^{487, 488} According to local records, at least nine orcas and nearly 200 pilot whales were taken in 2017.⁴⁸⁹ Species targeted in these hunts include the spinner dolphin (*Stenella longirostris*), short-finned pilot whale (*Globicephala macrorhynchus*), Atlantic spotted dolphin (*Stenella frontalis*), killer whale (*Orcinus orca*), Fraser’s dolphin (*Lagenodelphis hosei*), False killer whale (*Pseudorca crassidens*), Risso’s dolphin (*Grampus griseus*), melon-headed whale (*Peponocephala electra*), Clymene dolphin (*Stenella clymene*), striped dolphin (*Stenella coeruleoalba*), dwarf sperm whale (*Kogia simus*), and rough-toothed dolphin (*Steno bredanensis*).

Hunts are conducted from small boats, powered by gasoline engines, using hand-thrown harpoons and deck mounted harpoon guns (modified shotguns). The hunts occur year-round and are unregulated. No quotas are set and no catch records are maintained by the government. Documented captures since 1949 suggest that whalers on St. Vincent have caught at least 13,856 small cetaceans including 5,869 short-finned pilot whales, 109 killer whales, and 7,851 other small cetaceans. Since 1986, Vincentian whalers have also caught 45 humpback whales and two Bryde’s whales. Eight sperm whales were also taken between 1967 and 1974.⁴⁹⁰

In St. Lucia, there are hunts for pilot and other whales and dolphins, including pygmy and false killer whales (*Feresa attenuata* and *Pseudorca crassidens* respectively), bottlenose dolphins (*Tursiops truncatus*),



Figure 11. Drying cetacean meat in Barrouallie, St. Vincent and the Grenadines. Image courtesy of Fundación Cethus.

Atlantic and pantropical spotted dolphins (*Stenella frontalis* and *Stenella attenuata*), striped dolphins (*Stenella coeruleoalba*), killer whales (*Orcinus orca*), Fraser’s dolphins (*Lagenodelphis hosei*) and melon-headed whales (*Peponocephala electra*).⁴⁹¹ The export of pilot whale meat from St. Lucia and St. Vincent, to Antigua and Barbuda and to the United States has been documented for personal and commercial use as recently as 2016.⁴⁹² The United States reported the import (and confiscation) of pilot whale meat from St. Vincent in 2006, 2007, 2008, 2009, 2010, 2011, 2014, 2015 and 2016 (totaling 89.79 kg), registered for personal use but some for commercial purposes. Law enforcement data document 29 separate confiscations of meat over that period, all at San Jose airport.⁴⁹³

Other countries, including Trinidad and Tobago continue to opportunistically hunt short-finned pilot whales (*Globicephala macrorhynchus*), false killer whales (*Pseudorca crassidens*), common bottlenose (*Tursiops truncatus*), spotted (*Stenella* sp.), and spinner dolphins (*Stenella* sp.).⁴⁹⁴ No annual estimates for the numbers of striped or bottlenose dolphins killed annually in Trinidad and Tobago have been documented.⁴⁹⁵ Opportunistic take of sperm whales and unidentified delphinid species has been documented in Haiti.⁴⁹⁶ Reports from organizations working on the ground in Haiti, for instance, have reported recent takes of dolphins (*Stenella* spp.) by fishermen using spears.⁴⁹⁷

Small cetaceans have been hunted in Venezuela since the 1960s and utilized for a variety of purposes, including for human consumption, oil production, and for bait in catfish, crab and shark fisheries. Of the 20 species found in Venezuelan waters, 11 are known to be targeted in hunts.⁴⁹⁸ Bottlenose and spinner dolphins may be subject to the highest levels of hunting around Margarita Island off eastern Venezuela. However, tucuxi (*Sotalia fluviatilis*) and Amazon river dolphins, also known as boto (*Inia geoffrensis*), are killed in more remote regions for their blubber and teeth, or for use as bait. From 1990–2008, an estimated 840 boto were taken by villages along the Orinoco River. Estimated but unconfirmed figures of small cetaceans hunted per year range from several hundred to 21,000 per year.⁴⁹⁹ A 2016 workshop identified the illegal hunting for meat and for use as bait as the major threat to freshwater aquatic mammals in Venezuela.⁵⁰⁰ A high rate of bycatch and consumption of at least 180 Guiana dolphins has been documented in the Lake Maracaibo system in western Venezuela. The use of dolphins by local communities here is culturally supported and encouraged, including recipes for its preparation.⁵⁰¹

Elsewhere along the Brazilian shelf and as part of the Caribbean Large Marine Ecosystem, the taking of unspecified species of dolphins in French Guiana has been cited, but the numbers are unknown.⁵⁰² Several thousand dolphins of mixed species are killed in Brazil annually in directed hunts, including tucuxis and botos, despite the prohibition of hunting, killing or harassment of cetaceans since 1987. Although the killing of botos is illegal in Brazil, where their meat and blubber is used as shark bait in longline or for the piracatinga (catfish) fishery, large areas in the Amazon region are remote with poor monitoring and enforcement. Numbers of cetaceans killed for these fisheries is reportedly increasing, and commercial exports of piracatinga to Colombia and for local consumption continues to grow.^{503, 504}

Overall, few formal data are available regarding numbers of animals taken, and it is likely that dolphin species are targeted and hunted in significant numbers opportunistically throughout the region.⁵⁰⁵



Figure 12. Dead dolphin killed near BonBon Haiti, southwest of Jeremie, near Abricots in August 2020. Image courtesy of Haiti Ocean Project.

Although manatees have been documented in 27 countries in the WCR over the past two decades, year-round populations of manatees occur in only 20.⁵⁰⁶ Most populations are estimated at below one hundred individuals with patchy distribution.^{507, 508} In most parts of the species' range, the population status of manatees is unknown, population sizes have never been estimated, and population trends are uncertain, although local and regional experts suggest that numbers in many countries may be declining at present. Heavily hunted in the past, they have played an important role in the folklore and traditions of indigenous peoples of the region.

Currently, manatees are hunted throughout the Caribbean both opportunistically (e.g., taken by accidental entanglement in fishing nets) and through directed take. Although the numbers taken are relatively small, because they are long-lived and slow to reproduce, they are susceptible to over-exploitation like most marine mammals. For example, illegal hunting represents the greatest threat to manatees in Colombia. There and elsewhere, manatees are killed for their meat by coastal and riverine fishermen but



Figure 13. One of three manatees killed in October 2019 in Anse-à-Foleur Haiti. Image courtesy of Haiti Ocean Project.



Figure 14. Crafts made with cetacean bones and teeth in St. Vincent and the Grenadines. Image courtesy of Fundación Cethus.

are also subject to entanglement in fishing nets. Illegal hunting has been documented in Belize and other manatee range states, such as Panama, Costa Rica, Mexico, Haiti, Honduras, Dominican Republic, Guyana and Venezuela.^{509, 510, 511, 512} In October of 2019, near Anse-à-Foleur on the north coast of Haiti, three adult manatees were killed by local fishermen who caught them in their nets near the coast.⁵¹³

The killing of even a few manatees every year may represent the difference between growth and decline of the very small manatee populations in the WCR. While only a relatively few countries in the WCR actively hunt or consume marine mammals, some countries have asserted their political and sovereign right to reserve this activity for the future. Several countries have become more outwardly supportive of marine mammal exploitation since joining the International Whaling Commission (IWC).⁵¹⁴ Several countries, including CRFM States, are guided by the overarching principle of sustainable use of living marine resources including marine mammals based on the importance attached to prioritizing human needs and recognizing the importance of food security, nutrition, livelihoods, employment and socio-economic development. However, principles of sustainable use must be based in the best scientific data available, and population level assessments are non-existent for most marine mammal populations within the WCR.

Because the status of most marine mammal populations in the Caribbean is unknown, the impact of direct hunting on marine mammal populations in the WCR is uncertain. Furthermore, some marine mammals in the WCR might be expected to carry high contaminant burdens, which should be of concern with regard to human consumption of cetacean products. Mercury and other heavy metals and persistent toxins exist in the environment from both natural and man-made sources and bioaccumulate in cetaceans and other marine mammals.⁵¹⁵ Due to their position at the top of the food chain, toothed cetaceans tend to accumulate higher contaminant loads.⁵¹⁶ *Note: see also below under Pollution and Marine Mammal Health section.*

SUMMARY OF TAKES AND COMMERCIAL USE BY SPAW PARTIES (AND TERRITORIES)

COUNTRY	SMALL CETACEANS CAUGHT AND USED FOR HUMAN CONSUMPTION SINCE 2000	EXPORTS OF CETACEAN MEAT OR OTHER PRODUCTS FOR COMMERCIAL PURPOSES SINCE 2000
THE BAHAMAS	-	-
BARBADOS	-	-
BELIZE	-	-
COLOMBIA	· boto, tucuxi, pantropical spotted dolphin	-
CUBA	· not for consumption · many live captured	-
DOMINICAN REPUBLIC	-	· 1,920 carvings in 2004 (mainly commercial) · sperm whale oil in 2003
FRANCE		
(Guadeloupe)	-	-
(Martinique)	-	-
(Saint Martin)	-	-
(French Guiana)	· unspecified dolphins · numbers not known	-
GRENADA	-	-
GUYANA	-	-
HONDURAS	-	-
NETHERLANDS		
(Aruba)	-	-
(Curacao)	-	-
(Bonaire, Saint Eustatius and Saba)	-	-
(Sint Maarten)	-	· 0.548 kg meat in 2014 (T)
PANAMA	-	· 16 “specimens” in 2006/7 (T)
ST. LUCIA	· hundreds annually: Pilot whales, common dolphin, pygmy killer whale, Fraser’s dolphin, melon-headed whale, false killer whale, pantropical spotted dolphin, Clymene dolphin, striped dolphin, Atlantic spotted dolphin, bottlenose dolphin	· 2.08 kg meat in 2015 · 2 kg meat in 2016
ST. VINCENT AND THE GRENADINES	· annual average of 142.5 pilot whales and 210.6 “other dolphins” (spinner, Atlantic spotted, killer whale, Fraser’s dolphin, False killer whale, Risso’s dolphin, melon-headed whale, Clymene dolphin, striped dolphin, dwarf sperm whale, rough-toothed dolphin) · 60 killer whales since 2007	· a total of 89.6 kg meat in 29 separate exports in 2006, 2007, 2008, 2009, 2010, 2011, 2014, 2015 and 2016 (personal and commercial)

TRINIDAD AND TOBAGO	• striped and bottlenose dolphin (1990–2009)	-
UNITED STATES	-	-
(Puerto Rico)	-	-
(US Virgin Islands)	-	-
VENEZUELA	• thousands annually (for human consumption, medicine and bait) • eleven species targeted, mainly, bottlenose dolphin, spinner dolphin, tucuxi and boto	-

Figure 15. Table of SPAW Contracting Parties participating in hunting or commercial trade in cetaceans. Source: Animal Welfare Institute (2019).⁵¹⁷ Note: 'Takes' reflected in this table include illegal (poaching) and legal hunts and captures, and opportunistic takes (non-targeted) in fisheries (e.g., bycatch). Data reflect 'takes' that are documented in the literature, but for which the differentiation between types of 'takes' is not always possible or quantifiable.

Highlights

- SPAW Parties and other countries in the WCR still legally and illegally take (hunt, capture, kill) far too many marine mammals annually, and specifically cetaceans, in violation of their commitments to the SPAW Protocol.⁵¹⁸ Some marine mammals are opportunistically and directly targeted for hunting as a food source and for use as bait in fisheries in the WCR.
- At the most recent COP 10 in Roatan, Honduras, Contracting Parties adopted a series of recommendations relating to cetacean protection, including the promulgation of national legislation prohibiting the take, capture, killing and harassment of marine mammals, including all cetacean species and the West Indian manatee.⁵¹⁹ Parties called upon member states to report the numbers and species of cetaceans taken in hunts and identify research needs and opportunities to collect and share data relating to the distribution of cetaceans in the Region.
- Currently, no Parties are reporting the directed takes (hunting) of marine mammals. These takes require an exemption under the SPAW Protocol. Unlike for Article 11(2) exemptions, guidance has not been articulated for Parties for actions that might be pertinent under Article 14.
- Those countries seeking an exemption for traditional marine mammal hunting activities under Article 14 would require population assessments to determine that such activities do not "cause either the extinction of, or a substantial risk to, or substantial reduction in the number of, individuals making up populations of species of fauna, particularly migratory species and threatened, endangered or endemic species."⁵²⁰
- Because no baseline data is being collected on targeted populations, the impact of these hunts on local or regional marine mammal populations is unknown.

2. HABITAT DEGRADATION AND COASTAL DEVELOPMENT

Caribbean marine and coastal habitats are characterized by coral reefs, mangrove forests, and seagrass meadows. Beach habitats may be important for sea turtles and other marine life, but it is the coastal and pelagic habitats that are relevant to discussions focused on marine mammal protection. The pelagic deep-water ecosystems are where many species spend their full or partial lifecycle, and also contribute to global climate regulation.

Habitat degradation is noted as a severe problem across the Caribbean Sea Large Marine Ecosystem (CLME). Human activities such as infrastructure expansion, population growth and urbanization, land-based and marine-based tourism, fishing and harvesting of living resources, mining, fossil fuel exploration and development, wastewater and solid waste disposal, shipping, and agriculture can impact near-shore and pelagic marine environments where marine mammals feed, socialize, travel, or rest. These marine habitats are found across approximately 15 million km² of the Wider Caribbean, comprised of three adjacent large marine ecosystems, including the Gulf of Mexico, Caribbean Sea and North Brazil Shelf.⁵²¹ The CLME represents 3.3 million km² and is bound to the south and west by the North Brazil Shelf LME and to the north by the southeastern limits of the Gulf of Mexico LME.⁵²² Together, these three areas comprise the Wider Caribbean.

Regional key indicators of marine habitat health in the region, including coral cover, recruitment, health, fish and invertebrate diversity are considered poor. Mangroves and seagrass are also in decline, and monitoring across the region is inadequate to adequately assess impacts of their loss or degradation to coastal marine mammal species. Overfishing and invasive species (e.g. lionfish) can alter the composition of ecosystems, which can lead to further degradation of associated habitats (e.g., continuing coral decline resulting from excessive nutrient loads and a reduction in herbivorous fish). Cargo and other vessels utilize shipping lanes that transit important marine mammal corridors.

Mapping exercises under the LifeWeb Project indicate, for instance, that for the North coast of the Dominican Republic, there are areas with intense commercial traffic overlapping well-known habitats for humpback whales, including the Marine Mammal Sanctuary of the Dominican Republic. This is a similar scenario for North of Puerto Rico and for Martinique, Guadeloupe, and St. Kitts and Nevis, where critical areas for the specific marine mammal species (except the Manatee) overlap with high maritime traffic.⁵²³ Furthermore, as habitat degradation continues, the tourism potential of the region declines with both positive and negative impacts while the vulnerability of the coasts to extreme weather events and sea levels rise.

Coastal development. Within the past five years, the Kingdom of the Netherlands, St. Lucia, St. Kitts and Nevis, Jamaica, Dominica, Antigua and Barbuda, the U.S. Virgin Islands, and the Bahamas have announced resort, marina, or port development projects that are located in or adjacent to sensitive ecosystems containing corals, mangroves and seagrasses.⁵²⁴ Despite adoption by various countries of policies and strategies such as integrated coastal zone management



Figure 16. An increase in stranded stillborn and juvenile dolphins found in the Gulf of Mexico from 2010 to 2013 likely caused by chronic illnesses in dolphins exposed to oil from the Deepwater Horizon spill. Photo courtesy of Louisiana Department of Wildlife and Fisheries.

over the last decades, tools such as environmental impact assessments do not normally account for marine mammal conservation in most WCR countries. Examples of more recent coastal development projects impacting the coastal marine environment include the Curaçao Mega Cruise Pier expansion project,⁵²⁵ construction of Coral World dolphin facility in St. Thomas,⁵²⁶ Bahamas Lighthouse Point Disney Cruise Line pier, marina and guest complex in Eleuthera,⁵²⁷ and Bimini dredging project for a pier expansion involving the relocation of endangered corals.⁵²⁸

Fossil fuel production. Oil and gas production can take a heavy toll on coastal environments through the development of shipping and receiving ports and terminals, and through oil spills that degrade pelagic and coastal marine ecosystems. (See Section 3. *Pollution and Marine Mammal Health*, below.)

Sargassum. Since 2011, regular influxes of sargassum into the Wider Caribbean region is a cause of increasing concern. Pelagic Sargassum is a type of



Figure 17. short-finned pilot (*Globicephala macrorhynchus*) whale stranded in Sargassum in Barbados in 2015. Photo courtesy of J. Horrocks.

brown alga or seaweed that forms large floating mats, often referred to as ‘golden tides.’ Satellite images have shown unusually high amounts of Sargassum spreading throughout the tropical Atlantic and Caribbean Sea in 2018.⁵²⁹ It negatively impacts fisheries, waterways, shorelines and tourism, but more research is required to determine the nature and scope of the

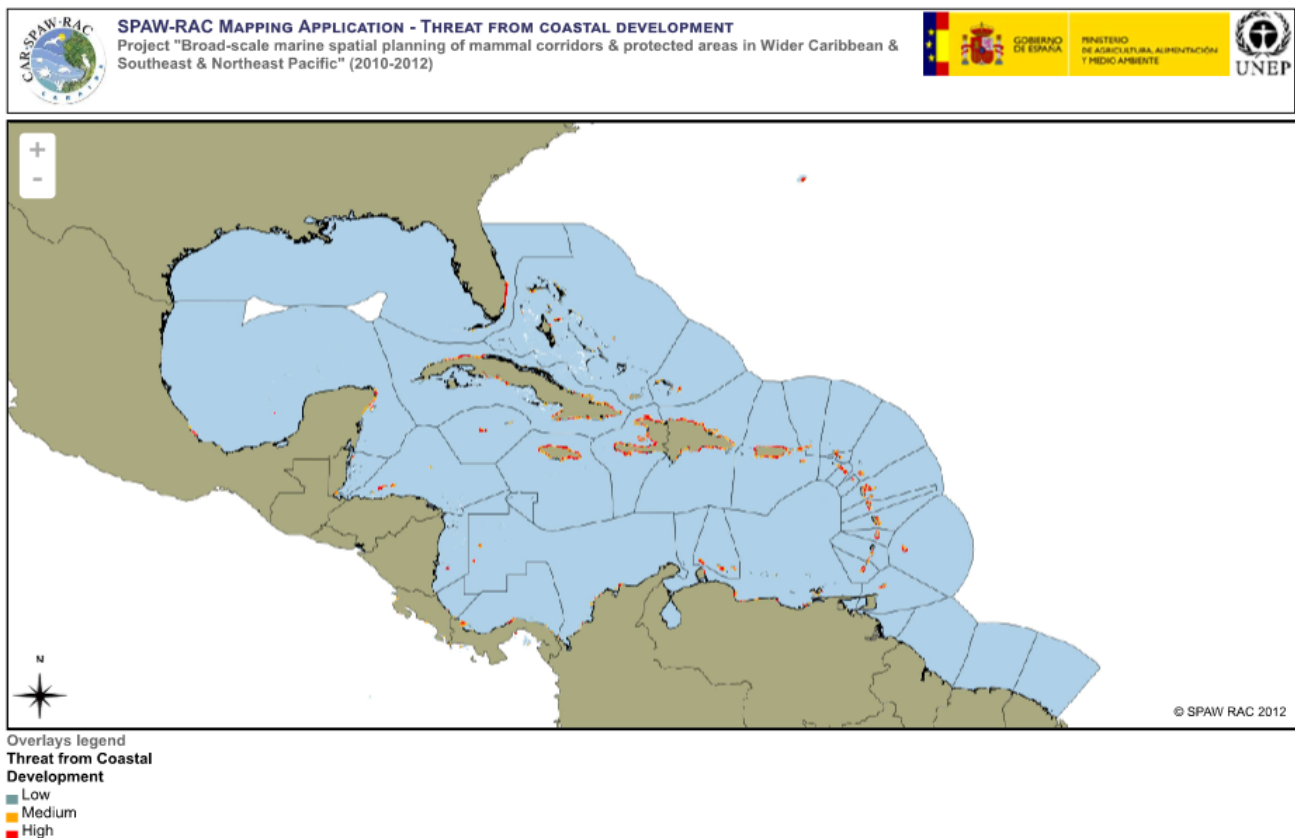


Figure 18. LifeWeb mapping that reveals coastal development threatens the coastal ecosystems of the WCR. Data current to 2012.

ecological impacts due to sargassum blooms in the region, and any specific impacts on marine mammals. Sargassum also provides refuge for migratory species and serves as an important habitat for a vast array of invertebrates and fish species, sometimes acting like a floating 'FAD' for some pelagic species, but its proliferation is problematic. Coastal dead zones have been associated with sargassum influx, where dead fish, turtles and other marine life have occurred in over 60% of the territories in the region.^{530, 531}

Highlights

- *Most countries have adopted and are implementing tools and strategies for the conservation and maintenance of goods and services by coastal and marine habitats, such as integrated coastal management plans. However, coastal development and habitat destruction remain a significant challenge for many countries within the WCR.*
- *Countries utilizing an ecosystems-based approach and integrated coastal zone management often do not include marine mammal protection when conducting environmental impact assessments as fundamental to all coastal and deep-water planning and development projects and permitting.*
- *SPAW Contracting Parties are currently not reporting or seeking STAC review of all significant coastal development projects prior to approval for assessment of pertinence under the Exemptions provision of the SPAW Protocol (Article 11(2)) to enhance environmental review and assessments regarding marine mammal considerations.*
- *Basic wastewater disposal, including the disposal of raw sewage, continues to challenge some Contracting Parties in the Region, many of whom continue to dump untreated wastewater directly into the ocean.*
- *The influx of sargassum into the WCR since 2011 has become a significant management and potential health and safety issue that requires better understanding and expertise regarding disposal and prevention.*

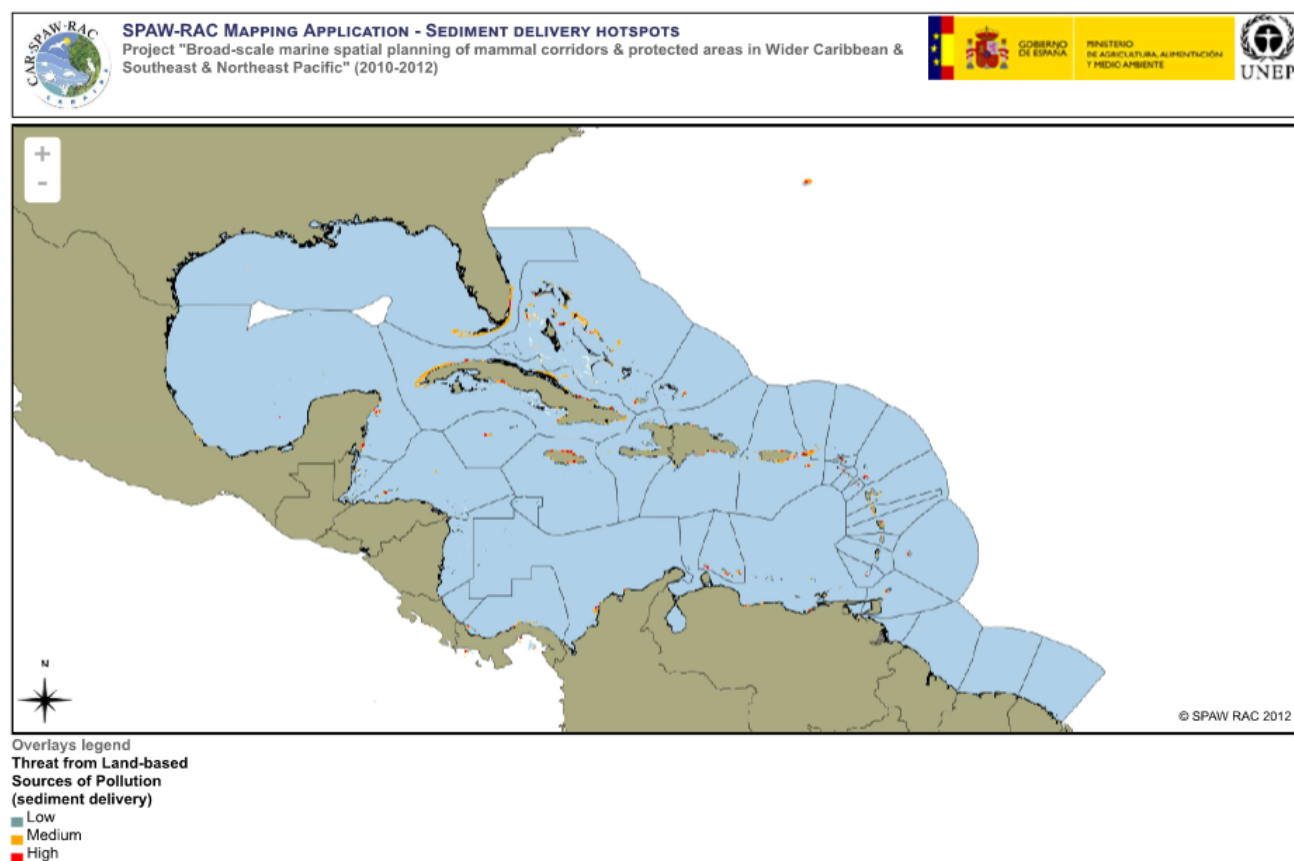
3. POLLUTION AND MARINE MAMMAL HEALTH

Although pollution in the CLME affects all three ecosystem types, its impacts are typically more evident along the coastal zone. Pollution problems in the CLME can be linked to a diversity of both land-based and marine sources and activities: e.g. tourism, households, industry, agriculture, forestry, mining, boat construction and cleaning, shipping, and exploration for oil and gas. Generally, it will be possible to establish a direct link between the (often more localized) problems of marine pollution near the coasts and the human activities occurring in these areas.

The volume of maritime transport in the region suggests that this activity constitutes an important (potential) source of pollution, through for example the discharge of garbage and waste (marine debris), and the possibility of accidents including oil spills. Shipping also contributes to noise pollution, a less studied threat in the region that has been linked to

marine mammal disturbance, displacement, and injury (e.g., hearing loss and trauma) in other oceans of the world.⁵³² Marine mammal strandings in the Caribbean region (and elsewhere) have been directly linked to noise pollution from naval training exercises in the region (see *item 7. Strandings* and *item 9. Acoustic disturbance and underwater noise below*).

All small island states face special problems in relation to waste management, including lack of capacity for modern facilities for safe processing of solid waste (including hazardous) in sanitary landfills and incinerators; lack of public awareness about waste, need for prevention, and reduction; making recycling and composting feasible and accessible; and persistent hurricanes that can generate large volumes of waste and debris which may be toxic (e.g., timber treated with preservatives).⁵³³



■ Figure 19. LifeWeb mapping of sediment delivery hotspots in the WCR. Data current to 2012.

Nutrient pollution and sedimentation. A complex issue is the problem of land-based sources of pollution, which may be located at considerable distances from the sea. Such sources may still impact vast expanses of the marine environment, as increased sediment, nutrient, and contaminant loads are being discharged into both LMEs by the rivers from the region's major drainage basins (e.g. those of the Amazon, Orinoco and Magdalena rivers in South America, and those associated to other major rivers in Central America and the Caribbean islands).

Excessive nutrient loads contribute to harmful algal blooms which are exacerbated by warming oceans and can lead to toxic effects on people and marine life, including marine mammals. In some locales, toxic algal blooms are becoming more frequent, more toxic, longer-lasting and more widespread, including in southern Florida.⁵³⁴ Acute morbidity and mortality events occur almost annually among marine mammals that appear to correlate with the presence of toxic algal blooms.⁵³⁵

Marine mammals may be affected by algal blooms through inhalation or the ingestion of food-web transfer. However, there have been no toxic tides reported in the insular Caribbean, where circulation is good and nutrient levels are low. Small restricted bays in the extreme southern Caribbean may be vulnerable to this problem, but it is not reported on a regional level.⁵³⁶ Furthermore, although primarily small-scale mortality or stranding events of marine mammals have been reported for the Caribbean,⁵³⁷ large mass mortalities of the West Indian manatee have been caused by toxic algal outbreaks in Florida over several decades and most recently in 2018.⁵³⁸ Similarly, over 200 bottlenose dolphins were likely killed by toxic algal blooms (i.e., the red tide) in a declared Unusual Mortality Event from 2018-2020 along Florida's coastline.⁵³⁹

Fossil fuel production. Oil pollution, associated with exploration, development, and extraction by the fossil fuel industry in the region is a real source of actual and potential pollution. A series of oil spills occurred in Trinidad's Gulf of Paria in late 2013 and early 2014,⁵⁴⁰ and although there were no documented direct marine

mammal mortalities during that spill, the longer-term failure of whales to reoccupy the Gulf of Paria could be due to the effects of disturbance and noise associated with the extensive oil and gas production facilities in the Gulf and heavy commercial shipping traffic.^{541, 542} In late October 2020, a potential catastrophic oil spill was averted in the Gulf when a damaged Venezuelan oil tanker remained intact during maintenance procedures that required the offloading of 1.4 million barrels of crude oil.⁵⁴³

In May 2017, oil washed ashore on the beaches of Venezuela, Aruba, Bonaire, and Curaçao, and is believed to have originated from a tank release from Trinidad in late April 2017.⁵⁴⁴ Historically, between 1960 and 1995, 28 vessel spills occurred where in each instance over 10,000 gallons were spilled into the marine



Figure 20. A bottlenose dolphin covered in oil after the Deep Horizon Oil Spill in 2010. Photo courtesy of NOAA National Ocean Service.

environment. High levels of dissolved petroleum hydrocarbons have been found throughout the Caribbean Sea, suggesting that oil and its byproducts are present throughout the Region.⁵⁴⁵ Colombia, Mexico, Trinidad and Tobago, and Venezuela are the major crude oil producing countries in the Region.

Oil and gas production is heavy in the U.S., Guyana, Venezuela, and Trinidad and Tobago, and is emerging elsewhere as countries like Bahamas and Barbados as they explore fossil fuel extraction in their waters. Offshore oil exploration is generally increasing in the Region. The potential dangers to the marine environment and marine mammals from oil and gas exploration and development is significant, as evidenced by the largest offshore oil spill in U.S. history from which the upper Gulf of Mexico has yet to recover—the BP Deepwater Horizon oil spill in April 2010. Extensive oiling can contaminate vital foraging, migratory and breeding habitats of marine mammals at the surface, in the water column, and on the ocean bottom.⁵⁴⁶ Long term impacts are still being felt, and oil exposure has caused reproductive and organ damage and has contributed to the largest and longest marine mammal unusual mortality event ever recorded in the Gulf of Mexico, including a 50% decline in some bottlenose dolphin populations in the northern Gulf.⁵⁴⁷ Oil exposure resulted in up to a 7% decline in the population of endangered sperm whales in the Gulf of Mexico and nearly half of the critically endangered Gulf of Mexico Bryde's whales were impacted by oil with a population declines of 22%.⁵⁴⁸

Where offshore drilling exists today, the associated coastal industrialization and pollution threaten local communities. In addition to accidental spills, standard operating procedures for oil and gas extraction generate waste, including radioactive materials, polluted water, sludge and sediments.⁵⁴⁹

Furthermore, oil and gas seismic exploration can impact the hearing and navigation of marine mammals and shipping vessels can injure whales more directly through ship strikes.

Although Belize has banned oil exploration, Trinidad and Tobago is the most established and largest oil and gas

producer in the CLME, and Guyana,^{550, 551} Aruba, Jamaica, Barbados and the Bahamas are in various stages of exploration. In February 2021, after 48 days of drilling in the Bahamas, including near sensitive marine protected areas, the Bahamas Petroleum Company (now called Challenger Energy Group) announced they did not find commercially viable quantities of oil but may continue drilling elsewhere.⁵⁵²

A 2015 review of seismic mitigation measures along northern South America indicates that Brazil and Colombia have adopted formal guidelines, whereas other countries in this area have applied general internationally accepted mitigation measures.⁵⁵³

Maritime traffic. The semi-enclosed Caribbean Sea is ranked as having one of the most intense maritime traffic in the world, and these activities have led to significant oil pollution. Sources of pollution from shipping include ballast water, sewage, grey water, solid waste, noise, oil discharges and air emissions. The Caribbean Sea is ranked as one of the principal transit zones in the world, with at least 214 ports found within or bordering the Caribbean. The Panama Canal plays a significant role in promoting increased shipping traffic within the Caribbean, and petroleum shipments represent nearly 30% of total canal traffic.⁵⁵⁴ Besides commercial shipping, the Caribbean Sea hosts over 70 cruise ships from approximately 24 cruise companies operating in the Caribbean Sea.⁵⁵⁵

Oil pollution from shipping is classified as one of the most significant threats to marine life in the Caribbean. UNEP estimates that in excess of 50% of the pollution is caused by ballasting and emptying of bilges.⁵⁵⁶ Estimates in excess of 700,000 barrels of oil may be discharged annually into the marine environment from operational ballast activities and tank washing.⁵⁵⁷

Overall, direct impacts from shipping-related pollution are not well documented within the Caribbean.

Mercury and heavy metals. Mercury and other heavy metal contamination in seafood is well-documented, as are the serious implications for human and animal health.⁵⁵⁸ Primary sources of mercury pollution are

artisanal gold mining and coal-fired power plants.⁵⁵⁹ As mercury bioaccumulates within the marine food chain, marine mammals (and other higher trophic-level species)—and those that consume them—are highly susceptible to the impacts of mercury toxicity, including disruption in neurologic, cardiovascular, reproductive, and endocrine systems.^{560, 561, 562} More recently, other persistent organic pollutants, such as the insecticide Chlordane (CLD) have been found in the blubber of cetaceans.⁵⁶³ Mercury and other heavy metals and persistent toxins exist in the environment from both natural and man-made sources. Due to their position at the top of the food chain, toothed cetaceans tend to accumulate higher contaminant loads.⁵⁶⁴

Mercury is discharged from artisanal mining operations in the Amazon basin, including in Colombia, Venezuela, Guyana, French Guiana and Suriname and flows into the Caribbean basin by the rivers from the region's major drainage basins.⁵⁶⁵ At least 10 endangered species are threatened by illegal gold mining operations in 21 states in Colombia, including the boto (*Inia geoffrensis*).⁵⁶⁶ A recent study⁵⁶⁷ recorded total mercury in 46 river dolphins (*Inia* and *Sotalia*) from Arauca and Orinoco Rivers (Colombia), the Amazon River (Colombia), a tributary of the Itenez River (Bolivia) and from the Tapajos River (Brazil) evidencing the role of these species as bioindicators of the presence of mercury in natural aquatic environments.⁵⁶⁸

Most recently, researchers in St. Vincent have released additional information relating to the high levels of mercury and selenium in pilot whales, killer whales, Risso's dolphins and other small cetaceans that are caught and consumed on the island, and especially in Barrouallie.⁵⁶⁹ All samples (122) exceeded the FAO and World Health Organization (WHO) consumption advisory levels for mercury, and given the high concentration of these metals and frequency at which these marine mammal tissues are consumed, this issue poses a significant human health concern. This recent research elaborates on past research that revealed high concentrations of mercury in spinner and spotted dolphins (*Stenella longirostris* and *Stenella frontalis*), species also consumed on St. Vincent.⁵⁷⁰ Other studies reveal that cetacean-based food products

may represent a public health risk because a large portion of the population may be exposed to high methylmercury (nearly 78% of survey respondents in St. Vincent and the Grenadines).⁵⁷¹

Concern about mercury levels in sargassum, marine mammals, sharks and other fish species has been expressed as a growing interest and priority in the region. Several countries, such as Antigua and Barbuda, are parties to the Minamata Convention and are participating in preliminary mercury sampling and testing programmes in an effort to create a regional coordinative node or mechanism for a comprehensive assessment for the Caribbean region.⁵⁷²

Marine debris, solid waste and wastewater. Besides being a threat to the region's marine and coastal tourism industry valued at US\$57 billion, marine pollution poses a threat to marine mammals. Solid waste and wastewater are the most pervasive sources of marine pollution in the region, including direct or indirect discharge of solids and agricultural runoff from land-based sources, shipping, petroleum exploration and production, and discarded fishing gear.

Region-wide, well-functioning sewers for wastewater collection to be treated in water treatment plants are expensive infrastructures and not readily available to households and hotels in the Caribbean. Septic tanks and Packaged Sewage Treatment Plants often service residential developments, hotels, and industrial estates, but the systems are often poorly maintained and deliver raw sewage into ground and surface water. Hotels discharge untreated sewage into inshore waters throughout the region (often from inoperative treatment plants), affecting coastal wetlands, coral reefs, and seagrass beds. Regionwide, nearly 85% of wastewater discharged into the Caribbean Sea is left untreated.⁵⁷³

Marine litter is also accumulating in the region, where up to 80% of the litter found in the Caribbean Sea is made of plastic.⁵⁷⁴ Most of this litter is from land-based sources, including shoreline and recreational activities that contribute upwards of 86% of the marine litter collected between 2006 and 2012.⁵⁷⁵ Currently, there

are 14 Caribbean countries that have banned plastic bags and/or Styrofoam as part of efforts to combat marine pollution.⁵⁷⁶ Plastics and other debris pose a threat to marine mammals through entanglement, ingestion or possible transfer of chemical pollution through micro and nano plastics and introduction of chemical residuals into the marine environment that have biological effects at low concentrations.⁵⁷⁷

An IWC workshop⁵⁷⁸ recently reviewed the current state of knowledge regarding marine debris and interactions with cetaceans (both ingestion and entanglement), considering evidence for associated toxicology and health effects besides the direct lethal. It agreed that the scale of the actual and projected increase in plastics is alarming and that the impacts of marine debris are more substantial than previously thought.

For the Dutch Caribbean, ingestion of anthropogenic debris has so far only been documented in two stranded beaked-whale specimens.⁵⁷⁹ There is still uncertainty on the potential scope of lethal and sub-lethal effects. In terms of microplastics, ingestion has now been demonstrated in many marine species, including plankton, fish, and Mediterranean fin whales.⁵⁸⁰ The physiological and toxicological effects of microplastic ingestion for cetaceans remain poorly understood.

Little is known about the type, amount and sources of abandoned, lost or discarded fishing gear (ALDFG) in the Caribbean. A 2009 survey revealed that the majority of ALDFG was underwater (60.1%), on the shoreline (24.6%) or floating at sea (15.3%), but the extent of this problem in the Region remains elusive. However, ALDFG has been cited as an important contributor to marine debris in the Caribbean.^{581, 582} Such gear includes plastic and nylon fishing gear that can persist in the marine environment for decades.

An estimated 640,000 tons of abandoned, lost or discarded fishing gear enters the oceans each year, compounding the difficulty of determining what percentage of entanglements are in this versus in active fishing gear. The importance of long-term studies, standardised post-mortem procedures, strandings networks and the assessment of floating

debris during aerial surveys was emphasized. There is growing concern that Fish Aggregating Devices (FADs) are an increasing threat and source of marine pollution, where derelict FADs can continue to entangle and capture marine life.⁵⁸³

Considering that ALDFG is a significant threat to marine mammals in other oceans, the absence of data for the Caribbean is concerning, and does not suggest that this form of marine debris is not a threat for the region (See *preceding Fisheries Interactions, Entanglement and bycatch* above).

Overall, direct impacts of pollution from plastics and other marine debris are not well documented within the Caribbean. Entanglement and ingestion of marine debris by marine mammals is historically documented in the region. Plastic bags and plastic threads have been found in the stomachs of the Guiana dolphin (*Sotalia guianensis*) and Blainville's beaked whale (*Mesoplodon densirostris*) in Brazil,^{584, 585} the Smithsonian Institute has documented two pygmy sperm whales since the early 1970s known to have ingested plastic bags;⁵⁸⁶ and a manatee died from the effects of ingesting a large sheet of plastic in Florida.⁵⁸⁷

Highlights

- While there are considerable efforts in the region, particularly under the LBS Protocol, regarding various land-based and marine-based pollutants, including action plans and initiatives to address such pollution, no continuous monitoring programme is in place to determine impacts on marine mammal health and their critical habitats and prey. Pollutants that are of importance include excessive nutrient loads, marine debris, wastewater, oil pollution, mercury and heavy metals.
- Stranding networks are a viable and under-utilized resource to support the collection of contaminants data. The inclusion of contaminant investigations during pathological examination of stranded or hunted cetaceans could provide critical information towards assessing pollution and impacts in the

Region. Biopsies and stomach content analysis can provide critical information as well regarding plastics consumption and contaminants.

- Synergies with the LBS Protocol and associated AMEP Programme are evident and marine mammal conservation needs can be addressed in tandem with, or fundamental to, projects, training courses and other initiatives related to various aspects of pollution impact in the WCR.*
- Oil and gas exploration and development is increasing in some parts of the Region, posing an increasing threat to the marine environment.*
- Basic wastewater disposal, including the disposal of raw sewage, continues to challenge some Parties in the Region, many of whom continue to dump untreated wastewater directly into the ocean.*

4. WHALE WATCHING AND ASSOCIATED ACTIVITIES

Whale watching is still a fairly new idea in the WCR, beginning in the early to mid-1980s with the development of dolphin watching and swimming tours in The Bahamas and humpback whale watching off the Dominican Republic. In 1988, commercial whale watching started in Dominica. By the mid-1990s, whale watching was attracting visitors in the Turks and Caicos Islands, the U.S. and British Virgin Islands, Puerto Rico, Martinique, Grenada, and St. Vincent and the Grenadines. During the late 1990s, whale watch tours also started up in St. Lucia, St. Kitts and Nevis, St. Barthélemy, and Guadeloupe.⁵⁸⁸

Although detailed information for the WCR is incomplete, in 2008 there were at least 21 countries and territories that offer some form of marine mammal watching.⁵⁸⁹ These include land-based, vessel-based sightings and vessel-based listening tours as well as swim-with experiences, with vessel tours ranging from small zodiacs to cruise ships. Globally, the industry generates over US\$2.1 billion dollars in annual revenue—although Central America and the Caribbean contribute a small percentage (2.3%) of this total worldwide.⁵⁹⁰

Total expenditures on whale watch activities in 23 countries in Central America and the Caribbean totaled nearly \$US 54 million in 2008.⁵⁹¹ The largest growth in whale watch activities between 1998 and 2008 occurred in Costa Rica, Guadeloupe, Martinique, Nicaragua, Panama and St. Lucia.⁵⁹² Some countries do not have established commercial operations (e.g., Venezuela) whereas others are exploring the potential for expansion (e.g., Colombia). In Colombia, at least 35,000 individuals participated in whale or dolphin watching in 2006, a number that has surely increased since then and likely in the Pacific region where operations are consolidated.⁵⁹³

The countries with the highest whale watcher expenditures include The Bahamas, Dominica and the Dominican Republic.⁵⁹⁴ Whale tourism expenditures on Dominica alone generate approximately \$3 million U.S. dollars (USD) in annual net profit.⁵⁹⁵ In Guadeloupe,

Martinique and St. Martin, the whale watch industry generated over two million Euros in 2015.⁵⁹⁶ The current Mapping Ocean Wealth Initiative notes that whale and dolphin watching in Dominica, Grenada, Saint Lucia, and St. Vincent and the Grenadines generates \$6.2 million annually.⁵⁹⁷

The challenge remains to accurately monitor and determine the viability and sustainability of such operations over time/years, which may not always be monitored continuously. At least ten countries and territories have developed guidelines or codes of conduct for vessel operation, four have national regulations, and at least five have operator associations.

Other countries have the potential to develop marine mammal activities in the future, perhaps only limited by mammal occurrence and distribution, economic constraints, or lack of infrastructure. For example, at least 16 species of cetaceans have been recorded off the waters of Aruba, and although there are no commercial whale-watching operations on the island, the large numbers of tourists, and high public awareness towards marine mammals and their conservation offer positive prospects for whale-watching operations there.⁵⁹⁸ Some countries and territories have seen their whale watch operators rapidly expand. In Martinique, there were two operators in 2007; this grew to 21 operators in 2015, and at least 41 operators by 2019.⁵⁹⁹

The Dominican Republic had 33 companies operating 46 boats, taking upwards of 28,000 passengers in 2008 alone—attracting the largest numbers of whale watchers in the Caribbean.⁶⁰⁰ In 2018, there were 56 boats with permits in Samaná Bay. Some of these operators have ‘regular’ permits that allow them to whale watch continuously, while some have ‘rotational’ permits which are shared by various boats and allow them to whale watch only one day at a time each rotation. As a result of these permits, the maximum number of boats that can conduct whale watching activities in Samana Bay as of May 2018 is 43.⁶⁰¹ Today, operators on Silver Bank, part of the larger marine mammal sanctuary of the Dominican Republic, are

limited to five permitted commercial operators at any one time in order to protect the whales and their environment, along with other strict regulations for divers, researchers, and recreationalists.⁶⁰²

When well-managed, whale watching has the potential to attract foreign tourists and exchange, as well as to encourage the development of an extensive suite of benefits and services.⁶⁰³ In many places, whale watching provides valuable, sometimes crucial, income to a community, with the creation of new jobs and businesses. The true value of whale watching can extend far beyond tourist expenditure and include financial, recreational, scientific, educational, cultural, heritage, social, aesthetic, spiritual/psychological, political, environmental quality, ecological services and other values. The whale watching potential for the Caribbean ranges from considerable to outstanding in about half of the countries studied.⁶⁰⁴ Marine mammal watching can also serve as an important platform for education and outreach regarding marine mammals and their ocean environment.⁶⁰⁵

Marine mammal tourism, like tourism of all kinds, can have a downside. Intensive, persistent and unregulated vessel traffic that focuses on animals while they are resting, feeding, nursing their young, or socializing can disrupt those activities, and have a long-term impact on the populations they target, reducing fitness, increasing stress, and affecting populations in a manner similar to directed mortality.^{606, 607, 608} Disturbance from whale watching has been linked to whales and dolphins abandoning or permanently leaving their preferred foraging or resting areas.⁶⁰⁹ Whale watch vessels have collided with whales, causing injury to whales and humans.⁶¹⁰ Entrepreneurs may rush to take advantage of newly discovered whale or dolphin watching opportunities, with little or no monitoring of the effects of these activities.⁶¹¹

In addition, vessels used for marine mammal watching can add noise, emissions, and other pollution to the marine environment (e.g., chemicals from cleaning supplies and sunscreen, solid waste such as food and beverage containers). Tourism activities focusing on cetaceans often involve invasive activities (such

as swimming with the animals) that may cause disturbance, including vessel strikes, and other physical injuries.⁶¹² Many of these operators are based outside the Caribbean, and organize tours within the WCR to interact with these animals. It is not always clear how programmes based in other countries benefit the local economy or regional conservation efforts within the WCR.

Some countries enable and promote direct interaction with marine mammals while clients are swimming in the ocean. The Dominican Republic and Dominica are two countries in the region that permit this activity with humpback whales in the former, and sperm whales and other species in the latter. These activities have been demonstrated to cause behavioral responses from the targeted cetaceans.^{613, 614, 615} In addition, swimmers have been seriously injured during these encounters.⁶¹⁶ Although it is prohibited to scuba dive or aggressively swim or free dive with the humpbacks in the Dominican Republic, snorkeling encounters are commercially offered on Silver Bank. The growth of the industry in the Dominican Republic is limited through the number of permits that are issued each year.

Direct interaction with cetaceans during these encounters can lead to injury or habitual behaviors that can compromise the health and welfare of humans and cetaceans alike. Bottlenose dolphins have become habituated to handouts from humans in Florida, affecting foraging behavior, and increasing the risk of vessel strikes through proximity to boats, and directed vandalism from fishermen and others.⁶¹⁷ Some of these provisioned dolphins have also exhibited aggressive behaviors towards swimmers.⁶¹⁸

Few whale watching companies regularly include a strong educational element in their tours. One study found that over 80% of interviewed tourists in Samaná Bay ranked the importance of public education on whale conservation as high or very high and recommended that every whale watching boat has an interpreter/guide on board who can present basic information about whale behaviour, ecology and conservation needs.⁶¹⁹ Every year, the Vice Ministry of Protected Areas and Biodiversity holds training sessions

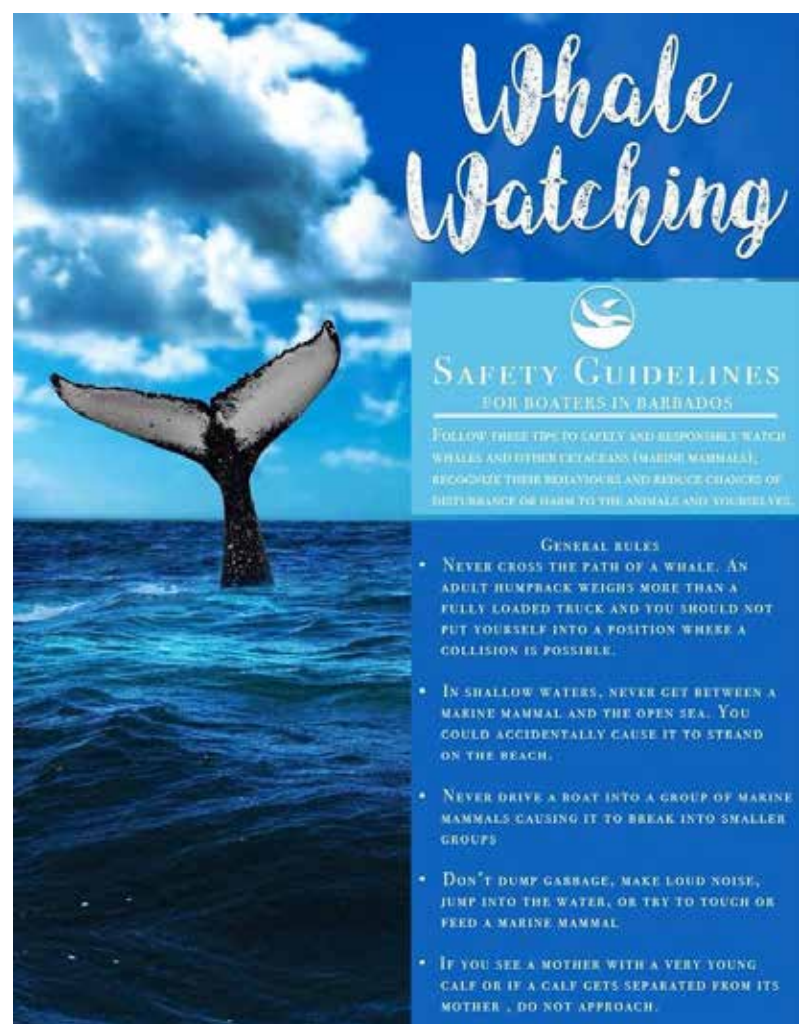
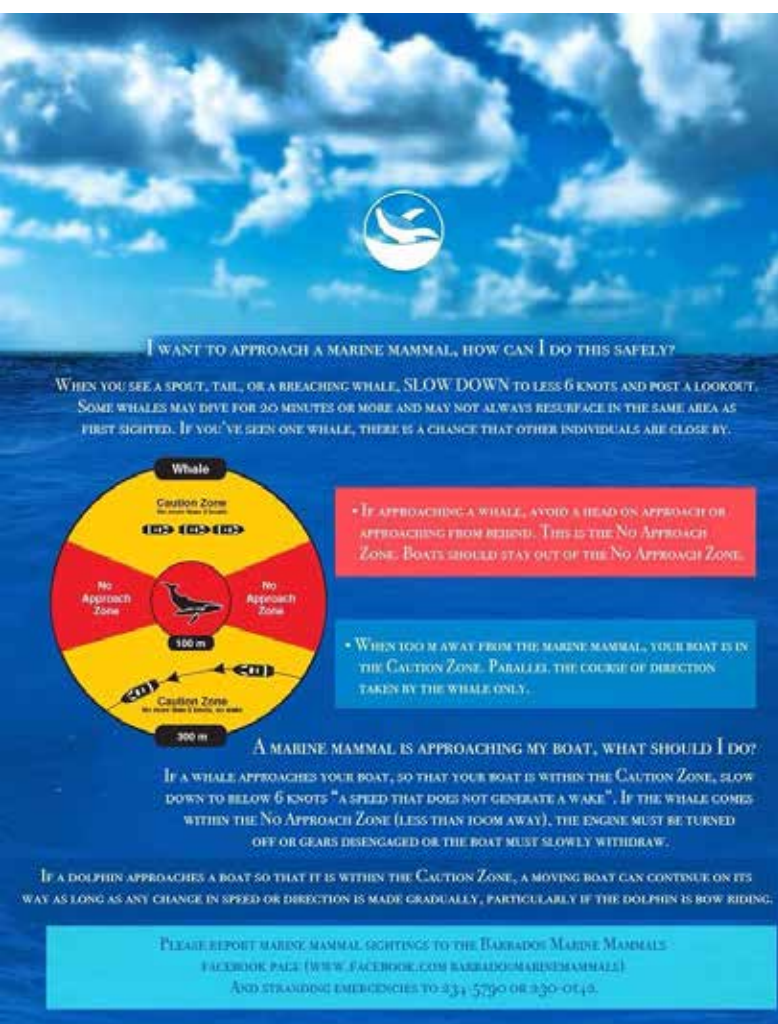
for captains and operators, with the aim of strengthening education. The Association of Boat Owners of La Bahia de Samaná (ASDUBHAISA) has also strengthened the capacity of its members and captains with courses on first aid, basic navigation and maritime safety.

Recent surveys. A recent survey of SPAW Contracting Parties distributed by the SPAW RAC in collaboration with the CARI'MAM project attempted to update information regarding how many countries in the WCR might have legislation, regulations, or guidelines specific to the management of marine mammal viewing. Nine countries were represented along with responses from NGOs, academia, whale watching operators and marine protected area managers. These surveys suggest that seven SPAW contracting parties, including the

Dominican Republic, Colombia, Bahamas, USA, Panama, and France have legislation, regulations or voluntary guidelines governing marine mammal watching.

Of those countries with legislation or regulations; six require a permit to conduct marine mammal watching activities; seven prohibit the disruption of marine mammal behavior or feeding; six prohibit physical contact with marine mammals; and seven specified responsible approach distance and vessel handling and speed; and viewing time limits.

Approach distances ranged from 50m for whales and dolphins to a more protective 300m for larger vessels. For example, in the Dominican Republic and AGOA Sanctuary, whale watching can only be undertaken



■ Figure 21. Whale watching safety guidelines for boaters in Barbados created by NGOs.

through authorization. In the French Antilles, non-authorized boats (e.g., leisure boats) are not permitted to approach whales or dolphins within 300m.

At least three support some kind of on-board research. More generally, speed, approach, time and type of vessel engine guidelines were noted to be less respected than interaction guidelines or regulations, such as not touching or swimming with marine mammals.

The primary species under observation is the humpback whale, followed by sperm whales, pantropical spotted dolphins, and the common bottlenose dolphin. In some countries, like Colombia, viewing operations also target the Guiana dolphin and tucuxi (*Sotalia spp.*) and boto (*Inia geoffrensis*).

Compliance data is lacking, but generally compliance with voluntary guidelines is expected to be relatively

low, as corroborated by the recent surveys cited above. Compliance data for mandatory regulations is equally as scarce, although existing studies do not bode well even for critically endangered species like the North Atlantic right whale.⁶²⁰ For example, one study of whale watching in Colombian waters noted that 94% of boats approached too fast, and nearly 80% of all boats approached mother and calves, with duration times with the animals exceeding the 30-minute limit.⁶²¹ In another study, dolphin tour operators in Florida adhered to voluntary guidelines approximately 60% of the time.⁶²²

Regional guidelines. Whale Watch Guidelines under the SPAW Protocol were developed and proposed in October 2011 during a workshop held in Panama City, Panama.⁶²³ These guidelines were subsequently adopted at the 7th meeting of the COP in Punta Cana, Dominican Republic in October 2012.⁶²⁴

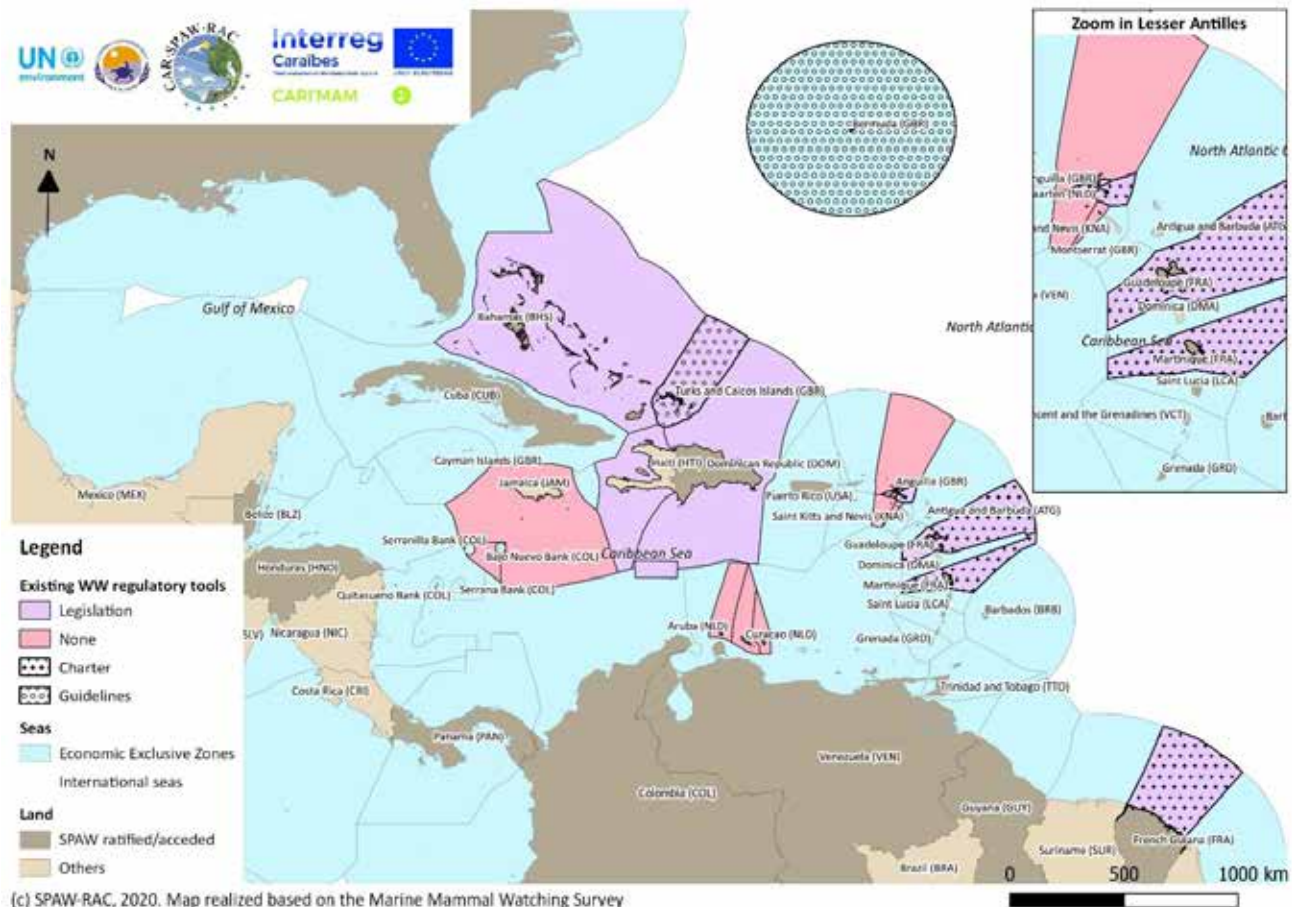


Figure 22. Results from surveys distributed by the RAC regarding national guidelines for marine mammal viewing.

CaribWhale⁶²⁵, an association of whale watchers in the Caribbean formed in 2000 but officially incorporated in 2007, held its last general assembly in St. Lucia in May 2010, but has not convened a meeting since. Capacity building and training workshops were also held in 2002, 2005, and 2007.⁶²⁶ The association originally was comprised of whale watch operators from Dominican Republic, Guadeloupe, Dominica, St. Lucia, St. Vincent, and Grenada. There currently is no regional association in operation in the Caribbean, although the CARI'MAM network serves as an aggregator to encourage dialogue and exchange of information within the WCR.

Highlights

- *Outreach surrounding the Regional best-practices guidelines that were developed through the Whale Watch workshop conducted by SPAW and partners in Panama in 2011 is lacking. The IWC has noted these guidelines in their online worldwide handbook.*⁶²⁷
- *A few Parties have developed and/or adopted their own marine mammal identification guides and viewing guidelines, however capacity building and monitoring of adherence to best practices in the field remain a challenge.*
- *There is a lack of research and monitoring of long-term impacts associated with persistent and unregulated vessel traffic resulting from marine mammal viewing.*
- *Opportunistic and unregulated marine mammal viewing occurs in many countries within the Region, suggesting the potential need for a more formalized network of responsible operators to guide best practice.*
- *A patchwork of guidelines, best practices, and regulations exists within the Region to address existing and emerging marine mammal viewing operations.*

5. PROTECTED AREAS AND OTHER MANAGEMENT REGIMES

The designation of ecologically-sensitive or biologically-important areas, whether in the form of delineated marine protected areas under national designation or through the SPAW Protocol, may help to reverse this downward trend in general habitat degradation and loss of critical coastal ecosystems throughout the Region.⁶²⁸

The Caribbean Marine Protected Area Management Network and Forum (CaMPAM), as a core of the SPAW Programme, has for over 20 years provided a platform for capacity building through training activities, communication tools, and grant awarding to expedite transfer of knowledge and lessons learned as well as financial resources across the Wider Caribbean region.⁶²⁹ The CaMPAM database currently contains information for a total of 1069 Caribbean marine and coastal MPAs from 44 countries. CaMPAM is interoperable with the World Database on Protected Areas managed by the UN World Conservation Monitoring Centre (WCMC) with support from IUCN and its World Commission on Protected Areas (WCPA) and includes the 35 MPAs currently listed under the SPAW Protocols which are of particular importance⁶³⁰ (*see complete list in the table below*). The programme also intends to assist in the establishment and management of protected areas, and in the creation of a network of protected areas (SPAW Protocol Art. 7(2) and 23(2e)). The goal of such a network would be enhanced if based on ecological connectivity and common conservation goals to address protection and management of living marine resources, habitats, and ecosystems of the Wider Caribbean region.

One goal of the recently-launched 'Caribbean Marine Mammals Preservation Network,' (CARI'MAM Project) is the development of Management Plans for MPAs which specifically address marine mammal focused measures.⁶³¹ To advance this objective, an analysis based in a 'marine mammal tracking tool' developed by the 'Towards a transatlantic partnership of Marine Protected Areas' Project was disseminated to 400-500 MPA managers and stakeholders under the auspices of the CARI'MAM.⁶³² This analysis revealed that, aside from

the designated sanctuaries, most MPAs in the region do not include marine mammals in their management goals and objectives, nor do they incorporate elements to address threats identified to impact marine mammals.

Marine Mammal Sanctuary of the Dominican Republic. The Dominican Republic was the first Caribbean nation to establish a marine mammal sanctuary. The Silver Bank and Navidad Bank Humpback Whale Sanctuary was created in 1986 and expanded in 1996 and 2004 to include Navidad Bank and part of Samaná Bay, covering the three main humpback breeding grounds in Dominican waters. Today, the Dominican Republic's sanctuary protects all marine mammals within its 32,879-square kilometer area. The area attracts the largest breeding aggregation of humpback whales in the North Atlantic, with more than 3,000 individuals sighted within a season.

AGOA. The AGOA Marine Mammal Sanctuary was declared in September 2010, in recognition of the vast diversity of marine mammal species present in the French Antilles and the Caribbean in general, and of the potential threats facing these marine mammals and their habitats. AGOA's entire 143,256 square-kilometer French Exclusive Economic Zone (EEZ) is currently defined as a critical habitat for marine mammals. In all, 25 of the 30+ cetacean species that can be found in the Caribbean Sea, including baleen and toothed whales, have been documented in the French Antilles.

Yarari. In September 2015, the Government of the Netherlands established the Yarari Marine Mammal and Shark Sanctuary in the Caribbean Netherlands, encompassing the territorial waters and the Exclusive Economic Zone surrounding the islands of Saba and Bonaire. The objective of Yarari is to provide a refuge for the protection and conservation of marine mammals and sharks and their habitats from negative impacts of human activities.

The Stellwagen Bank Sister Sanctuary Program in collaboration with marine mammal sanctuaries in the Dominican Republic, Bermuda, French Antilles and the



■ Figure 23. Map of marine mammal sanctuaries in the WCR under the Sister Sanctuary Programme. Source: Tadzio Bervoets/DCNA.

Caribbean Netherlands, is a pioneering science-based programme which has been supported under the framework of the SPAW Programme.⁶³³

In 2006, the United States' National Oceanic and Atmospheric Administration (NOAA) and the Dominican Republic's Ministry of Environment and Natural Resources established the world's first Sister Sanctuary agreement to protect the endangered humpback whale between NOAA's Stellwagen Bank National Marine Sanctuary (SBNMS) and the Santuario de Mamíferos Marinos de la República Dominicana (SMMRD).⁶³⁴ The agreement has since been renewed and helps improve humpback whale recovery in the North Atlantic by increasing public awareness and support for marine mammal conservation through joint research, monitoring, education and capacity building programmes. The sister sanctuary relationship is crucial to the long-term conservation of the North Atlantic humpback whale population.

In 2012, NOAA's Stellwagen Bank National Marine Sanctuary (SBNMS) and the Bermuda Government

signed a Sister Sanctuary Agreement which pledged cooperation on scientific and educational programmes to better protect the endangered North Atlantic humpback whale population. This sister sanctuary partnership was developed under the auspices of the Sargasso Sea Alliance—an international effort led by the Government of Bermuda to protect the unique ecosystem of the Sargasso Sea and its iconic species. Bermuda is a critical migration corridor for humpback whales and its marine mammal sanctuary encompasses its entire Exclusive Economic Zone (EEZ), roughly a 450,000 square kilometer circle of jurisdictional ocean.

The Stellwagen Bank National Marine Sanctuary (SBNMS) and the Caribbean Netherlands also signed a Sister Sanctuary Memorandum of Agreement (MOA) in 2017. With the addition of "Yarari", the Caribbean Netherlands' Marine Mammal Sanctuary, the multi-sanctuary, science-based Sister Sanctuary programme has increased protection for North Atlantic humpback whales from 2,100 km² to 669,440-km² over the past decade.

LIST OF PROTECTED AREAS LISTED UNDER SPAW PROTOCOL (CARTAGENA CONVENTION)

#	COUNTRY	SITE	SIZE (SQ. KM)	TERRESTRIAL SURFACE (SQ. KM)	WETLAND SURFACE (HA)	MARINE SURFACE (SQ. KM)
1	Belize	Glover's reef Marine Reserve	350	0	0	200
2	Belize	Hol Chan Marine Reserve	55	0	900	42
3	Belize	Port Honduras Marine Reserve	405	0	0	405
4	Colombia	Sanctuary Cienaga Grande de Santa Marta	268	161	10660	0
5	Colombia	Regional Seaflower Marine Protected Area	65000	650	250	65000
6	Colombia	Regional Natural Park of Wetlands Suriqui	6181	0	6181	0
7	Cuba	Guanahacabibes National Park	398	179	5998	160
8	Cuba	National Parc Cayos de San Felipe	2625	20	198	242
9	Dominican Republic	National Park Jaragua	1536	611	9400	830
10	Dominican Republic	National Park la Caleta	12	2	0	10
11	Dominican Republic	National Park Sierra de Bahoruco	1226	1226	0	0
12	Dominican Republic	National Park Haitises	631	451	18000	0
13	France	Grand Connétable Island Natural Reserve, French Guiana	79	1	0	78
14	France	Kaw-Roura Marine Reserve, French Guiana	947	277	65590	14
15	France	Amana Marine Reserve, French Guiana	154	100	4	41
16	France	National Park of Guadeloupe	2467	1068	5567	1344
17	France	Saint Martin Lagoon Ponds	2	0	198	0
18	France	Saint Martin National Natural Reserve	31	2	1	28
19	France	Agoa Sanctuary, French Antilles	138000	0	0	138000

20	France	Petite-Terre National Natural Reserve, Guadeloupe	10	2	10	9
21	France	Étang des Salines Reserve, Martinique	98	0	98	0
22	France	Versants Nord de la Montagne Pelée Reserve, Martinique	836	836	0	0
23	Grenada	Molinière-Beauséjour Marine Protected Area	3,5	0	0	3,5
24	Kingdom of the Netherlands	Saba National Marine Park	2679	0	0	2679
25	Kingdom of the Netherlands	St Eustatius National Marine Park	32,9	5,4	0	27,5
26	Kingdom of the Netherlands	Man O War Shoal Marine Park, St. Maarten	31	0	0	31
27	Kingdom of the Netherlands	Bonaire National Marine Park	257	60	170	27
28	Kingdom of the Netherlands	The Quill and Boven National Park, St Eustatius	5	5	0	0
29	Kingdom of the Netherlands	Saba Bank National Park	2679	0	0	2679
30	Kingdom of the Netherlands	Mont Scenery National Park, Saba	4	4	0	0
31	Saint Vincent and the Grenadines	Tobago Cay Marine Park	66	5	1	60
32	United States of America	Florida Key National Marine Sanctuary	99467	266	0	9947
33	United States of America	Dry Tortugas National Park, Florida	262	0,4	0,28	261,6
34	United States of America	Everglades National Park, Florida	6110	3824	341	2416
35	United States of America	Flower Garden Banks National Marine Sanctuary	145	0	0	145

■ Figure 24. Protected areas listed under the SPAW Protocol as of 2020.

Highlights

- *There is no current programme to promote network-type collaboration among SPAW protected areas based on ecological connectivity or common conservation/protection goals, despite the connectivity provided by the Sister Sanctuary initiative.*
- *Tools are being developed by other programmes that could serve to guide MPA managers in the Region (e.g., TransAtlantic marine mammal tool) to develop marine mammal-focused protected areas.*
- *One critical programme to encourage connectivity between MPAs and capacity building in the Region, which has successfully operated for over 20 years, is currently being reviewed and requires funding (the SPAW CaMPAM).*
- *The majority of MPAs in the Region do not consider marine mammal protection in the design, management, or operational and financial planning of these areas.*

6. RESEARCH PROGRAMMES

The establishment of sustainable regional organisations dedicated to research or stranding response in the Caribbean has been intermittent and challenging. The Eastern Caribbean Cetacean Network (ECCN), Southern Caribbean Cetacean Network (SCCN) and Dutch Caribbean Cetacean Network (DCCN) are examples of regional organisations that were established to promote marine mammal research and conservation in the region, and are no longer playing an active role or have limited engagement. Oftentimes, marine mammal research is undertaken or supported by nonprofit organisations in the region (e.g., Guyana Marine Conservation Society; Bahamas Marine Mammal Research Organization⁶³⁵) in tandem with rescue and stranding response, and sometimes in collaboration with government agencies.⁶³⁶

Some whale watch operators in the region also conduct or host collaborative and participatory science programmes that include the collection of photos for photo identification, photogrammetry, and behavioral and population-level research (e.g., OMMAQ⁶³⁷ and Association Evasion Tropicale⁶³⁸).

In Curaçao, the captive dolphin facility (Curaçao Seaquarium/The Dolphin Academy) served as the coordinator of the SCCN and was charged with establishing a database to include sightings data and a bottlenose dolphin ID database until about 2010. Although the SCCN and its dolphin database did not survive, the Dutch Caribbean Nature Alliance (DCNA) (including the Dutch Caribbean Islands of Aruba, Bonaire, Curaçao, Saba, St. Eustatius, and St. Maarten) has been promoting reporting of any and all marine mammal sightings (and other fauna and flora) on a shared global platform.⁶³⁹

Although many of these foundations and non-profit organizations have established biodiversity monitoring programmes, such as for sharks, birdlife, invasive species, marine debris, coral reefs and mangroves, there are relatively very few dedicated, long-term marine mammal monitoring and research programmes in the WCR. A 2014 report on the

status of marine mammal research in the WCR⁶⁴⁰ pointed out that information on the distribution, abundance and ecology of marine mammals in the Wider Caribbean Region is scarce. These efforts have ranged from visual to acoustic surveys, satellite telemetry and stranding response.⁶⁴¹ Genetic studies have also increased, including with manatees,⁶⁴² contributing some baseline knowledge about marine mammals in Puerto Rico, Cuba, Colombia, Bahamas, Mexico and Honduras.⁶⁴³

Of notable exception, the Dominica Sperm Whale Project⁶⁴⁴ has identified and studied over 30 social units of sperm whales in the eastern Caribbean since 2005, and has documented their decline in the region over a ten-year period.⁶⁴⁵ The Bahamas Marine Mammal Research Organization⁶⁴⁶ has conducted over 25 years of research in the Bahamas, and also coordinates marine mammal strandings response. BMMRO's research has tracked sperm whale population density in relation to major shipping routes in the Bahamas; responded to the mass strandings of beaked whales that occurred in 2000 as a result of naval training activities; and is currently undertaking various other marine mammal studies.

Venezuela supports an on-going research programme, 'Proyecto Sotalia' focusing on the Guiana dolphin, *Sotalia guianensis*, in Lake Maracaibo, as well as research, conservation and awareness of aquatic mammals in the country that is dependent on foreign financial support. A consortium of scientists compiled a review of cetacean strandings and mortality in Venezuela spanning the years 1988–2014 for presentation to the International Whaling Commission.⁶⁴⁷ Recent reviews of historic population estimates of bottlenose dolphins in Venezuela suggest that more monitoring needs to be done to establish baseline populations of coastal resident dolphins.⁶⁴⁸

Researchers from Venezuela, Aruba, Guadeloupe, and the Dominican Republic have collaborated since 2009 in a 'Caribbean-Wide ORCA' project to study the

occurrence and movements of orcas in the region. A total of 176 records were registered in the region and to date, over 300.⁶⁴⁹

In Cuba, there has been relatively little research on marine mammals with much of the information originating from historical and gray literature, and with recent efforts focusing on manatees.⁶⁵⁰ The National Aquarium has remained a key actor over the years.⁶⁵¹ Efforts to increase collaborative marine mammal research between Cuba, Mexico and the United States is being encouraged by the Trinational Initiative and The Ocean Foundation.⁶⁵²

In Panama, research in the Caribbean has focused mainly on resident bottlenose dolphins at Dolphin Bay, Bocas del Toro, on the effects of the intense year-round dolphin watching industry. PANACETACEA has been at the core of much research in Panama as a non-governmental actor.

In Belize and Mexico, the nonprofit organization FINS (Fundacion Internacional para la Naturaleza y la Sustentabilidad) has been conducting baseline marine mammal distribution and behavioral studies for over 10 years, including the more recent use of drone technology to broaden data collection for dolphin and manatee populations.⁶⁵³ Ecomar's field station in Belize has been conducting dolphin and manatee surveys since 2009, and informally logs sightings data on its website.⁶⁵⁴ ECOSUR based in Chetumal, Mexico has conducted extensive research on manatees.⁶⁵⁵ In addition, PROMMAC has been conducting monitoring of marine mammals utilizing drone and boat surveys, biopsy, and opportunistic tourism platforms, such as dolphin and manatee viewing excursions in Mexico and central America, including Belize and Honduras.⁶⁵⁶

In Honduras, several non-governmental organisations are involved in various aspects of marine mammal conservation and ecosystem preservation, such as Marliance, BICA and Fundacion Cayos Cochinos.

In the Dominican Republic, CEBSE (Center for the Conservation and Ecodevelopment of the Bay of Samana and its Surroundings) and Fundemar

(Fundacion Dominicana de Estudios Marinos) have been conducting cetacean field studies since 2004, and stemming from the illegal capture of dolphins in the Parque Nacional del Este.⁶⁵⁷ Research relating to whale watching in the Dominican Republic to date has focused primarily on the management of the industry as well as tourism perceptions rather than on possible impacts of whale watching on the whales, although there has also been some research on whale populations,⁶⁵⁸ including through participation in historical surveys discussed below.

In French Guiana, GEPOG has conducted aerial transect surveys, along with training in biopsy techniques, disentanglement, strandings response and acoustic monitoring. Under the REMMOA Project, in 2018, an aerial survey and boat surveys dedicated to cetaceans and seabirds were conducted on the continental slope of French Guiana EEZ by the Ocean Science Logistic (OSL) NGO.⁶⁵⁹

In Puerto Rico, researchers are conducting sightings and photographic inventories of cetaceans, including minke whales, humpback whales, spinner dolphins, Atlantic and pantropical spotted dolphins, rough-toothed dolphins, false killer whales, and sperm whales^{660, 661}; and modelling distribution of bottlenose dolphins off the southwest coast under the Puerto Rico Bottlenose Survey.⁶⁶²

In Martinique, SEPANMAR has been conducting cetacean inventories since 2003, including aerial line surveys, photo identification, and acoustic studies.

On Guadeloupe, visual and acoustic data is being collected by the nonprofit organization Observatory for Marine Mammals of Archipelago's Guadeloupe (OMMAG), one of the contributors to the Caribbean-wide Orca Project,⁶⁶³ and utilizing voluntary participatory 'citizen science' to collect sightings data. Association Evasion Tropicale (AET) has been conducting long-term photoidentification and monitoring studies, strandings response, outreach, and whale disentanglement activities for decades,⁶⁶⁴ including the monitoring of sperm whales in Guadeloupe waters since 1998 and documenting their decline.⁶⁶⁵

On Saba, the Saba Conservation Foundation has been collecting acoustic data since 2012. STENAPA and STINAPA have also been collecting acoustic data on St. Eustatius and Bonaire, and the Nature Foundation in St. Maarten. This data has reportedly not yet been analyzed.

A majority of the field research in the Caribbean has focused on humpback whales.⁶⁶⁶ This may partly be due to the predictability, presence, allure, and availability of funding from larger institutions and government agencies. The MEGAPTERA project on St. Martin established in March 2019 involves the tagging, biopsy, acoustic recording and photo identification of humpback whales.

Historically, and more recently, the U.S. National Oceanic and Atmospheric Administration (NOAA) has collaborated with a multitude of regional organizations and institutions to conduct multi-year longitudinal studies that have shaped prevailing knowledge about humpback whale presence and migration in the region. In the early 1990s, The Years of the North Atlantic Humpback whale (YoNAH) project was an international research collaboration to study the North Atlantic humpback whale across most of its known range, and was the first attempt at such an ocean-basin-wide study of a cetacean species.⁶⁶⁷ It utilized biopsy sampling and photo identification, and resulted in abundance estimate numbers for the population.

YoNAH was followed by MONAH (More North Atlantic Humpbacks) in 2004–2005 and involved collaboration with whale researchers in the Dominican Republic who found that there were fewer humpback primary mating and calving grounds (West Indies) than during the YoNAH survey a decade earlier.⁶⁶⁸ With an apparent slowing of the population growth rate, a more recent review of population-level trends in the Caribbean's North Atlantic population of humpbacks are inconclusive.⁶⁶⁹ Some of these later studies have also looked at impacts of vessel noise on humpback whales through the deployment of acoustic recorders, concluding the likelihood of masking effects and other impacts from the overlapping confluence of vessel noise and humpback whale song.⁶⁷⁰

The College of the Atlantic Humpback Whale Catalogue serves as the repository for all humpback whale tail photos taken throughout the North Atlantic since the mid 1970's, where YoNAH and MONAH photos are officially archived. The College of the Atlantic catalog provided the first matches of tail flukes from the Caribbean to all northern feeding grounds (e.g. USA, Canada, Greenland, Iceland and Norway).

Caribtails. Caribtails⁶⁷¹ was a voluntary citizen science programme established in 2014 to enlist yachters and cruisers to help track movements of humpback whales between their North Atlantic feeding grounds in Stellwagen Bank National Marine Sanctuary (Cape Cod, MA) and their breeding grounds in the WCR. The programme sought tail fluke photographs of humpback whales from the Caribbean region to aid in conservation efforts. This programme is no longer active, and it is not clear what database was initiated with the fluke photos received.

LifeWeb Project. The UNEP-Spain LifeWeb project (2010–2014) aimed to map marine mammal occurrence against some of the primary threats in the Region through the collection of GIS-generated data. Project outputs included mapping of critical marine mammal habitats, regional-scale migration routes, and socio-economic information on human activities to underpin broad-scale spatial planning and management of human impacts on marine mammals in Caribbean (and Southeast Pacific). The project succeeded in providing a very general overview of species distribution in the region. The LifeWeb project Mapping Application tool can be utilized to identify general areas of species distribution.⁶⁷²

CARI'MAM. More recently, the establishment of the CARI'MAM project (funded through September 2021) has resulted in a network of researchers and managers collaborating to share and establish sightings data, research protocols and data-sharing platforms, and implement passive acoustic monitoring (PAM) programmes across the Caribbean. The project intends to deploy 20 hydrophones in 19 locations in the Region. Data will be consolidated

and analyzed by the University of Toulon and shared with managers.⁶⁷³ Deployment of PAMs began in November 2020. CARI'MAM currently represents over 22 countries and territories.⁶⁷⁴ The main objective of CARI'MAM is to develop a network of marine protected areas dedicated to the conservation of marine mammals in the WCR through capacity building and development of common tools for management, monitoring and evaluation. Discussions regarding the development of a common platform to collect and share data from the Region are underway, including the utilization of Flukebook, Obsenmer or other data-sharing applications.

First Congress of Centroamerican Cetaceans.

Recent efforts at the occasion of the First Congress of Centroamerican Cetaceans (Panama, 11-13 March 2020) included the convening of the Second meeting of the Network of Central American and Caribbean Marine Mammal Researchers, which aims to establish partnerships and conservation strategies, and strengthen cooperation among researchers and activities of relevance to cetacean conservation in the Caribbean. This initiative is led by Dr. Laura May-Collado [Panacetacea,⁶⁷⁵ Panama] and Dr. Ester Quintana (Guatemala).⁶⁷⁶

MARINE MAMMAL POPULATION STATUS AND DISTRIBUTION OVERVIEW

Consolidating existing data on the status of regional and local populations of marine mammals in the Region remains a challenge. Not only are regional and national assessments lacking, there is no centralized database to access sightings and other data at the population or species level.

West Indian manatee. Population estimates, developed as part of a review conducted to evaluate the status of sirenians for the Red List (IUCN), indicate that manatee populations are decreasing throughout their range, with sizes ranging from approximately ten (The Bahamas) to at least 6,100 (Florida)⁶⁷⁷ individuals, with most being in the 100-500 range. The number of manatees in the WCR, including Brazil and Florida, may be under 10,000 individuals. This figure is based

on data of highly variable quality (or no data at all) and should be considered as only a crude approximation.⁶⁷⁸

Baleen and toothed whales. Cetacean fauna of the region is diverse, where migratory (seasonal) and resident populations occupy coastal and pelagic habitats that span a broad range of temperatures and depths. Because no large-scale or comprehensive systematic surveys of whale and dolphin populations have occurred in the region, it is difficult to provide a holistic assessment of regional cetacean populations. Similarly, rarely assessments have been conducted for single species at the national level. In French Guiana the population of the Guiana dolphin is estimated to be around 1700 individuals.⁶⁷⁹

At least ten cetacean species documented in the WCR are considered 'cosmopolitan' and occur in most major oceans—these include the common minke whale (*Balaenoptera acutorostrata*), sperm whale, pygmy sperm whale (*Kogia breviceps*), dwarf sperm whale (*Kogia sima*), Cuvier's beaked whale (*Ziphius cavirostris*), Blainville's beaked whale (*Mesoplodon densirostris*), as well as orcas, Risso's dolphin (*Grampus griseus*), striped dolphin (*Stenella coeruleoalba*), and common bottlenose dolphins (*Tursiops truncatus*). Six species—



■ Figure 25. Map of the West Indian manatee's current range.

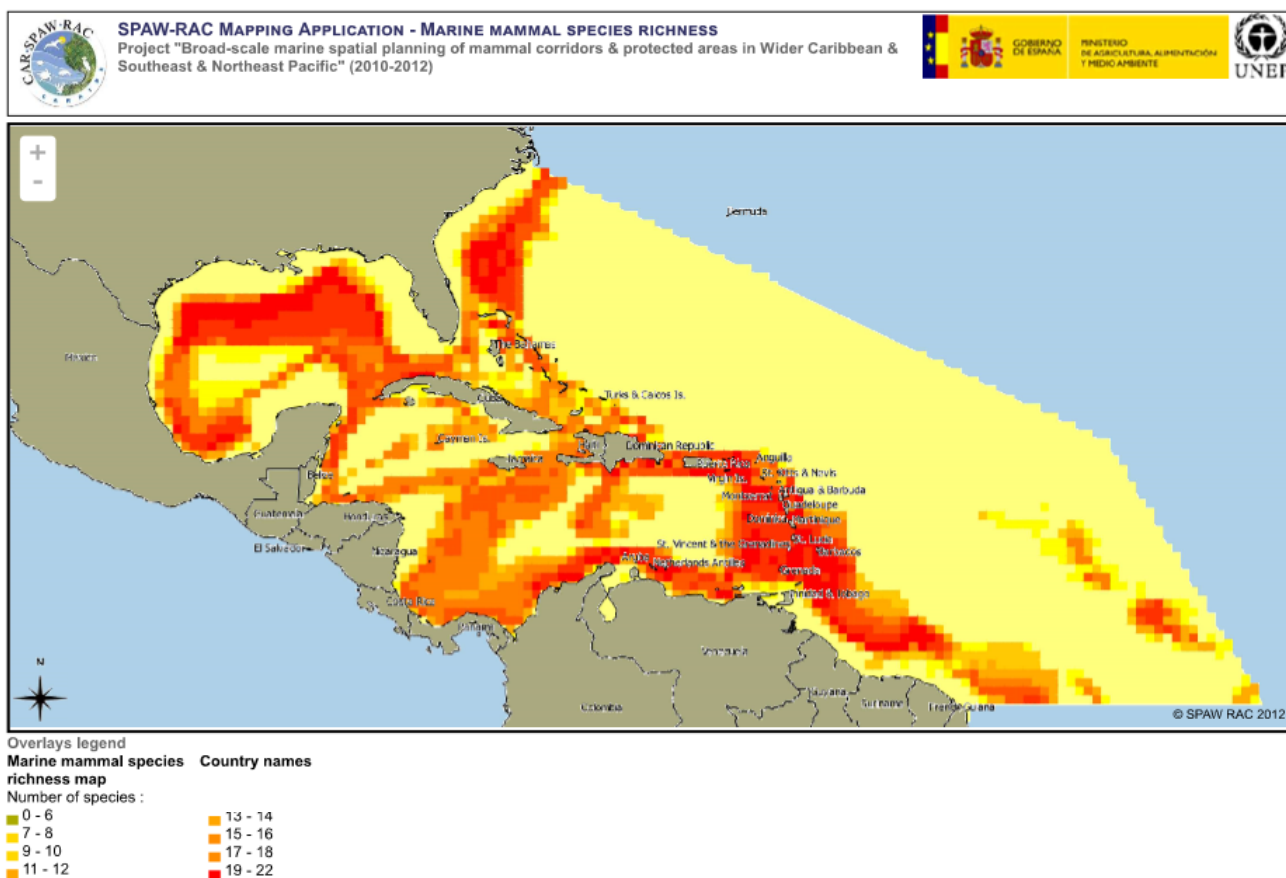


Figure 26: LifeWeb mapping of marine mammal distribution in the WCR. Data current to 2012.

North Atlantic right whale (*Eubalaena glacialis*), True's beaked whale (*Mesoplodon mirus*), Sowerby's beaked whale (*Mesoplodon bidens*) and Gervais' beaked whale (*Mesoplodon europaeus*), and the Atlantic spotted dolphin and Clymene dolphin (*Stenella clymene*)—have a more limited distribution that is confined to the Atlantic Ocean. Of these, three species (North Atlantic right whale, True's beaked whale, and Sowerby's beaked whale) have limited sightings in the region. Eleven cetacean species have distributions that are unique to tropical or warm temperature waters and may be considered warm-water species. These include the Bryde's whale (*Balaenoptera edeni*), short-finned pilot whale, false killer whale, pygmy killer whale, melon-headed whale (*Peponocephala electra*), the rough-toothed dolphin (*Steno bredanensis*), pantropical spotted dolphin (*Stenella attenuata*), spinner dolphin, Fraser's dolphin, tucuxi (*Sotalia fluviatilis*), and Guiana dolphin (*S. guianensis*). The blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera*

physalus), sei whale (*Balaenoptera borealis*), and humpback whale have migratory distributions and travel to and from their feeding grounds in the Arctic to their breeding grounds near the equator; they transit warm and cold-water zones.⁶⁸⁰

The toothed whales feed mostly on squid and fish, with some species occasionally feeding on other marine mammals. Toothed whales are generally smaller than the baleen whales, and although fishermen characterize many toothed whales as 'porpoises', there are no true porpoises (of the family *Phocoenidae*) in Caribbean waters. The vast majority of marine mammals in the WCR are representatives of Odontoceti.

Pinnipeds. With the declared extinction of the Caribbean monk seal in the 1950s, and noting that the natural range of the California sea lion is in the Pacific Ocean and that of the hooded seal does not normally

extend into the WCR, the presence of pinniped species is considered rare and uncommon. Despite these latter two species being documented within the region, the California sea lion was introduced (with escapes from captive facilities) and the normally northern-bound hooded seal perhaps a wayward victim of climate change.⁶⁸¹

Other. The neotropical and Giant river otters (*Lontra longicaudis* and *Pteronura brasiliensis*) are aquatic mammals that are found in the riverine water systems of Mexico, Belize,⁶⁸² and other countries throughout Central and South America, including the island of Trinidad.⁶⁸³ Although they live in riverine habitats, they can also live on the shorelines of marine and estuarine environments where they hunt marine species in highly saline waters. As such, this species should be considered within the realm of marine mammals in the Caribbean region in need of protection and management under the MMAP.

- *Much of the research in the region is conducted by NGOs, often without the participation of government or regulatory authorities, hampering information exchange and integration into management policies at the national level.*
- *Improved data and scientific knowledge is required to serve as a foundation for improved policy, legislation and education programmes to improve marine mammal conservation and protection in the WCR.*

Highlights

- *The LifeWeb mapping application remains the most comprehensive regional assessment of general temporal and spatial scale of marine mammal occurrence and species distribution to date to identify marine mammal critical areas for research focus and/or protection.*
- *Population-level assessments at the regional and local level are severely lacking. The significant lack of species distribution data remains a need to be addressed.*
- *There is a necessity to support and maintain a network of researchers and collaborators, or a permanent mechanism that would serve as the coordinative body for marine mammal research, data collection, and data consolidation.*
- *A variety of online data platforms (e.g., Flukebook, Obsenmer, Observation.org) are currently being utilized in the region, limiting the availability and sharing of data.*
- *Some researchers are working opportunistically to build relationships with platforms of opportunity, such as ecotourism vessels.*

7. MARINE MAMMAL STRANDINGS

Marine mammal strandings occur throughout the WCR. As marine mammals and their ranges intersect with human activities, they are exposed to a variety of threats that impinge upon their health and welfare, and sometimes result in stranding events. Marine mammals suffer from disturbance, injury, or illness relating to exposure to contaminants, noise, pollution, vessel traffic and other stressors.

In response to these events, and the potential value they hold for shaping our knowledge and design of conservation measures, a series of regional workshops were held under the auspices of the SPAW MMAP with a variety of partners.⁶⁸⁴ These workshops included an eastern Caribbean marine mammal stranding response training workshop that was held at the University of the West Indies Veterinary School of Medicine in November 2005 in Trinidad;⁶⁸⁵ a workshop held in the Dutch Caribbean in November 2009 on Curaçao; a workshop for the French-speaking Caribbean held in January 2010 on Guadeloupe;⁶⁸⁶ and a workshop for the Spanish-speaking Caribbean held in April 2010 in Panama.⁶⁸⁷ The purpose of these workshops was to provide stranding response and necropsy training in the Region.

Additionally, the International Whaling Commission (IWC), in collaboration with the UNEP/CEP SPAW Programme, hosted a series of disentanglement training and stranding response workshops in St. Martin (November 2013)⁶⁸⁸ and Guadeloupe and Martinique (2015).⁶⁸⁹ The development of a stranding network was also identified as a priority during the 2013 Mama Coco Sea workshop for countries in the Northern South America.⁶⁹⁰

It is clear that stranding networks are important vehicles to provide data on many levels and across threats, informing issues such as bycatch, vessel strike, noise impact, contaminants assessment, improving basic knowledge on species (e.g. reproduction, diet) and enhancing collaboration among WCR countries. Recommendations from these training workshops identified ideal elements of a stranding response network, including the establishment of a mechanism

for allowing quick reporting of live-stranded, ill, injured, or dead animals (e.g., a hotline); establishment of an emergency response team, with a veterinary component to manage reports of strandings, particularly live animals; and standardization of data collection and reporting procedures for the French, Dutch and Spanish Caribbean. The workshops also recommended the development of a regional strandings database and standing working group to integrate existing data forms and protocols. Other recommendations include the development of a focal point for each island to coordinate with a regional implementing focal agency.

A compilation of protocols and techniques for responding to strandings were elaborated upon in two publications resulting from these workshops, and including links to sample data collection and reporting forms utilized by other stranding programmes (e.g., NOAA Fisheries marine mammal health and stranding response programme data forms).⁶⁹¹ The workshops intended to establish a centralized archive of samples and a database of findings of countries in the region. To the authors' knowledge, this database has not yet been established. Standardized data collection forms have been established and are available, but it is not clear whether those forms have been distributed or made available on the SPAW-RAC website, or centralized for easier regional distribution.

Although not officially authorized by the U.S. National Marine Fisheries Service (NMFS), a Caribbean Stranding Network (CSN) led by Dr. Antonio Mignucci is based in Puerto Rico and operates collaboratively with the Manatee Conservation Center and the Inter-American University of Puerto Rico veterinary programme.⁶⁹² It assists with programmes in the Dominican Republic, Venezuela, Cayman Islands, Cuba, Guatemala, Mexico, Panama, Belize, Turks and Caicos, the British Virgin Islands, Colombia and with support throughout the region.^{693, 694}

However, many countries rely on local individuals who have the capacity to respond, which may include

local veterinarians, species experts (e.g., those individuals who respond to sea turtle strandings), or nonprofit organizations that are focused on the marine environment. For example, in the Bahamas, Belize and Guyana, representatives and other experts from nonprofit organizations who conduct research programmes or advocacy campaigns on behalf of marine mammals coordinate local stranding response efforts, often with little assistance from governments.^{695, 696, 697}

In some countries like the United States and the Dominican Republic, stranding network members may include local or national aquaria. Network members organize periodic stranding conferences and trainings.⁶⁹⁸ In Mexico, strandings are coordinated by a central network under the Mexican Society for Marine Mammalogy (SOMEMMA), recording nearly 1,300 stranding of 34 species of marine mammals.⁶⁹⁹ With increasing technological advancements and teleconferencing tools, virtual assistance and collaboration is also occurring when direct response teams are not available (e.g., veterinarian support is being provided by the Caribbean Stranding Network via Whatsapp).⁷⁰⁰ Similarly, the National Office for Biological Diversity in Venezuela manages a Whatsapp group for strandings response.

The Bahamas Marine Mammal Stranding Network was established by BMMRO in 2008 and conducts training workshops for Bahamians on a regular basis. Over 70 trained participants and a dozen veterinarians from 15 Bahamian islands have been trained as stranding network members.⁷⁰¹ Other informal but active networks exist, including the Dutch Caribbean Cetacean Network (DCCN) that was set up as a stranding response group including members from the Dutch Islands and some members of the 2009 stranding response workshop on Curaçao.

Regional overview. Stranding incidents are sporadic and diverse across the Region. Reports from the BMMRO reveal that between 2008 and 2020, at least 61 marine mammals stranded either alive, or dead in Bahamian waters. Of these, all but two were cetaceans.⁷⁰² Of those stranded, only one Bryde's whale showed direct evidence of entanglement in fishing

gear, while moderate or advanced decomposition prevented the definitive evidence of human interaction with the other carcasses that were retrieved. Of the 12 individuals that stranded alive, six were rescued and refloated or rehabbed and/or released.⁷⁰³ In mid-March 2000, a multi-species stranding of 17 cetaceans (four species included Cuvier's beaked whales, Blainville's beaked whales, Minke whales and a spotted dolphin) was discovered in the Northwest Providence Channels of the Bahamas Islands. Based upon necropsies, it was determined that these strandings occurred as a result of acoustic impulse trauma produced by mid-range frequency active sonars deployed by U.S Navy ships during training exercises.⁷⁰⁴

As a result of efforts from its Stranding Network in Trinidad and Tobago, a study found that eggs and/or adult trematodes (*Nasitrema* sp.) were present in the

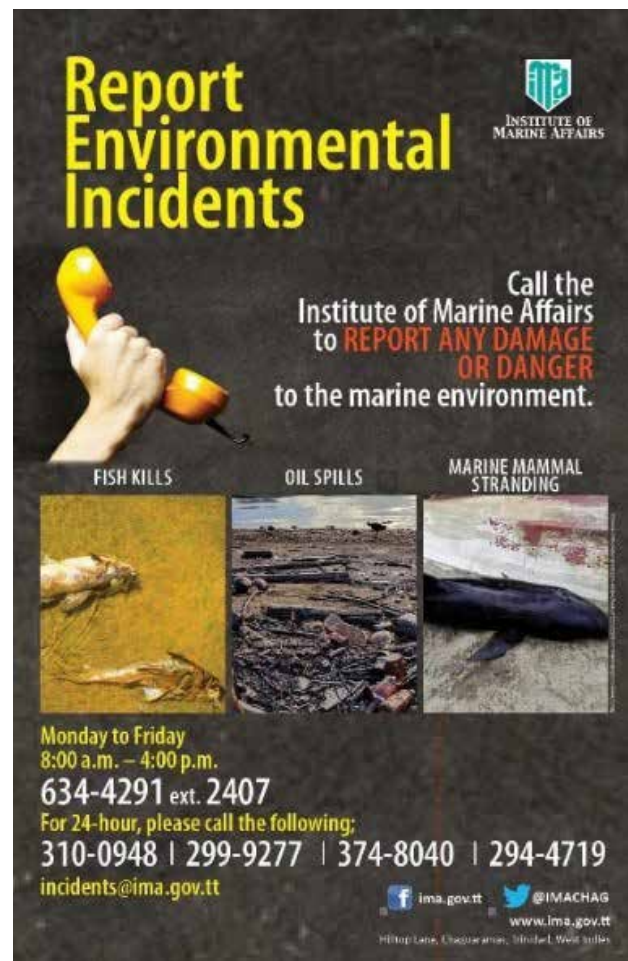


Figure 27. Trinidad and Tobago flyer with strandings hotline. Source: Institute of Marine Affairs, Trinidad and Tobago.⁷⁰⁵

brain of five melon-headed whales (*Peponocephala electra*) reported as single strandings on the beaches of the eastern (Atlantic) coast of the Caribbean island of Trinidad between March 2013 and November 2015. The findings suggest that Nasitrema species-associated encephalitis may be a common cause of melon-headed whale strandings in the southeastern Caribbean.⁷⁰⁶

Other historic mass stranding events in the Caribbean region have coincided with naval operations, including seven separate beaked whale mass strandings between 1991 and 2000 in the regions of the Caribbean in which the U.S. Navy has conducted training, including Puerto Rico, Jamaica, U.S. Virgin Islands, and the Bahamas.⁷⁰⁷ Although no mass strandings events in the Caribbean have been linked to naval sonar activity since the 2000 stranding event in the Bahamas, researchers have concluded that there is a significantly higher stranding rate during periods of naval active sonar activity for the Caribbean region.⁷⁰⁸ The Dutch Caribbean has not seen many strandings in the last five years.⁷⁰⁹

In the Wider Caribbean, there is a need for capacity building in the area of unusual mortality events of marine mammals, specifically on-the-ground response to animal strandings and collection of relevant data; training in sampling methods; and archiving and analysis of samples to support the establishment of baseline understanding for marine mammal populations and general ocean health. Because of the low recovery rate of carcasses (both those that make it to shore, and those that never do),⁷¹⁰ these undetected marine mammal mortality events may further challenge our understanding of ocean health and related impacts for marine mammal populations.

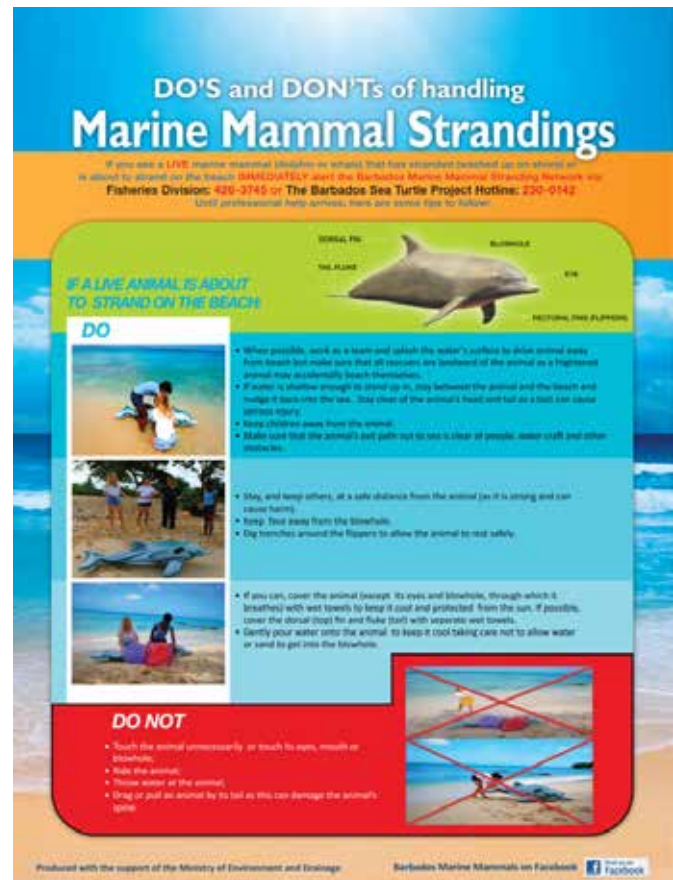


Figure 28. Marine Mammal stranding flyer distributed by Barbados Marine Mammals network. Source: Barbados Marine Mammals.



Figure 29. Dead stranded Cuvier's beaked whale on Bonaire (2017). Photo credit: STINAPA/Caren Eckrich.

Highlights

- *Capacity building and training workshops have been held in the region in the past with multi-stakeholder funding and collaboration.*
- *Some of the key primary objectives of these stranding workshops have not yet been achieved in the region, including a centralized database of data and archived samples; centralized regional coordination and response; and establishment of a regional focal point or implementing agency.*
- *The existing Caribbean Stranding Network (CSN) located on Puerto Rico has the potential to serve as a regional node for stranding coordination, and to promote the increased connectivity to local/national focal points and existing national networks.*
- *A Marine Mammal Stranding Guide (CEP Technical Report 74) was developed by the Eastern Caribbean Cetacean Network (ECCN) in collaboration with SPAW RAC and is a key tool, among stranding guides from other regional seas programmes, for dissemination within the Region.*
- *There is potential to expand upon existing social networks and citizen-based initiatives to disseminate real-time reporting on strandings.*
- *Strandings serve as an underutilized source of data regarding marine mammal health and distribution.*

8. MARINE MAMMALS IN CAPTIVITY

Several species of marine mammals are maintained in captivity in the WCR (in both tanks and sea-pens) for the purpose of display to the public who pay to view them. Opportunities for direct physical contact with whales, dolphins, sea lions, and even manatees, including touching, feeding and swimming with wild and captive animals, are increasing in range and intensity in the WCR. There are 54 facilities in the insular Caribbean (not including U.S. facilities), holding at least 565 individual cetaceans.⁷¹¹ (See Figure 30.)

The bottlenose dolphin (*Tursiops truncatus*) is the most commonly-held species of cetacean in captivity in facilities in the WCR, although the Guiana dolphin, (*Sotalia guianensis*) has also been involved in shows performing alongside common bottlenose dolphins (*Tursiops truncatus*) in Colombian facilities at the 'Oceanario Islas de Rosario' near Cartagena, at the 'Acuario del Rodadero' near Santa Marta⁷¹² and are still held in at least one facility.⁷¹³

The Bahamas, British Virgin Islands (Tortola), U.S. Virgin Islands, Cayman Islands, Colombia, Cuba,⁷¹⁴ Curaçao, Dominican Republic,⁷¹⁵ France, Honduras, Jamaica, Mexico, St. Kitts and Nevis, Venezuela and U.S. offer different experiences with dolphins displays and dolphin interactive programmes. Dolphin Discovery, a major enterprise in the WCR and increasingly in the U.S., maintains 23 facilities in the region holding dolphins, although the Tortola and Anguilla facilities have been closed either permanently or for 'refurbishment works'⁷¹⁶ due to the impacts of hurricane Irma (2017).⁷¹⁷

Proposals for facilities in Panama⁷¹⁸ by Ocean Embassy and St. Lucia⁷¹⁹ by Dolphin Discovery respectively have been put forward but have not materialized. Some of these proposals involved the live-capture of dolphins in local waters, including proposals in Panama and Antigua that were ultimately rejected, often after years of opposition.⁷²⁰ Most cetacean capture methods are invasive, stressful, and can potentially be lethal. They can also fracture populations that are traumatized after the chase and

handling of operators, and who may selectively take individuals from the population.⁷²¹

In Haiti, eight dolphins were captured in 2004 and eventually released after public pressure forced authorities to respond after two had died during the process. At least 10 bottlenose dolphins were captured in Guyana in 2004 (up to 50 were authorized over the course of several years), and 15 dolphins were captured in 2005 near Roatan Island, Honduras.⁷²² In Venezuela in May 2004, illegal captures of bottlenose dolphins in the Gulf of Paria by Waterland for its facility resulted in the death of one dolphin and the capture of at least a dozen others. The Venezuelan Navy confiscated 10 dolphins that fishermen held in sea pens in the Gulf. Waterland was brought to court for "hunting and ecosystem destruction in special areas and natural ecosystems," but was ultimately dismissed.⁷²³ In the Dominican Republic in August 2002, eight bottlenose dolphins were illegally captured from coastal waters of Bayahibe and Parque Nacional del Este for local dolphinarium, Manati Park.⁷²⁴ Action from the government prevented further captures from occurring.

As reported in 2007, Cuba maintains a direct live capture fishery for bottlenose dolphins via annual quotas which are assigned to dolphinariums of various countries under the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES).⁷²⁵ Recent exports from Cuba include six dolphins sent in 2007 to the Dolphin Academy on Curaçao, and nine animals sent to Venezuela in 2011 and 2013.⁷²⁶ The numbers of dolphins captured for domestic use is unknown, and there have been no studies to determine whether these removals are sustainable. Parties to CITES can export specimens if the exporting party issues a non-detriment finding (NDF), stating that removals will not harm wild populations. Bottlenose dolphins are listed on CITES Appendix II and as such require an NDF for their export.⁷²⁷

Not all countries appear to possess regulations on the acquisition, care and maintenance of marine mammals in captivity, and there is not an established tracking

mechanism to follow the status of live captures and trade of animals once they are captured. The live capture and holding of marine mammals in captivity, whether for display, touching, feeding or swimming,

in facilities with tanks or sea-pans, continues to attract proposals and investments for new facilities and to be a threat of concern in light of the lack of sufficient data on the status of dolphin populations throughout the region.

WCR COUNTRIES AND FACILITIES

COUNTRY	#	PARK NAME	BOTTLENOSE	GUIANA (SOTALIA)
Anguilla	1	Dolphin Discovery Anguilla-St. Maarten	-	-
Bahamas	4	Atlantis Paradise Island	42	-
		Balmoral Island Resort (Blackbeard's Cay)	8	-
		Dolphin Encounters	27	-
		Dolphin Experience	11	-
Belize	0	-	-	-
BVI	1	Dolphin Discovery Tortola	-	-
Cayman Islands	2	Dolphin Cove Grand Cayman	8	-
		Dolphin Discovery Grand Cayman	14	-
Colombia	2	Acuario Rodadero	2	3
		Oceanario Islas del Rosario	8	-
Cuba	11	Acuario Nacional	6	-
		Acuario Cayo Naranjo (Holguin)	11	-
		Acuario Baconao	2	-
		Delfinario Varadero	14	-
		Delfinario de Cayo Coco	2	-
		Delfinario Cayo Guillermo	6	-
		Delfinario Cayo Largo	20	-
		Delfinario Cienfuegos	4	-
		Delfinario Varadero	10	-
		Rancho Cangrejo Dolphinarium	9	-
		Cayo Blanco Dolphinarium	2	-
Curaçao	1	Dolphin Academy & Therapy Center	19	-
Dominica	0	-	-	-
Dominican Republic	5	Dolphin Discovery Punta Cana	14	-
		Dolphin Explorer	30	-
		Dolphin Island Park	20	-
		Manati Park	2	-
		Ocean World Puerto Plata	18	-
Grenada	0	-	-	-
Honduras	1	Roatan Institute of Marine Sciences	17	-

Jamaica	5	Dolphin Cove Montego Bay	4	-
		Dolphin Cove Ocho Rios	5	-
		Moon Palace Jamaica	4	-
		Dolphin Cove Puerto Seco Beach	4	-
		Yaaman Adventure	4	-
Martinique	0	-	-	-
Mexico- Quintana Roo	18	Delphinus Acuario Interactivos	6	-
		Delphinus Puerto Morelos	9	-
		Delphinus Punta Cancun	4	-
		Delphinus Riviera Maya	20	-
		Delphinus Xcaret	20	-
		Delphinus Xel-Há	25	-
		Dolphin Discovery Cancun-Isla Mujeres	25	-
		Dolphin Discovery Costa Maya	4	-
		Dolphin Discovery Cozumel	10	-
		Dolphin Discovery Dreams	5	-
		Dolphin Discovery Riviera Maya	20	-
		Dolphin Discovery Tulum-Akumal	4	-
		Dolphin Discovery Playa Del Carmen	3	-
		Dolphinaris Barcelo	5	-
		Dolphinaris Cancun	10	-
		Dolphinaris Cozumel	10	-
		Dolphinaris Riviera Maya Park	10	-
		Dolphinaris Tulum	5	-
Panama	0	-	-	-
Puerto Rico	0	-	-	-
St Kitts and Nevis	1	Dolphin Discovery St. Kitts-Nevis	5	-
St Vincent	0	-	-	-
St. Lucia	0	-	-	-
Turks and Caicos	0	-	-	-
USVI	1	Coral World	4	-
Venezuela	1	Waterland Mundo Marino	11	-
TOTAL	54		562	3

565 TOTAL ANIMALS FROM TWO SPECIES

UNITED STATES FACILITIES

PARK NAME	BOTTLENOSE	BELUGAS	ORCA	COMMONS	ROUGH-TOOTH	WHITE-SIDED, P.	PILOT WHALE
Aquatica Orlando	-	-	-	4	-	-	-
Brookfield Zoo	7	-	-	-	-	-	-
Clearwater Marine Aquarium	5	-	-	-	2	-	-
Discovery Cove	46	-	-	-	-	-	-
Dolphin Connection	6	-	-	-	-	-	-
Dolphin Quest Hawaii	14	-	-	-	-	-	-
Dolphin Quest Oahu	6	-	-	-	-	-	-
Dolphin Research Center	25	-	-	-	-	-	-
Dolphins Plus Bayside	6	-	-	-	-	-	-
Dolphins Plus MMR	8	-	-	-	-	-	-
EPCOT The Seas	3	-	-	-	-	-	-
Georgia Aquarium	12	6	-	-	-	-	-
Gulf World Marine Park	15	-	-	-	5	-	-
Gulfarium Marine Adventure	7	-	-	-	-	-	-
IMMS	8	-	-	-	-	-	-
Indianapolis Zoo	13	-	-	-	-	-	-
Island Dolphin Care	8	-	-	-	-	-	-
Long Marine Lab	2	-	-	-	-	-	-
Marineland Dolphin Adventure	14	-	-	-	-	-	-
Miami Seaquarium	23	-	-	-	-	-	-
Mirage Dolphin Habitat	10	-	1	-	-	-	-
Mississippi Aquarium	5	-	-	-	-	-	-
Mystic Marineland Aquarium	-	3	-	-	-	-	-
National Aquarium in Baltimore	6	-	-	-	-	-	-
Navy Marine Mammal Program	80	-	-	-	-	-	-
Sea Life Park	18	-	-	-	-	-	-
SeaWorld Orlando	38	2	5	-	-	-	-
SeaWorld San Antonio	21	10	5	-	-	5	-
SeaWorld San Diego	32	3	10	-	-	-	4
Shedd Aquarium	-	9	-	-	-	5	-
Six Flags Discovery Kingdom	14	-	-	-	-	-	-
Texas State Aquarium	4	-	-	-	-	-	-
Theater of the Sea	7	-	-	-	-	-	-
TOTAL: 33	463	33	21	4	7	17	4

549 TOTAL ANIMALS FROM 7 SPECIES

■ Figure 30. Inventory of captive *cetacean spp.* in the WCR. Data compiled by Cetabase. Data current as of November 2020.

In recent years, the ethics of capturing and maintaining marine mammals in captivity have increasingly come into question. Scientific evidence indicates that cetaceans in captivity suffer mental and physical stress, which is revealed in aggression between themselves and toward humans, and a lower survival rate and higher infant mortality than in the wild.^{128, 129, 130} Methods used to transport cetaceans can also cause injury and stress.⁷³¹ In the absence of viable captive breeding programmes, cetaceans continue to be taken from wild populations.

In the WCR, the degree to which dolphins are still captured locally and traded internationally is uncertain, but numbers held in captive facilities in the region are increasing. Few if any data are available on local, often small, populations in the Caribbean that are targeted for capture.⁷³² Finally, the assessment of source populations is generally lacking, and live capture often adds to the pressure on stocks already at risk from hunting, bycatch in fisheries, habitat degradation and other factors.⁷³³

Highlights

- *There are very limited data on dolphin population assessments in the WCR and hence the impact of live captures and their potential harm to local populations remains a threat to wild dolphin populations.*
- *A significant number of marine mammals exist in captive facilities within the Region. Individual cetaceans have been tracked for the purposes of this report, and not including pinnipeds, to provide a general overview of the magnitude and scope of this issue and illuminating the potential welfare and conservation concerns associated with this activity.*
- *Proposals for the establishment of new facilities and operations involving dolphins in captivity continue to throughout the Region. This trend, however, might see a decline in a post-Covid19 economy and as facilities struggle to stay open and profitable during the pandemic.*
- *The development, adoption, and monitoring of the application of regulations and/or guidelines governing the acquisition, care and maintenance of marine mammals in captivity, irrespective of*

the type of facility, is a challenge in the region and requires attention.

- *To date only one SPAW party (Kingdom of the Netherlands) has presented an exemption to the Protocol with the STAC for captures, exports or imports of marine mammals for education or research purposes.*

9. ACOUSTIC DISTURBANCE AND UNDERWATER NOISE

There is ongoing and increasing concern regarding the potential effects on marine mammals of underwater noise produced during geophysical seismic surveys, military (naval) training exercises, and vessel traffic. Cetaceans (whales and dolphins), pinnipeds (seals and sea lions) and sirenians (manatees) all rely on sound for fundamental biological and ecological aspects of their lives (e.g. communication, finding prey, navigation, avoiding predators). Mass cetacean stranding events have been associated with military operations across the globe.⁷³⁴ Vessel noise is also a known source of disturbance for cetaceans, including from whale watching vessels.⁷³⁵

During the MaMa CoCo SEA (Marine Mammal Conservation Corridors in Northern South America) meeting in Paramaribo (2013⁷³⁶), it was recognised that regional guidelines are urgently needed in order to minimise acoustic disturbance to marine mammals from seismic survey operations within the region from North Brazil (west of the Amazon Estuary) to Colombia involving eight countries (Brazil, France (French Guiana), Suriname, Guyana, Venezuela, Colombia, Aruba, Curaçao, Trinidad and Tobago). There are no regional guidelines for the MaMa CoCo SEA region, nevertheless seismic operations take place, and are increasing as oil and gas production continues to expand in the WCR.

During the SOLAMAC (Society of Latin American Specialist in Aquatic Mammals) conference held in Colombia in 2014, a pre-meeting workshop was held on the impacts of seismic surveys on marine ecosystems. The Brazilian guidelines⁷³⁷ were considered the most advanced seismic guidelines currently available in the region, which are adapted to local circumstances, species, and ecosystems.

A 2015 review of seismic mitigation measures indicates that,⁷³⁸ apart from Brazil and Colombia where local mitigation measures are currently adopted and France where national guidelines for underwater noise were adopted in 2020,⁷³⁹ the remaining countries in the MaMa CoCo SEA region do not have mitigation guidelines in place. Nevertheless, some countries and

oil companies have voluntarily adopted mitigation measures during past surveys, such as Soft Starts (SS) i.e., the gradual increase in the seismic source as stipulated from low power to the required working power (Full Volume) and the use of experienced and/or certified marine mammal observers. However, information regarding the number of seismic surveys actually conducted within the MaMa CoCo SEA region, their noise exposure, and set of mitigation measures is largely unavailable.

Seismic surveys continue to occur around the Caribbean isles with increasing oil and gas exploration, with a recent example being the survey conducted by the Texas University in November 2014 in the coastal waters around Bonaire.⁷⁴⁰

The U.S. Navy's Atlantic Undersea Test and Evaluation Center (AUTC) assists in establishing and maintaining naval ability of the United States in the Region through testing, evaluation, and underwater research. AUTC is located on Andros Island within the Bahamas.⁷⁴¹ The site is used for naval exercises involving the use of mid-frequency active sonar which have been associated with beaked whale mass stranding events in the Bahamas and elsewhere.^{742, 743, 744}

In Panama, the intense bottlenose dolphin watching activities in Boca del Toro, where a resident population is the main target, reveal that despite guidelines, engine and propeller noise are the principal causes of disturbances.⁷⁴⁵ A recent study⁷⁴⁶ revealed that in the presence of tour boats, dolphins were less likely to stay socializing and were more likely to begin traveling, and less likely to begin foraging while traveling. Additionally, activity budgets for foraging decreased and traveling increased as an effect of tour boat presence.

Highlights

- *Marine mammals, and especially cetaceans, are sensitive to sound. Stranding events and behavioral responses by cetaceans to anthropogenic sources of underwater noise, including seismic surveys and vessel traffic, have been documented in the scientific literature and in the Region.*
- *To better understand the threat of noise within the WCR marine environment, monitoring is required to collect baseline data that can be assessed over time to reveal the persistence or intensity of acoustic disturbance or underwater noise associated with sonars, maritime/coastal traffic, and activities that affect vital marine mammal behaviors.*
- *There is a need for the development of regional guidelines for mitigation measures of seismic activity.*
- *The collection of qualitative and quantitative data by Marine Mammal Observers during seismic survey operations could provide useful information for seasonal distribution, occurrence, and identification of migratory routes/habitat use, as well as for behavioral responses and other impacts of seismic surveys.*

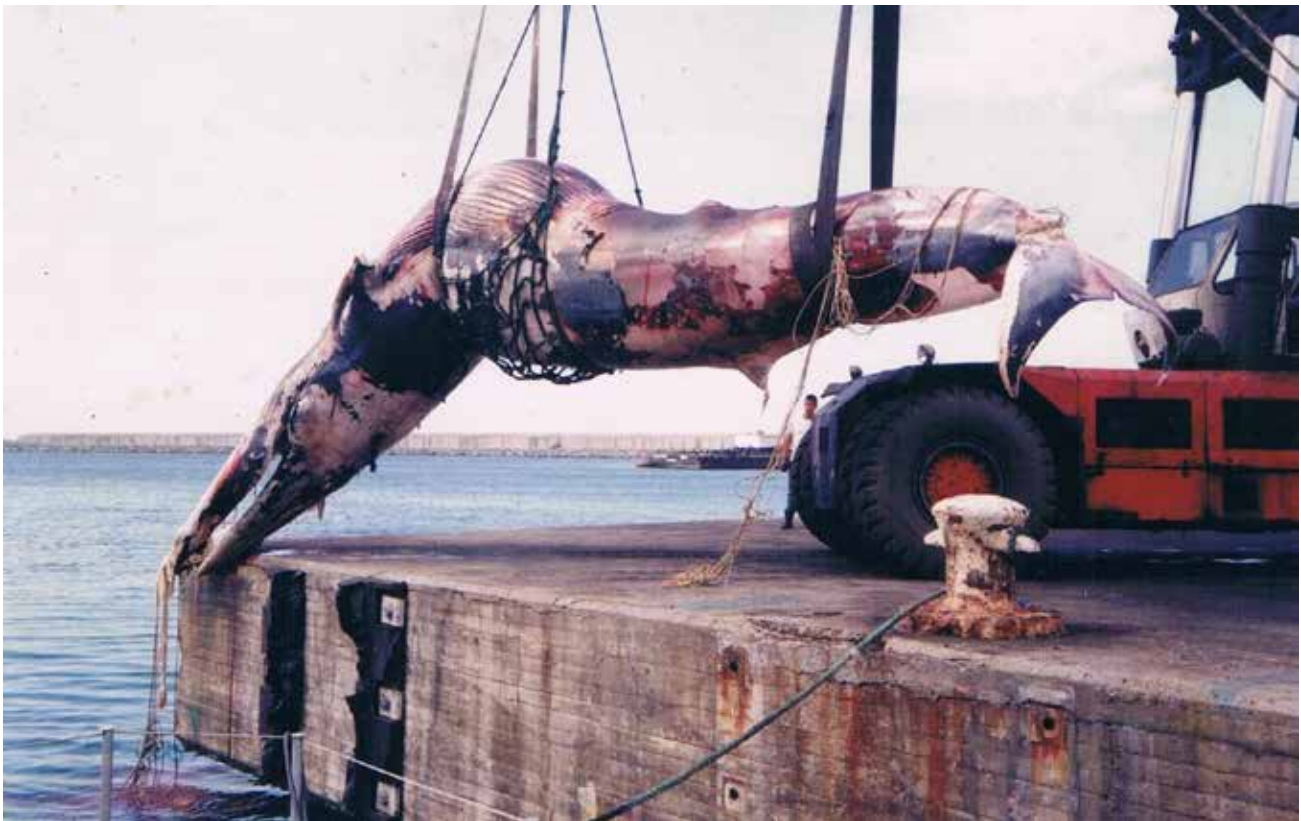


Figure 31. A *Balaenoptera* sp. caught on the propeller of a cargo ship at sea and brought to port of La Guardia, Venezuela. Image courtesy of Jaime Bolanos and Salvador Boher/archives of PROFAUNA-MARN

10. VESSEL STRIKES

Shipping in the Wider Caribbean is one of the main identifiable anthropogenic impact drivers within the Region, with high concentrations of shipping lanes throughout the Caribbean Islands (see *Figure 32 below*). The shipping intensity map mainly consists of lanes utilized by industrial cargo liners and ferries with fixed cycles of repetition in a fixed lane, mainly between interisland shipping lanes. Commercial cruise vessel data is less available but is considered significant. Vessel traffic not only contributes to direct injury to marine mammals,⁷⁴⁷ but also serves as a significant source of underwater noise in the Region.⁷⁴⁸

A joint IWC and SPAW/UNEP Workshop to address collisions between marine mammals and with a focus on the Wider Caribbean, was held in Gamboa (Panama, 18–20 June 2014). The resulting report⁷⁴⁹ reviewed current, relevant ship strike mitigation measures with experts from around the world, identified data gaps and information needs in the region, and discussed management initiatives which are most likely to be effective in the region.

The workshop reported that there are few (around 10) reports from the Wider Caribbean area listed in the IWC Ship Strikes Database from 1961–present.⁷⁵⁰ This may be a reflection of underreporting, rather than absence of occurrence. From 1991 to 2010 four ship strikes were recorded for the Caribbean region, including Omura's whale (*Balaenoptera omurai*) (1 Nov 2000, 100 km SW Bonaire Island), Sperm whale (18 January 2001, 20 nm off Puerto Rico), Bryde's whale (11 January 2000, SW of Bonaire) and Pygmy Sperm Whale (30 October 1991, St. Croix Island, Virgin Islands). Some additional reports exist from Guadeloupe (five strikes) and potentially two further reports from the Dominican Republic. In April 2014, there was a 'near miss' documented by a survey vessel where a near collision of a humpback whale with a high-speed fishing vessel. The Workshop noted that small cetaceans are probably involved in collisions with smaller fishing boats, too, as many of the photographs of small cetaceans taken for photo-identification purposes within the region have propeller scars. Some reports might also include strikes that have occurred after a whale is already dead, and may be struck while

floating.⁷⁵¹ It is likely that the occurrence of ship strikes in the Caribbean region is highly underreported.⁷⁵²

The French AGOA Sanctuary is currently employing a tool that allows ships to avoid collisions with large marine mammals. REPCET®⁷⁵³ is the first on-board computer system able to monitor whale positions during daylight due to collaboration with shipping companies, environmental actors and engineers. Its aim is to limit the risk of daytime ship strikes and reduce mortality of large cetaceans.

In Aruba, the prevalence of external injuries and tooth rake marks were examined in Atlantic spotted dolphin (*Stenella frontalis*) (n=179), bottlenose dolphin (*Tursiops truncatus*) (n=76) and false killer whale (*Pseudorca crassidens*) (n=71) in Aruban waters using photo identification techniques. Eleven injury categories were

defined and linked to either human-related activities or natural causes. All injury categories were observed. In total, 18.7% of all individuals had at least one injury. Almost half (41.7%) of the injuries could be attributed to human interactions, of which fishing gear was the most common cause (53.3%) followed by propeller hits (13.3%).⁷⁵⁴ In fact, Luksenburg (2014) found high incidences of external injury in small coastal cetaceans in Aruban waters.

In Venezuela, the probable cause of death for 19 of the 624 documented strandings that were analyzed was identified as resulting from collisions with vessels.⁷⁵⁵

Anecdotal reports from the Bahamas indicates that an increasing number of manatees are being seen with propeller scars. Most of the scars are reportedly minor, but one has been reported as near fatal.⁷⁵⁶

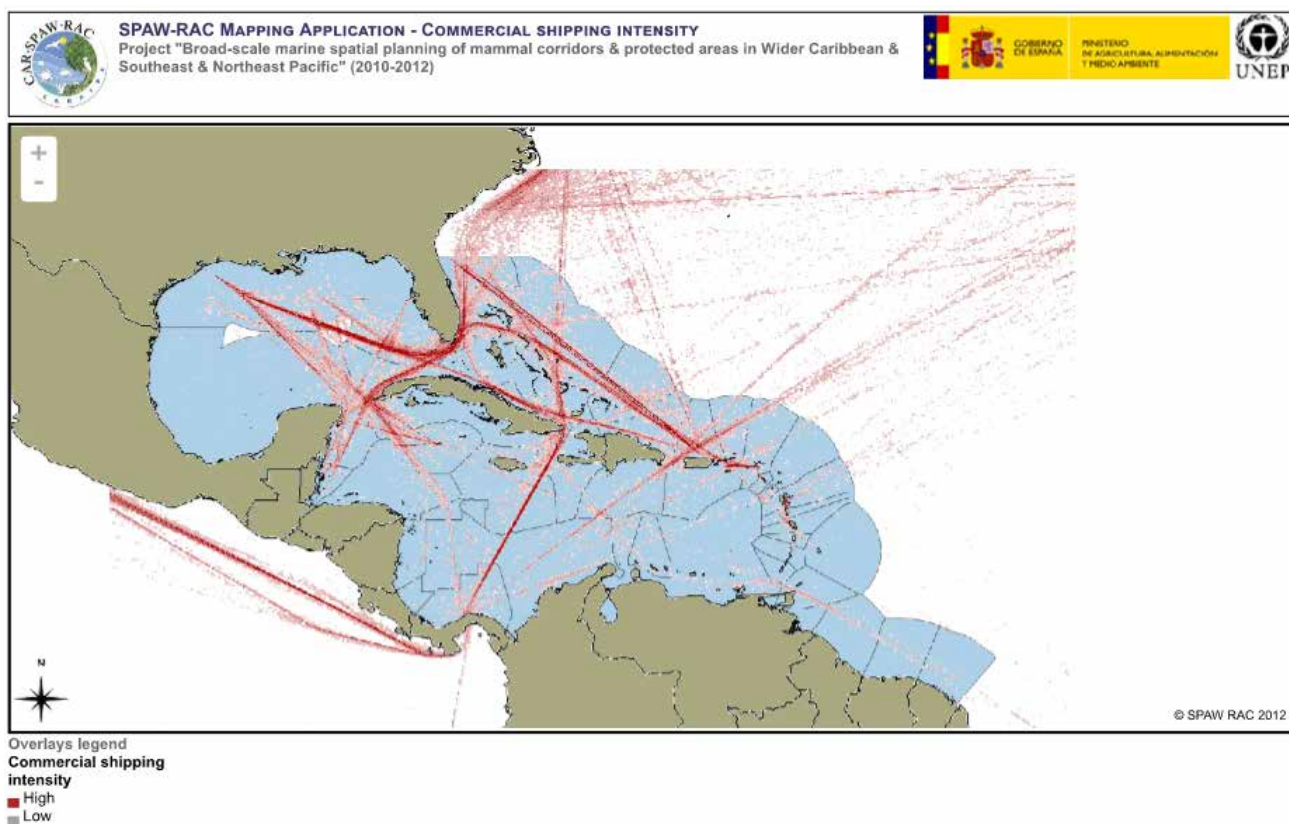


Figure 32. LifeWeb application mapping of commercial shipping intensity in the WCR. Data current to 2012.

In the southeastern United States, collision with vessels is the primary threat to manatee populations. In 2018, manatee mortality rates were the highest in the past five years, with the average number of deaths ranging between 371 to 538 deaths annually.⁷⁵⁷ Reports from Belize also indicate that vessel strikes are the primary threat to manatee populations.⁷⁵⁸ Similarly, critically endangered North Atlantic right whale populations are threatened further by entanglements in fishing gear and vessel strikes, prompting a variety of speed restrictions and mitigation measures.⁷⁵⁹

The SPAW IWC vessel strike workshop noted that the value of the LifeWeb GIS data is limited—the GIS data can show where human threats occur, but cannot identify areas of highest risk. The workshop concluded that managers need better abundance and distribution data at local and national levels.

With regard to ship strikes, information on cetacean distribution, strike numbers and risk assessments are needed. Although there is substantial shipping traffic through the region, without cetacean distribution and strike data, it is difficult to determine whether ship strikes are truly a regional problem beyond localized and species-specific data (e.g., manatee).

to highlight potential overlap of shipping and cetacean occurrence; pathological examination of animals stranded or found drifting at sea; and photo-identification of animals to document scars from ship strikes (propeller strikes).

- *Some countries are deploying technological tools to attempt to mitigate collisions between whales and vessels, including REPCET in the French West Indies.*

Highlights

- *National and local level distribution and abundance data is required to better understand threats from vessel strikes, and to utilize existing high-level GIS (LifeWeb) mapping data. There is a paucity of such assessments for the majority of marine mammals in the WCR.*
- *There is a lack of central standardized and simple reporting format for inclusion of vessel strike data in the IWC database and other relevant instruments for the Caribbean Region.*
- *A variety of mariner platforms exist within the Caribbean that can serve as data collection points for vessel strike data, including sailors, regattas, recreational, cruise, and whale watch operators.*
- *Data requirements and sources include the characterization of shipping activities in the area*

11. CLIMATE CHANGE

The threat and consequences posed by climate change for small island developing states and the Caribbean are forecasted to be significant.⁷⁶⁰ Many of the consequences of global climate chaos are being felt within the Region now in the form of intensified weather events. Beyond sea level rise and the impacts to coastal infrastructures and livelihoods, the consequences for marine biodiversity are predicted to be far-reaching. The principal effects will likely include further losses to the coral reef systems; erosion of coasts and beaches; increases in various disease vectors; changes in ocean currents; fish recruitment and migration; and a stronger foothold for marine invasive species.

More generally, the key changes in climate expected for the Caribbean include increases in air and sea surface temperatures, an increase in sea level and ocean acidification, an increase in the frequency and intensity of storms and hurricanes, general acidification and greater overall unpredictability in weather.⁷⁶¹

The potential impacts on cetaceans have not been comprehensively detailed or understood. The IWC has led discussions through the convening of four workshops on climate change (1996, 2010, 2011 and 2014).⁷⁶² The small cetacean populations living in restricted habitats such as estuaries, rivers and shallow waters were identified as likely to find it harder to adapt to changing circumstances. Research continues to better evaluate how cetacean populations are likely to respond to climate change. In 2014, the IWC Scientific Committee established a Climate Change Steering Group which is leading on this work.⁷⁶³

Not surprisingly, the most definitive predictions and case studies on the climate change impacts on cetaceans are available for Arctic and Antarctic settings for which the consequences of climate change also appear to be most certain.⁷⁶⁴ For tropical settings, predictions are much more difficult.

In tropical areas, marine mammals will likely have to deal with increased thermal stress, more frequent

cases of toxic algal blooms, and reduced freshwater flows which will tend to concentrate environmental contaminants from land in coastal and estuarine areas.⁷⁶⁵ Marine mammals already carry high levels of environmental toxicants in their blubber and this may also interact in adverse ways with thermal stress. In addition to this list of predicted challenges, in the Caribbean cetacean prey sources supplies are to a large extent result of wind-induced upwelling.⁷⁶⁶ Any changes to wind patterns or intensity will likely impact food availability and hence impinge upon cetacean population dynamics. Predictions of declines in Caribbean fishery potential of between 15 to 50% are forecasted in the longer term, but such analyses do not discuss potential implications for marine mammals.⁷⁶⁷

The IWC⁷⁶⁸ addressed possible responses from species, related to three working hypothesis on how cetaceans would be impacted by climate, as follows:

Hypotheses related to temperature

- T1: Small cetacean species will redistribute to avoid thermal stress where possible.
- T2: Modification of ecosystem structure and productivity will lead to changes in cetacean distribution to meet trophic demands.
- T3: Species in restricted habitat with little or no capacity to redistribute will be exposed to thermal, nutritional and health related stress.

Hypotheses related to hydrology

- FW1: Changes in hydrological regime will entail changes in habitat use for obligate freshwater and estuarine species and populations.

Hypotheses related to sea level rise and geomorphologic alterations

- SL1: Changes in salinity and sedimentation rates will entail habitat alterations for riverine and estuarine species.
- SL2: Sea level rise will physically reduce habitat for obligate freshwater species.
- SL3: Loss of supporting habitat for coastal/ estuarine species, including small cetaceans

and their prey (sheltering areas, nurseries for prey species, etc.).

The health and productivity of, for example, coral reef ecosystems, and the patterns of fertility, migration and survival of living marine resources in general, are highly correlated with sea surface temperatures, fresh water and nutrient or contaminant influxes from river basins, and the occurrence of intense weather such as tropical storms. Changes in climate and other important environmental changes pose a major threat to food

security throughout the Caribbean: such changes not only directly threaten the production of food from land and sea for local consumption, but also threaten the revenue generation (e.g. through the impacts of coral reef degradation on both fisheries and tourism) needed to import food products that cannot be produced by the region itself.

Major impacts of climate change (oceanographic or ecological) are also expected to inflict shifts in human behavior, which will in turn impact marine mammals⁷⁶⁹

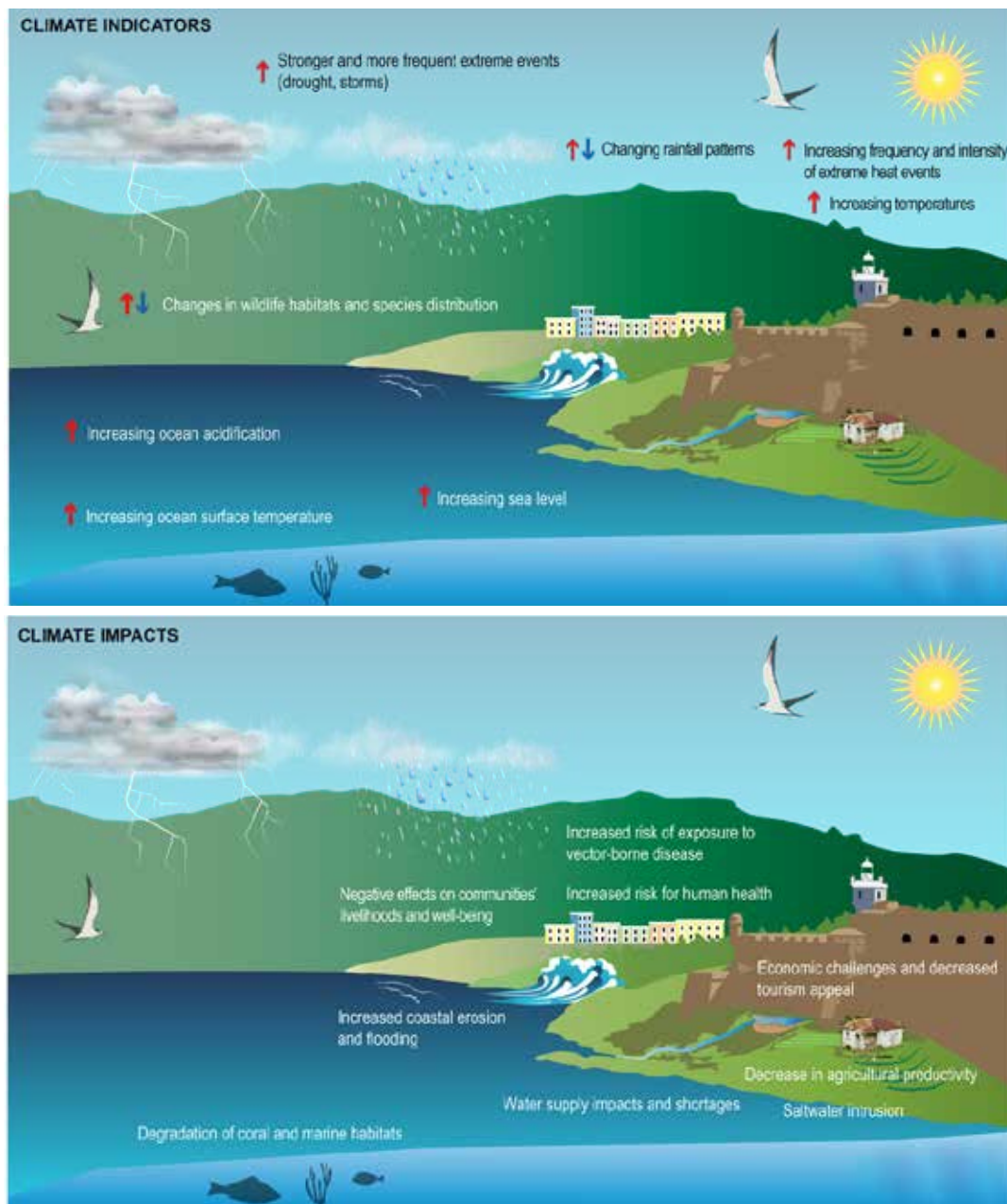


Figure 33. Impacts of climate change on the marine and coastal environment. Image source: 4th National Climate Assessment.⁷⁷⁰

and their habitats. The species that may be affected include coastal tropical cetaceans (and the manatee) in regions where coral reef tourism may decline or be displaced due to the conditions of reef health. Those species occurring in the EEZs of countries faced with drought and decreasing precipitation may also be affected, where resulting declines in food security may result in greater reliance on marine ecosystems and prey depletion for marine mammals. The importance of maintaining long-term studies and giving consideration to defining and identifying 'restricted habitat' is paramount to further predicting and addressing impacts from shifts in climate.⁷⁷¹

Considering the vulnerability of Caribbean countries to extreme events, there appears to be been general progress by most SPAW Parties in engaging with international climate change agreements/instruments and devising various national level responses to increase resilience and develop policies, strategies and mitigation measures to climate change, particularly to critical habitats such as coral reefs and mangroves.

Furthermore, the protection of whales and other marine mammals can translate into policies to protect the marine environment and mitigate climate change. Whales are ecosystem engineers, helping to recycle nutrients in marine ecosystems, sequester carbon, and support climate resilience.⁷⁷² The climate change agenda in the Caribbean has not yet successfully incorporated marine mammals as a core threatened marine resource group to be impacted and meriting attention.

Highlights

- *The health and productivity of Caribbean ecosystems, such as coral reefs and mangroves are highly correlated with sea surface temperature.*
- *Sea level rise impacts will primarily be experienced by coastal and estuarine populations and riverine populations in the lower parts of rivers.*
- *Possible responses to climate changes from marine mammals will cause shrinkage of distribution and preferred habitat utilization leading to increased*

density. Loss of supporting habitat for coastal/ estuarine species will impact prey availability, as well as a potential higher demand for marine resources in drought-prone counties.

- *Climate change is expected to exacerbate existing threats to marine mammals such as habitat loss, disease, pollution and human interactions.*
- *Long-term marine mammal data sets (e.g. occurrence, population density) are needed to support and contribute to on-going research by international organisations and others on modelling and predictions for scenario development, mitigation, and adaptation measures in the WCR.*
- *While many countries in the Region are working to reduce their carbon footprints and have committed to lower greenhouse gas emission targets, specific considerations for marine mammal protection are generally absent from planning strategies.*

THE WORK OF THE SPAW PROGRAMME TO IMPLEMENT THE MMAP

Previous sections discussed what countries and SPAW Parties are doing to implement marine mammal protection measures.

At the regional level under the Secretariat of the Caribbean Environment Programme, the subprogramme for the SPAW Protocol—in coordination with the technical support provided by the SPAW-RAC—is tasked with implementing the goals and objectives of the MMAP. To that end, the biennial SPAW Work Programme has incorporated a diverse array of initiatives that have been guided by the MMAP since its adoption in 2008, as well as those that reflect particular interest or requests from specific Parties.

Reports on the status of implementation of the MMAP have also been presented to Contracting Parties at meetings of the STAC and COP,⁷⁷³ along with activity and operational reports from the SPAW-RAC, which is also supported by expert working groups (e.g., marine mammals, species, exemptions) established by Parties and observers. Funding for these initiatives has been secured periodically through the contributions from Parties and long-standing partners of CEP, including other countries outside the Region, International

Governmental Organizations (IGOs), and non-governmental organizations (NGOs).

The biennial workplan of the SPAW subprogramme presented and approved by the governing bodies of the SPAW Protocol, at meetings of the STAC and COP, have contained activities and projects in support of implementation of the MMAP, reflecting priorities accorded by member countries, and their decisions and recommendations.

Regional programmes and initiatives are summarized in the table that follows the section below.

Legal and Institutional Framework

The SPAW Protocol entered into force on 18 June 2000 and since the adoption of the MMAP in 2008, Guyana (2010), Grenada (2012) and Honduras (2018) have become new Parties to the SPAW Protocol. The Secretariat continues to encourage ratification/ accession to the SPAW Protocol and has prepared cabinet briefs in English, French, and Spanish as means to highlight its importance and facilitate the process at the national level.

Institutional collaboration for enhanced coordination and joint programming in areas of common interest



■ Figure 34. West Indian manatees in Florida waters. Image courtesy of USFWS.

has been accomplished through Memorandum of Understanding (MOU) or Memorandum of Cooperation (MOC) with multilateral agreements and organisations, such as the Convention on Biological Diversity (1997) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS 2005). Since the adoption of the MMAP, MOUs have been signed with the Sargasso Sea Commission (2017) and the Caribbean Regional Fisheries Mechanism (CRFM) (2018). Currently, an MOU is under negotiation with the IWC.⁷⁷⁴

Since the adoption of the MMAP, a number of countries such as Colombia, Cuba, Panama, and Venezuela have adopted national legislation that is generally relevant to the conservation of marine mammals and/or that is specifically focused on marine mammals, as well as national action plans or species-specific recovery or management plans.⁷⁷⁵

Species Recovery or Management Plans

Under the MMAP, and consistent with the SPAW Protocol Articles 11 and 21,⁷⁷⁶ an update of the original 1995 “Regional Management Plan for the West Indian manatee, *Trichechus manatus*,” was published in 2010 to promote more effective research and management of this species.

A workshop on manatee rescue, rehabilitation, recovery and release was convened by the SPAW-RAC on September 30, 2013 in San Juan, Puerto Rico, with the attendance of nine countries. Protocols and procedures were drafted to be further adapted to each country’s needs and capacities regarding monitoring, assessment of health and capture, captivity, and release into the wild.⁷⁷⁷

Manatee reintroduction on Guadeloupe. Under the auspices of the MMAP and regional Manatee recovery plan, the late John Reynolds in collaboration with other marine mammal experts and the Parc National de la Guadeloupe, worked to return an experimental population of West Indian manatees to Guadeloupe under a project called Life Sirenia.⁷⁷⁸ Extinct from the lesser West Indies due to overhunting, the West Indian Manatee population is threatened throughout

the rest of the Caribbean. The goal of the project was to introduce 10 Antillean manatees into natural habitat (Grand Cul-de-cas Marin Bay marine reserve) to establish a self-sustaining population and promote similar future activities in the former historic range of the manatee, including St. Maarten and Martinique. Although two captive-born manatees were relocated to Guadeloupe in 2016, the project was suspended in 2018 and eventually abandoned in 2019 after one of the individuals perished shortly after translocation.⁷⁷⁹ Longer-term plans called for the future importation of up to 13 additional manatees to create a self-sustaining breeding population of manatees, including from Mexico. This project would have represented the first time a sirenian species had been reintroduced in a formerly-occupied area for conservation purposes.⁷⁸⁰

Individual countries within the distribution range of the manatee, have also adopted their own conservation Plan or Programme, including Cuba, Colombia, Belize, and Guatemala.

Fisheries Interactions

The Secretariat has progressively been collaborating with regional fisheries bodies and national fisheries authorities, recognising the importance of bycatch, entanglements and directed takes of marine mammals, especially in the absence of population assessment data.

The SPAW-RAC, in collaboration with Florida International University, conducted a study to assess the threats to West Indian manatees from bycatch and vessel strikes in five countries (Belize, Colombia, Mexico, the Dominican Republic and Haiti). It was found that fishermen still accidentally or intentionally catch manatees, and that manatees are not always released when this occurs. Incidental and intentional bycatch should be considered an important source of impact on manatees, understanding that this situation differs among countries targeted in the study.⁷⁸¹

A Memorandum of Cooperation was also signed with the Caribbean Regional Fisheries Mechanism (CRFM) in May 2018 for further coordination in areas of mutual interest. Parties have encouraged the Secretariat to

enhance cooperation and coordination with regional fisheries management organisations and mechanisms. This is in line with the endorsed regional policy under the CLME+ Project which seeks to guide harmonised sectoral policies and strengthen cooperation between regional fisheries bodies and environmental organisations.

In this context, SPAW has also contributed to ongoing efforts by regional fisheries bodies and the CMS Convention on species of regional concern, such as the Nassau grouper (*Epinephelus striatus*) and the nine species of sharks and rays listed under the SPAW Protocol. This was reflected through presentations and proposals by the subprogramme at relevant meetings. However, dedicated joint programmes and actions have yet to be designed and implemented under SPAW to comprehensively assess fisheries interactions, despite remaining a high threat to marine mammals in the region. Equally, the reporting of directed takes must be considered high priority and include incentives to entice short-term dedication to reporting and data collection to fill this crucial data gap.

Similarly, the IWC and CEP/SPAW jointly convened three workshops to improve awareness of, collect data, and mitigate the effects of ship strikes and entanglements on cetaceans in the WCR.

- A Training Workshop to Address Lethal Human Impacts on Marine Mammals of the (Spanish-speaking) Wider Caribbean was held in La Paz, Mexico, November 27-29, 2012. Training followed the overall strategy and curricula developed by the IWC expert advisory panel for this topic, and included a full day to train veterinarians and biologists to identify human impacts (entanglements and ship strikes) on both free-swimming and stranded cetaceans.
- A three-day training workshop was held on St. Martin, November 12-14, 2013 for French and English-speaking Caribbean countries hosted by the SPAW Regional Activity Centre. It was supported by a number of governmental and non-governmental agencies. Attendees included members of the regional marine parks

and experts nominated by their country's IWC Commissioner and SPAW Government Focal Points.

- A Workshop to Address Collisions between Marine Mammals and Ships with a focus on the Wider Caribbean, was held in Gamboa, Panama, 18-20 June 2014.⁷⁸² The objectives of the meeting were to: 1) review current, relevant ship strike mitigation measures with experts from around the world, 2) identify data gaps and information needs in the region, 3) discuss management initiatives which are most likely to be effective in the region, and beyond, and 4) recommend concrete actions for the IWC.

Habitat Degradation and coastal development

The conservation and sustainable use of coastal and marine ecosystems has been addressed under the SPAW Protocol from its onset, advocating the importance of coral reefs, mangroves and seagrass beds ecosystem services, identifying threats to their sustainability, and mobilizing actions from governments and stakeholders in the WCR. The drivers for habitat loss and urban development have for the most part remained unchanged since the adoption of the MMAP, and continue to be a threat to marine mammals. The intensity of such pressures seem to be increasing [see country assessments in this report] and include new emerging issues, such as sargassum influx to the region.

A State of Nearshore Marine Habitats Report was prepared as an output of the SPAW Programme as well as the CLME+ Project and as part of the effort towards implementation of the 10-year politically endorsed Strategic Action Plan (CLME+ SAP). A framework for the development of a Regional Strategy and Action Plan for the Valuation, Protection and/or Restoration of Key Marine Habitats in the Wider Caribbean 2021–2030 was also outlined at SPAW COP 10, Honduras, 3 June 2019.⁷⁸³

The Secretariat coordinated and/or cooperated with initiatives and projects relevant to coastal and marine ecosystems in the region, including:

- The Climate Resilient Eastern Caribbean Marine Managed Areas Network-ECMMAN

project which concluded in 2017 and led by The Nature Conservancy. UNEP/SPAW-RAC acted through the Caribbean Marine Protected Areas Managers (CaMPAM) network assisting with the strengthening of marine protected areas via a small grants programme.⁷⁸⁴

- The BEST 2.0 Caribbean Hub Programme led by the SPAW-RAC and supported by the European Commission aims to create innovative financing mechanisms for biodiversity conservation and sustainable development in the European Union Overseas Countries and Territories (OCTs) for small/medium-scale field activities on the ground. Targeted OCTs include seven SPAW territories (Saba, Saint Martin, Statia, Aruba, Curaçao, Bonaire and Saint Barthélemy) with a focus on local development, biodiversity conservation and sustainable use of ecosystem services.⁷⁸⁵

Pollution and marine mammal health

AMEP. The Assessment & Management of Environmental Pollution (AMEP) Programme supports countries in the Wider Caribbean to implement the Pollution from Land-based Sources and Activities (LBS Protocol) and Co-operation in Combating Oil Spills (Oil Spills Protocol).

Under the implementation of LBS Protocol, a series of initiatives and projects are underway which serve to increase knowledge of the overall status and impacts of land-based and marine pollution in the region. These projects are meant to prevent, control and manage, monitor and assess such sources, which include solid waste, marine litter and plastics, untreated domestic and industrial wastewater, and agrochemical run-off, including pesticides and fertilizers. Recent highlights include the establishment of a Caribbean Marine Litter Node, a Regional Nutrients Strategy and Action Plan, and the State of Convention Area Report.⁷⁸⁶

REMPEITC-RAC. Under the auspices of REMPEITC-RAC, the Regional Marine Pollution Emergency, Information and Training Centre for the CEP-LBS Protocol, the International Maritime Organization (IMO) supports activities such as training for oil spill

response managers focusing on tactical aspects of spill preparedness and response to ensure effective coordination, regulation, and capacities to protect marine and coastal ecosystems. The Center of Engineering and Environmental Management of Coasts and Bays (CIMAB) in Cuba and the Institute of Marine Affairs in Trinidad and Tobago were also designated as Regional Activity Centers (RAC) and support various aspects of the AMEP programme.

CLME+. The CLME+ project was also designed to increase synergies and collaboration between the SPAW and AMEP programmes, and has generated a 'State of the marine environment and associated economies (SOMME mechanism)'⁷⁸⁷ institutionalizing a collaborative, integrated reporting mechanism on the marine environment and its contributions to sustainable Blue Economy.

At the CEP Secretariat level, joint programming between SPAW and LBS Protocol implementation should continue to be strengthened as a basis to foster better knowledge and understanding regarding the links between pollution and marine mammal health. The need for continuous monitoring programmes to draw effective responses to such pollution affecting marine mammal health is real and has been evident through past recognition by WCR countries that the convening of a regional workshop on contaminants is needed but which has not been feasible to date and remains a gap to be addressed.

Whale watch and associated activities

Whale watching and associated activities are one of the backbones of the nature-based tourism industry in the WCR. The efforts of the Secretariat to address its potential negative impacts on marine mammal populations have been increased during the last decade.

The SPAW Programme convened a regional Workshop on marine mammal watching in 2011 that brought together marine mammal tour operators and government regulators from across the WCR to discuss the marine mammal watching industry in the region in Panama.⁷⁸⁸ As a result, the "Overarching Principles and Best Practice Guidelines for Marine



■ Figure 35. Bottlenose dolphins traveling in the waters of Belize. Image courtesy of Eric Ramos.

Mammal Watching in the Wider Caribbean Region” was adopted by SPAW COP7 in Punta Cana in 2012. Various countries have adopted national guidelines, regulations or legislation for marine mammal viewing, including Bahamas, Colombia, Dominican Republic, France (Guadeloupe), Panama, and the United States. Others have regional codes of conduct that are informally followed or recommended, but not widely distributed (e.g., Barbados)⁷⁸⁹ and sometimes complementing regulations (e.g., Bahamas).⁷⁹⁰

As an integral part of the LifeWeb Project, representatives from a few Eastern Caribbean nations were hosted by managers of the Marine Mammal Sanctuary in the Dominican Republic in 2012, providing an opportunity to highlight the economic potential, and research and conservation benefits provided by whale-watching and related activities.⁷⁹¹

Under the framework of the CARI’MAM Project, a proposal is under development for the creation of labeling or other voluntary scheme to be adopted in the region to encourage and guide sustainable and responsible commercial marine mammal watching in the region, and as a further the implementation of the SPAW Regional Guidelines adopted in 2011 by SPAW Contracting Parties.⁷⁹²

Protected Areas and Other Management Regimes

Sister Sanctuary Programme. The North Atlantic Humpback Whale Sister Sanctuary Program (NAHW-SSP) was initiated in 2006 by the Stellwagen Bank National Marine Sanctuary (SBNMS) to facilitate the effective management and conservation of humpback whales across jurisdictional boundaries and throughout its migratory range. To date, five member nations — Dominican Republic (Santuario de Mamíferos Marinos de la Republica Dominicana), Bermuda (Marine Mammal Sanctuary), the French Antilles (AGOA), the Caribbean Netherlands (Yarari) and the United States (SBNMS)—support the initiatives under the auspices of the MMAP.⁷⁹³ The initiative has forged the foundations of a marine mammal protected areas network.⁷⁹⁴ The management plans for the Sanctuaries in the Dominican Republic, French Antilles (AGOA) and Caribbean Netherlands (Yarari) were established since the adoption of the MMAP in 2008, and in the case of Yarari, management priorities have been identified.

Additionally, the Marine Mammals Protection Twinning project, one of three EU transatlantic MPA projects, was set up to connect MPA managers across the North and South Atlantic oceans. The experiences under the Caribbean MMAP were shared by the SPAW-RAC at the project’s second technical workshop held

in Iceland (October 2017) which examined twinning partnerships including sister sanctuaries and various MPA manager networks.⁷⁹⁵

CaMPAM (Caribbean Marine Protected Areas Management Network and Forum). SPAW has been strengthening management of MPAs in the Caribbean through CaMPAM over the last 20 years with regional training of trainers programmes, small-grants programmes, and a regional data base of MPAs among others. Through the implementation of the project “*Biodiversity for Sustainable Development in the Caribbean*” concluded in 2019,⁷⁹⁶ an evaluation, redesign and upgrade of the MPA regional database was achieved.⁷⁹⁷

The project was funded by the Government of Italy, which is also supporting the ongoing “*Regional support for the Caribbean Challenge initiative: Networking, consolidation and regional coordination of MPA management*,” aimed at the development of a biologically-representative, functional network of marine protected areas (MPA), capable of adapting to climate change. A third initiative of relevance is a partnership with the OSPAR Commission, North-East Atlantic, aimed at sharing best practices and lessons learned as an important means of benefiting enhanced management of MPAs.

Work continues on the listing process of MPAs under SPAW, encouraging future submission of MPAs by Parties, as well as resubmission of previous MPAs with additional information to the process and further development of the Cooperation Programme for SPAW-listed MPAs. Challenges remain for the continuation of CaMPAM, which despite its success as a model and its importance to MPA management in the region, is still dependent upon the availability of funding. Alongside CaMPAM, Both MPACoConnect⁷⁹⁸ under the leadership of the U.S. National Oceanic and Atmospheric Administration (NOAA) and National Marine Protected Areas Center and Gulf and Caribbean Fisheries Institute (GCFI)⁷⁹⁹ continue to play a role in connecting MPAs in the Region.

Currently, SPAW CEP is carrying out a consultancy to support establishment of an Ecological Network of

Protected Areas Listed under the Specially Protected Areas and Wildlife (SPAW) Protocol of the Cartagena Convention with financial support of the EU project ACP MEAs Phase III.⁸⁰⁰ An expected output is recommending representative, key, or priority migratory marine species and habitats to be targeted in the creation of the SPAW ecological network of MPAs (with validation by key stakeholders). Marine mammals are foreseen as a target group.

Under the CARI-MAM Project, an analysis of existing management plans for marine protected areas is being carried out using a ‘marine mammal tracking tool’ developed as part of the study methodology. Preliminary results indicate that In the Caribbean region, most of the MPAs are small and coastal, and do not include marine mammals in their management goals and objectives.

Research

LifeWeb Project. The UNEP-Spain LifeWeb project (2010-2014) assisted countries to develop and apply a cross-sectoral ecosystem approach to management of human threats to marine mammals. Project outputs included mapping of critical marine mammal habitats, regional-scale migration routes, and socio-economic information on human activities to underpin broad-scale spatial planning and management of human impacts on marine mammals in the Caribbean (and Southeast Pacific). It also assisted planners and managers with transboundary management and governance of marine resources via capacity building and technical guidance on marine spatial planning.

The SPAW-RAC mapping application presents the outputs for the WCR which are organized into four categories:⁸⁰¹

- distribution maps of the 25 marine mammal species;
- maps displaying species richness in the WCR;
- maps representing the major threats and impacts of human activities;
- maps that report the main protection measures that have been put in place for marine mammals throughout the region.

The LifeWeb Project demonstrated that, using scenario development based on overlap analysis, Marine Spatial Planning (MSP) was a useful tool for integrated long-term management and conservation of wide-ranging marine mammals. A limitation of this tool, however, is that the local importance of any specific area for MSP-based management of wide-ranging species such as cetaceans can only be defined in a regional context. As a result, although this project provided useful and broad-scale regional data, Caribbean-wide data at the local level, including local population assessments, are required to inform any national action plans or research programme as part of broader trans-boundary collaboration envisioned by the LifeWeb project.

Mama CoCo Sea Project. Under the framework of the LifeWeb Project, attention was also provided to the development of cooperation among countries of Northern South America.⁸⁰² A main goal was developing a platform for exchange among countries

and creating an action plan for the effective management of marine areas and mammals in Northern South America. A first skeleton for the Action Plan was constructed and requires follow-up for a formal adoption process.⁸⁰³

Limitations. Based on maps generated under the LifeWeb Project and Halpern et. al (2008),⁸⁰⁴ different human activities were analysed that directly or indirectly might affect marine mammals within their known distribution ranges. Several activities could not be included in the analysis because of the lack of spatialized, consistent data at the Caribbean scale, such as seismic research and hotel distribution. Paucity in the species distribution data available, and the reliance on sightings but not actual density, limited the quality of the species distribution analysis. The scale of most of the maps designed to encompass the whole Caribbean region made the quality of the data suboptimal for MSP analysis at the country/regional

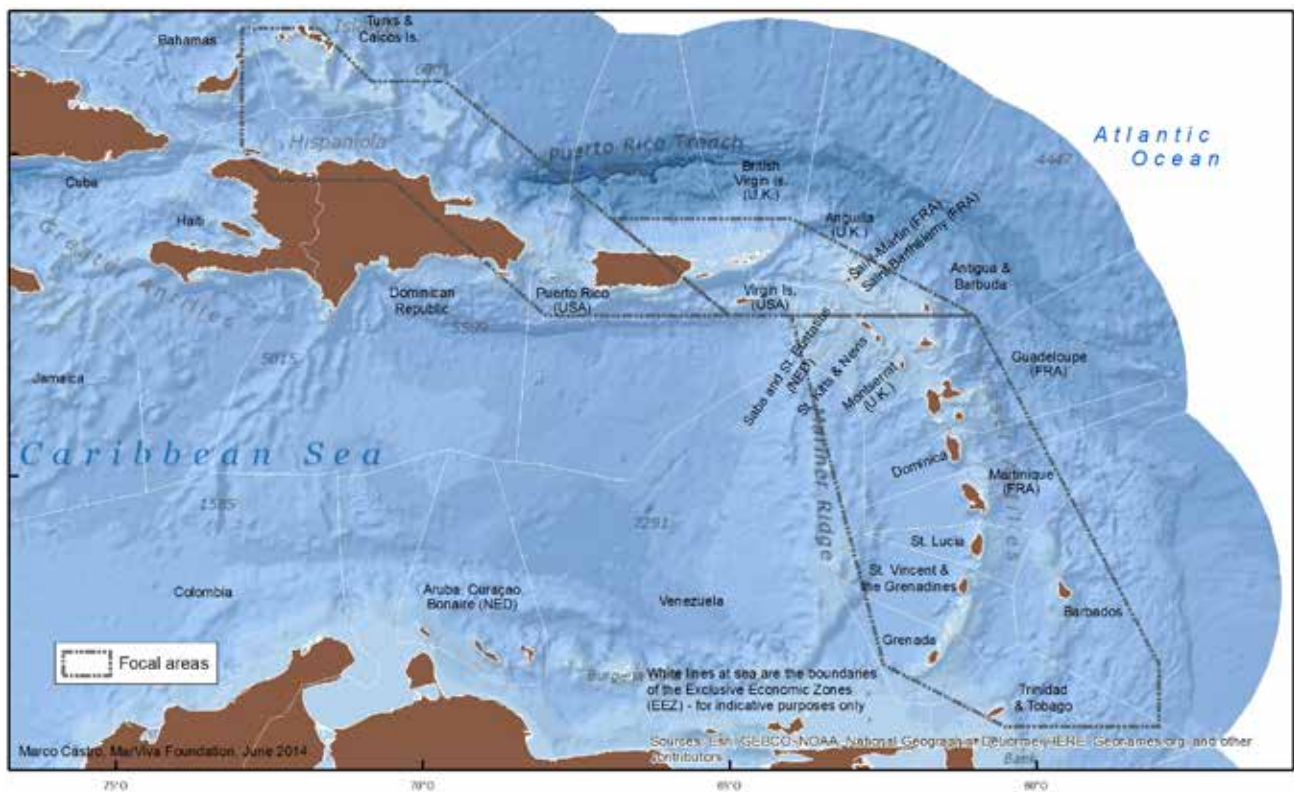


Figure 36. Three main focal areas identified for marine mammal transboundary management by LifeWeb mapping data.

level. Shipping routes, for example, lacked important components on local traffic routes and volumes.

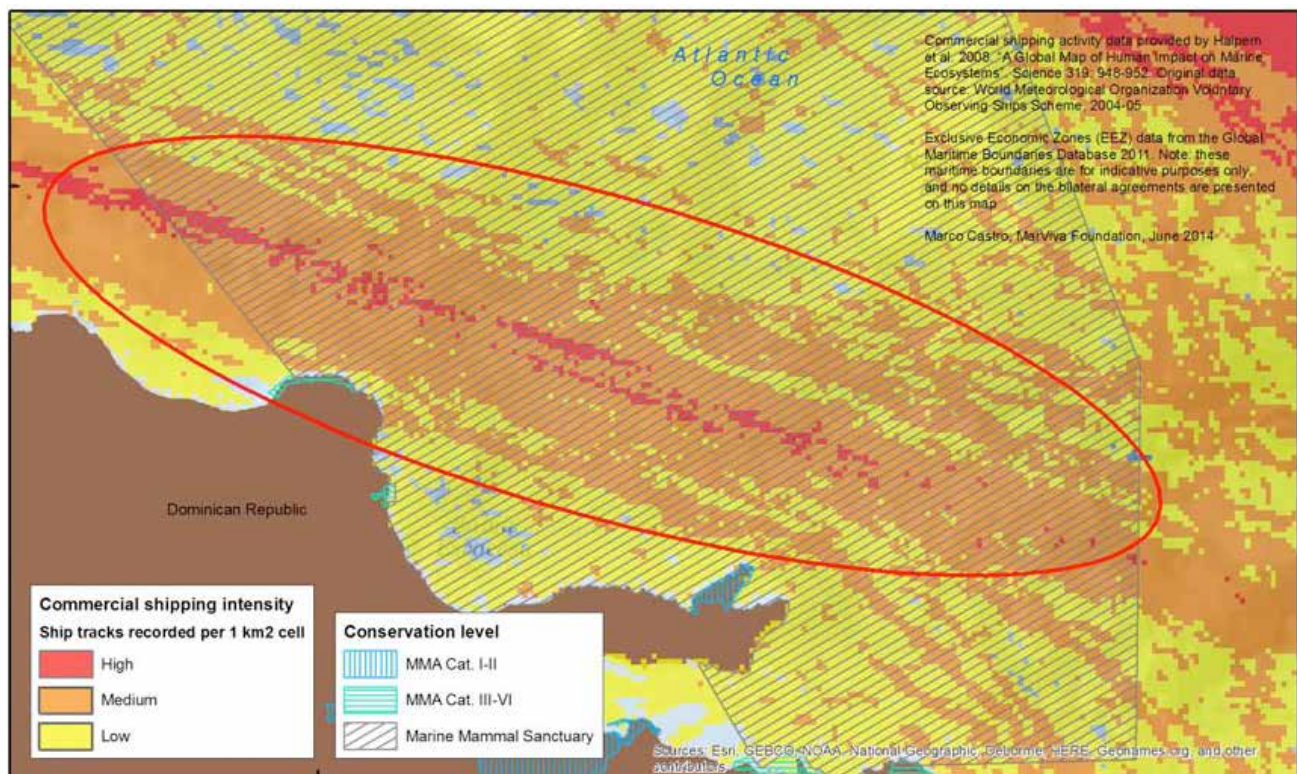
Methodology. In total, five species were used in the analysis out of the 37 species reported for the region. Marine mammal distribution limits of high interest species that are representative of a group (by their use of habitat and distribution patterns, and involvement in tourism viewing activities) were mapped for: the Humpback whale (*Megaptera novaeangliae*), the bottlenose dolphin (*Tursiops truncatus*) (a target for viewing activities), the Sperm whale (*Physeter macrocephalus*), the manatee (*Trichechus manatus*) (a coastal species), and the short-finned pilot whale (*Globicephala macrorhynchus*) (widely distributed throughout the region in deep offshore areas).

Two geographical areas were first identified as a result of analysis and review by experts at the 2012 Panama workshop,⁸⁰⁵ and subsequent mapping analysis defined three focal areas (Figure 36): 1. The Marine Mammal

Sanctuary of the Dominican Republic (*the north coast of the Dominican Republic, and includes most waters surrounding Puerto Rico, except the eastern coast. Turks and Caicos, in the northern fringe of the focal area, were also included here due to their relevance for the humpback whale*), 2. The Virgin Island Region, (*centered on the U.S. and U.K. Virgin Islands, including the eastern coast of Puerto Rico eastward to Antigua and Barbuda*) and 3. The Lesser Antilles Corridor, (*the Lesser Antilles from Antigua and Barbuda southward to Trinidad and Tobago, including Barbados*).

Through an overlap analysis it was possible to identify several critical areas within each of the Focal Areas, as it allows identification of areas where the interaction between a human use and a species distribution is intense (for the five marine mammal species selected). These critical areas represent areas where human activity and marine mammal habitat conflicts might exist, but a later compatibility analysis is required to assess the degree of conflict.⁸⁰⁶

FOCAL AREA 1: CRITICAL AREAS



■ Figure 37. Northern Dominican Republic Critical Area: Humpback whales and commercial shipping routes.

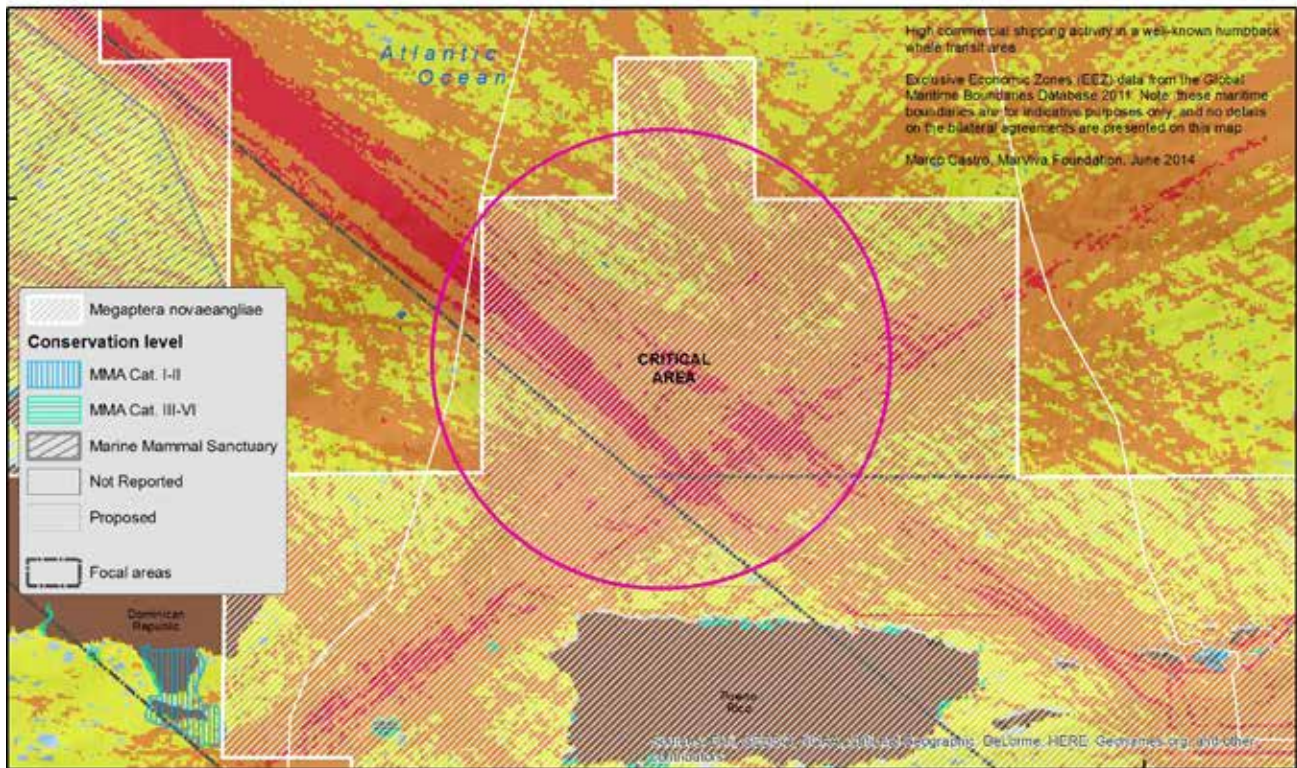


Figure 38. Northern Puerto Rico Critical Area: Humpback whales and commercial shipping routes.

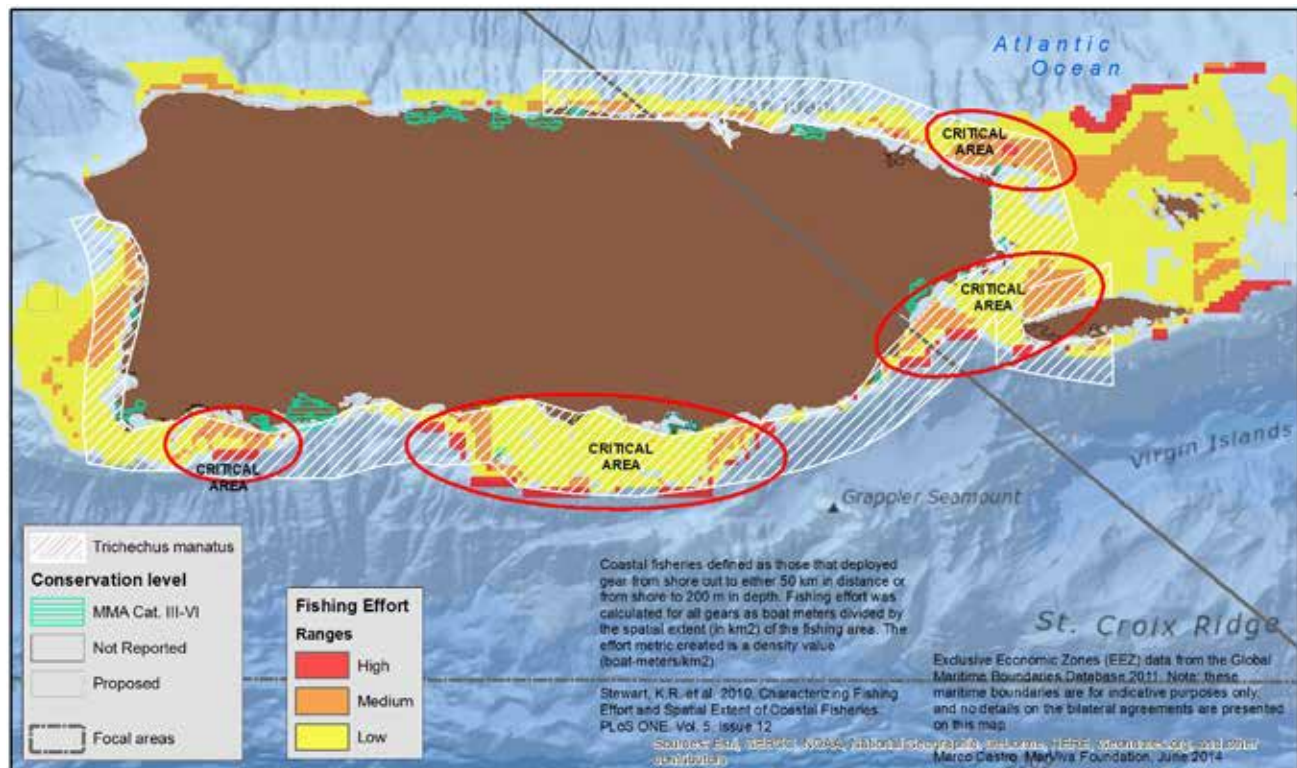


Figure 39. Puerto Rico Critical Areas: Manatee habitat and fishing effort.

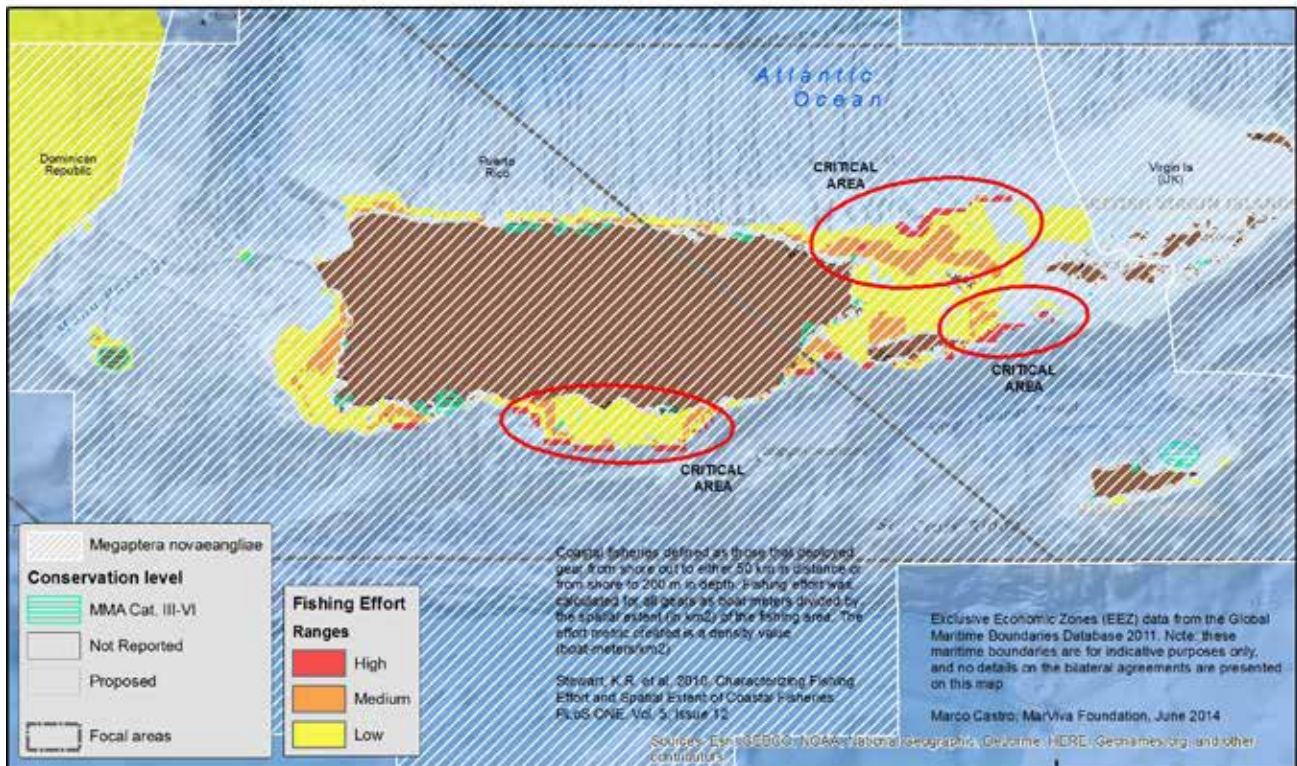


Figure 40. Puerto Rico Critical Areas: Humpback whales and fishing effort.

FOCAL AREA 2: CRITICAL AREAS

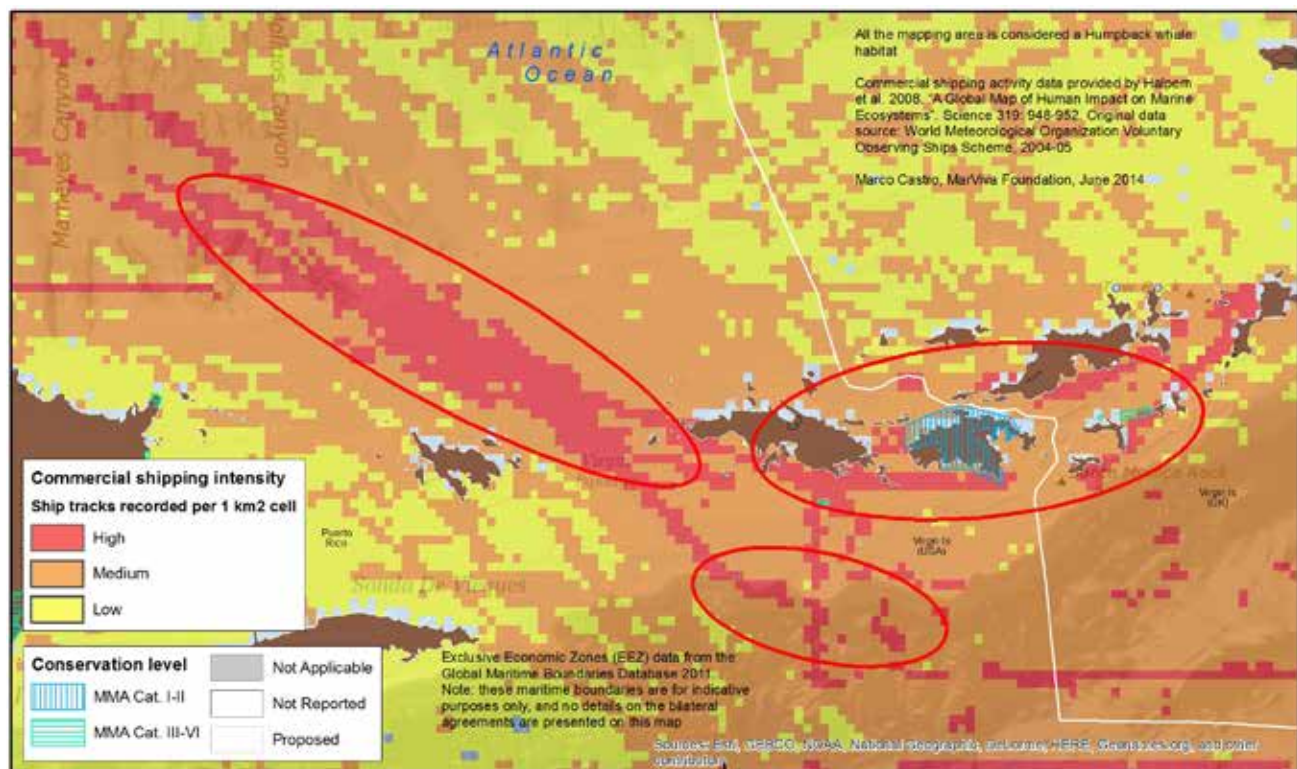


Figure 41. Virgin Islands Critical Areas: Humpback whales and commercial shipping routes.

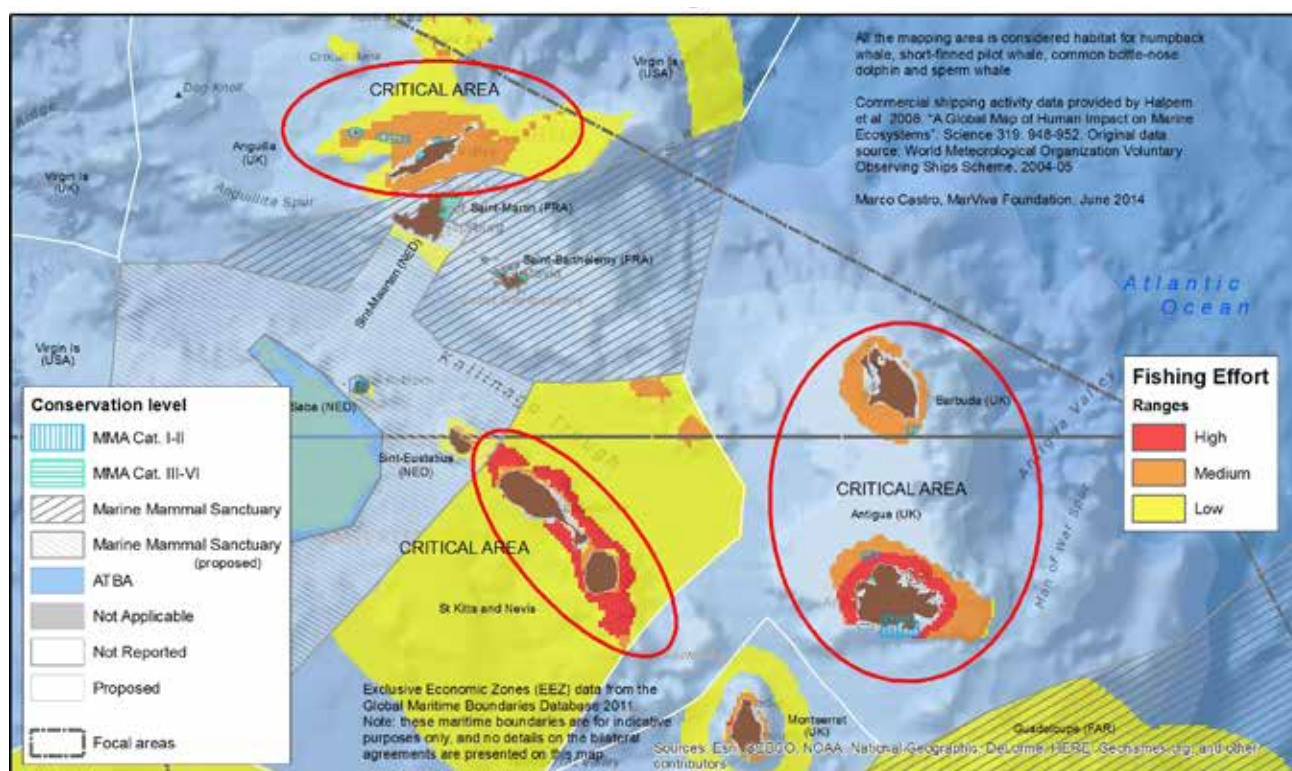
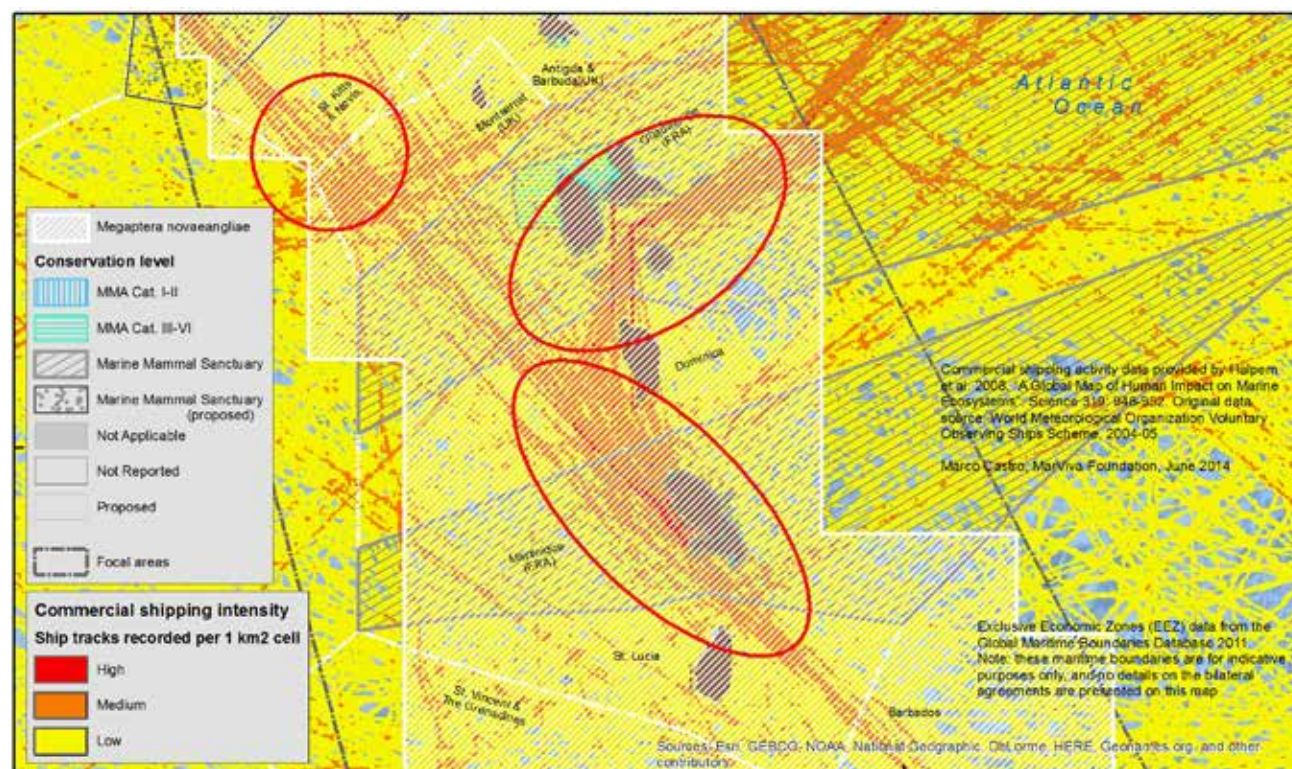


Figure 42. Northern Lesser Antilles Critical Areas: Coastal marine mammals and fishing effort.

FOCAL AREA 3: CRITICAL AREAS



■ Figure 43. Guadeloupe-Martinique Critical Area: Humpback whales and commercial shipping routes.

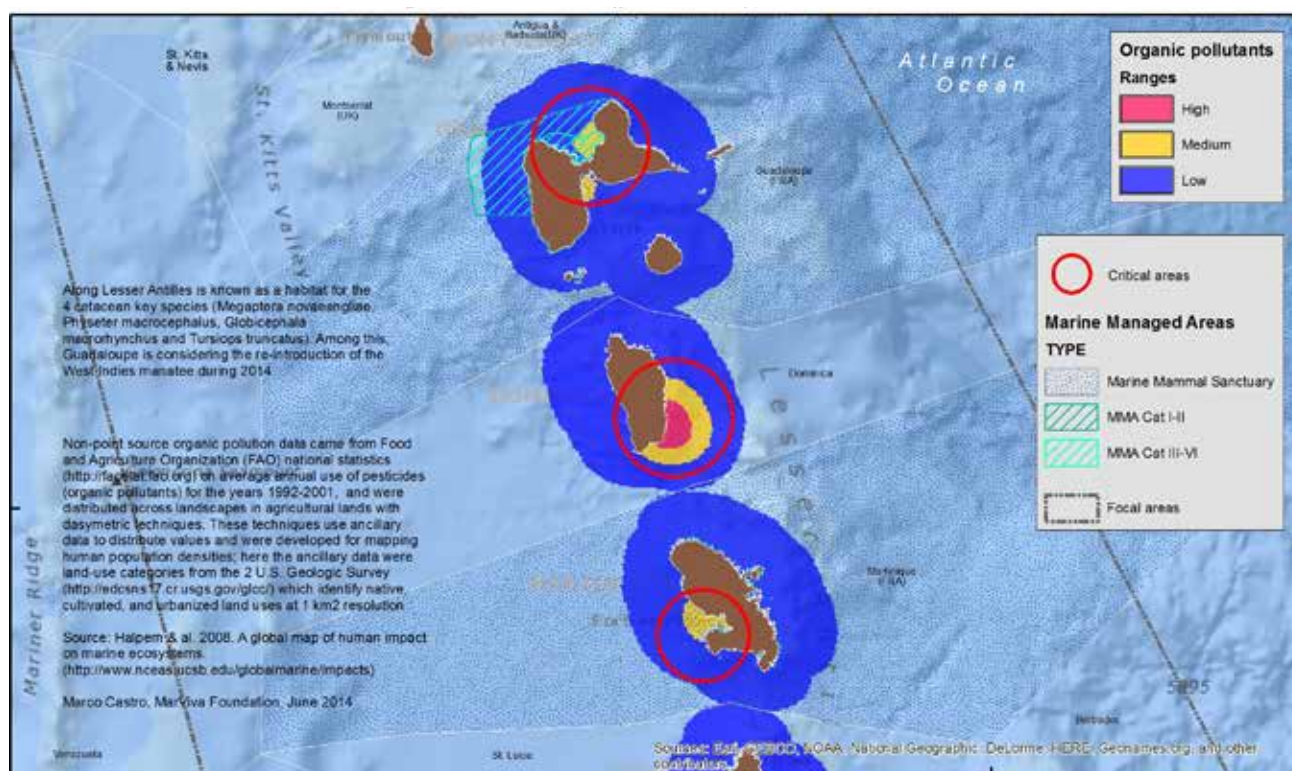


Figure 44. Guadeloupe-Martinique Critical Areas: Marine mammal habitat and organic pollutants.

The proposed scenarios resulting from the analysis were conceived as a way to employ and apply future management tools that seem appropriate for the type of overlap found, including the creation of Particularly Sensitive Sea Areas (PSSA) under the auspices of the International Maritime Organization (IMO),⁸⁰⁷ the creation of Regulated Fishing Areas⁸⁰⁸ to regulate fishing activities to minimize its impact on habitats or other populations; and Marine Protected Areas (MPAs) or Marine Managed Areas (MMAs) established to protect habitat conditions and key ecosystems. At the regional level, the strengthening of networks of Marine Protected Areas was recommended.

Megara Project. The SPAW-RAC supported the Megara Project,⁸⁰⁹ an initiative to monitor the annual migration of humpback whales (*Megaptera novaeangliae*) in the area of the Northern Lesser Antilles (Saint-Martin, Sint-Maarten, Anguilla, Saba, Statia, Saint-Bart) through the deployment of satellite telemetry. The project aimed to 1). Document the movement in the area of the Northern Lesser Antilles

and between the feeding areas and the tropical breeding areas, and 2). Sample skin and blubber of humpback and sperm whales in order to conduct genetic analyses (sex, identification of individuals, affiliation), eco-toxicological analyses (organic and non-organic pollutants) and isotopic analyses ($\delta^{13}C$ and $\delta^{15}N$) to trace feeding sources.

Strandings

Three regional Marine Mammal Stranding Response Workshops were organized (Curaçao 2009; Guadeloupe 2010; Panama 2010) with the goal of reviewing the techniques and protocols for responding to strandings, facilitating collaboration and consolidation of a regional stranding network for the WCR with a centralized pool of samples and database.⁸¹⁰ A Stranding Guide to marine mammals for the WCR was produced in 2013 with the intent to assist first responders⁸¹¹ and was disseminated throughout the Region, as well as a summary of stranding protocols.⁸¹² These tools have not been updated since 2013.



■ Figure 45. Clymene dolphin (short-snouted spinner or *Stenella clymene*) leaping in the waters of Belize. Image courtesy of Eric Ramos.

Captivity

In the framework of the LifeWeb Project an inventory of captive facilities was carried out in 2010, and individual dolphins captured and traded per country were identified. This information is now over ten years old and outdated, but can serve as a general indication where live dolphins are held, and where trade may occur. SPAW Parties should be encouraged to report their captive dolphin programmes under the Protocol's Exemption (Article 11(2)) reporting process, and as modeled by Netherlands Antilles in 2001 and 2008.⁸¹³ Based on a current review, there are currently at least 54 facilities holding marine mammals in captivity in the insular WCR (including Quintana Roo, Mexico and excluding U.S. facilities).⁸¹⁴ (see Figure 30). However, these numbers are constantly changing as animals die or are transferred into or out of the Region, requiring reporting and verification by individual countries in the Region.

Acoustic disturbance

There is increasing concern regarding the potential effects of anthropogenic noise in the marine environment, produced during geophysical seismic surveys and from other anthropogenic sources, such as naval exercises and vessel traffic. Marine mammals, and especially cetaceans, rely on sound for communication,

finding and capturing prey, navigation/migration, and avoiding predators. As a follow-up to the Suriname Workshop supported under the LifeWeb Project, the need for regional guidelines for seismic survey operations was recognized in the Northern part of South America (MaMa CoCo region - Marine Mammal Conservation Corridor for Northern South America).⁸¹⁵

As a result, a review and analysis of different mitigation measures used during seismic surveys in the Northern part of South America was published in 2015 for the eight countries involved. Only Brazil and Colombia have developed and adopted national guidelines, and guidelines for Trinidad and Tobago are under development. Gulf of Mexico, Brazil, French Guiana, Suriname and Venezuela all apply measures to all marine mammal species, with Colombia only applying measures to cetaceans, and Trinidad and Tobago applying measures only to those species they list as 'Species of Concern'.⁸¹⁶

The Green Heritage Fund Suriname (GHFS) has been leading this initiative to produce regional guidelines for seismic surveys within the Caribbean, where SPAW-RAC has supported the international team of researchers involved, in consultation with the country

representatives of the steering group of the MaMa CoCo SEA and a broad range of stakeholders in marine seismic survey operations.

Vessel Strikes

While data on shipping in the WCR is fairly available, data on marine mammal abundance and distribution remain limited, despite work of the LifeWeb project that resulted in range maps for 25 marine mammal species within the Region. They contain no information about species density within a more localized range or critical habitat. For an individual species, use of the range map can show where human threats occur within the range, but cannot identify areas of highest risk. To move forward with reliable designation of marine protected areas and ship-strike mitigation efforts on a sound scientific basis, a high priority needs to be placed on obtaining better abundance and distribution data (e.g., through systematic marine mammal surveys).

The SPAW programme convened three workshops to improve awareness of, collect data on, and mitigate effects of ship strikes and entanglements (Mexico 2012, St. Martin 2013 and the Joint IWC-SPAW 2014 Panama Workshop⁸¹⁷). The key recommendations resulting from these workshops include the need to acquire real time and historical ships track data for the Caribbean (AIS, LRIT, etc.) and the technical expertise to process it; as well as the need for countries to investigate the best means to inform commercial ships, recreational boaters, and other maritime interests when a voyage enters a Sanctuary or Marine Protected Area.

With regard to ship strikes, information on cetacean distribution, strike numbers, and risk assessments are needed. Although there is substantial shipping traffic through the region, without cetacean distribution and strike data, it cannot be determined if ship strikes are truly a problem. There are cases where extrapolation from data rich to data poor areas is acceptable (e.g., blue whales in Sri Lanka) and similar extrapolation could be useful in the WCR to target key locales or migratory corridors where species congregations are likely, well-studied (e.g., sperm whales in Dominica), or to serve as priority areas to conduct population assessments.



Figure 46. Bottlenose dolphin spyhopping in Belize. Image courtesy of Eric Ramos.

Climate Change

Caribbean nations are among the most vulnerable to the impacts of climate change. Having to cope with extreme events such as hurricanes with severe destruction of infrastructure and natural habitats worth billions of dollars, their vulnerability continues to increase. Caribbean nations are challenged to meet the costs of mitigation and adaptation and improve management of marine resources such as marine mammals.

While the work of SPAW has not had a climate-focused component per se, it has recognised that tackling climate vulnerability requires cooperation with various stakeholders across a multitude of issues.

The SPAW has supported the implementation of programmes and strategies that address direct or indirect effects on marine mammals. Strengthening of institutional arrangements, through the application of ecosystem-based management and decision support systems, is one such example, as well as measures that enhance conservation of critical habitats in the WCR, such as coral reefs, mangroves, and sea grass beds.

Ecosystem-Based Management (EBM) Application in the Region

- Continued collaboration with the pollution sub-programme and other partners in the implementation of the CLME+ project via development of a “*Regional Strategy and Action Plan for the valuation, protection and/or restoration of key marine habitats in the CLME+*”; and implementation of pilot projects demonstrating the transition to an EBM approach at the sub-regional/site level in the CLME+.
- Through the completed Italian-funded project “*Biodiversity for Sustainable Development in the Caribbean (EBM)*” there has been preparation of a technical document about lessons learned on EBM and DSS (Decision Support System) application in the Wider Caribbean, along with a final project report.
- Implementation of the BEST Initiative (executed through the SPAW-RAC) which aimed to support conservation of biodiversity and sustainable use of ecosystems services in Overseas Territories of the European Union. It included 4 medium-sized grants to address invasive alien species, sea turtle conservation, coral reef restoration, and establishment of Aruba’s first marine park. Many of the projects ended in late 2018, and others were completed in Spring 2019. BEST 2.0 officially ended in December 2019. The Carib-Coast Project focusing on coastal resilience in selected islands was also executed by the SPAW-RAC.

SUMMARY OF SPAW REGIONAL INITIATIVES RELATING TO THE MMAP

INDICATOR	MAJOR INITIATIVES
National legislation	Since the adoption of the MMAP in 2008, Guyana (2010), Grenada (2012) and Honduras (2018) have become new Parties to the SPAW Protocol; MOUs were signed with the Sargasso Sea Commission (2017), the Caribbean Regional Fisheries Mechanism-CRFM (2018), and an MOU is under negotiation with the IWC. ⁸¹⁸ The SPAW RAC conducted a survey of focal points in 2019 to determine the number of Parties with marine mammal-focused legislation under the auspices of the CARI'MAM Project.
Species specific recovery or management plans	Updating of the Regional Management Plan for the West Indian manatee (1995–2010); ⁸¹⁹ development of recovery plan for manatee (Cuba). Manatee reintroduction project on Guadeloupe in 2016 to 2019.
Fisheries interactions	Manatee bycatch review; ⁸²⁰ MOU with the Caribbean Regional Fisheries Mechanism (CRFM, 2018); Interactions with FAO (through its Western Central Atlantic Fishery Commission) and GCFI to strengthen collaboration.
Habitat degradation and coastal development	A State of Nearshore Marine Habitats Report; a framework for a Regional Strategy and Action Plan for the Valuation, Protection and/or Restoration of Key Marine Habitats in the Wider Caribbean 2021–2030. ⁸²¹
Pollution and marine mammal health	A regional contaminants workshop was prioritised, but has not yet occurred; increased cooperation with LBS protocol which should jointly engaged in pollution aspects of the MMAP.
Whale watch and associated activities	CARI'MAM Project network and surveys; Sister Sanctuary initiatives; Regional whale watch workshops/guidelines developed (Panama, 2011); WW responsible viewing label/certification programme being developed under CARI'MAM; Various countries have adopted national guidelines, regulations or legislation for marine mammal viewing, Bahamas, Colombia, Dominican Republic, France (Guadeloupe), Panama, United States.
Protected areas and other management regimes	LifeWeb project with GIS mapping application;; Transatlantic Marine Mammal Tool for MPA managers; 5 Marine Mammal Sanctuaries in the region (AGOA, Yarari and Bermuda since 2008); CaMPaM initiatives (updated MPA database, training of trainers courses, small grant and mentorship programmes); The Climate Resilient Eastern Caribbean Marine Managed Areas Network-ECMMAN project.
Research	CARI'MAM Project; LifeWeb Project with species distribution maps; CARI'MAM PAM project and reporting tool; development of sighting data collection platform (Obsenmer).
Strandings	Three stranding training workshops were convened (Curaçao 2009; Guadeloupe 2010; Panama 2011); A stranding guide (2013) was published and national guides developed/ adaptations developed.
Captivity	Inventory of captive facilities completed under LifeWeb project in 2010.
Acoustic disturbance	Analysis of different mitigation measures used during seismic surveys in the Northern part of South America (2015). ⁸²²
Vessel strikes	Three workshops to improve awareness of, collect data on and mitigate effects of ship strikes and entanglements (Mexico 2012; St. Martin 2013 and the Joint IWC-SPAW 2014 Panama Workshop). ⁸²³
Climate change	Regional Strategy and Action Plan for the valuation, protection and/or restoration of key marine habitats in the CLME+; Italian-funded project “Biodiversity for Sustainable Development in the Caribbean (EBM);” BEST Initiative and Carib-Coast executed through the SPAW-RAC.

RECOMMENDATIONS:

A roadmap for prioritised implementation of MMAP measures at the national and regional level

Ultimately, the aim of the MMAP is to assist participating governments in the Region to develop and improve marine mammal conservation policies and practices. Based on the present review and analysis of the state of implementation of the MMAP, the following recommendations may serve as a guide for the prioritization of future initiatives by SPAW Parties and other countries of the WCR. These recommendations are based in the 13 indicators that served as a framework for analysis within this report.

1. Establishment of a Coordinated Multilateral and Regional Approach to Marine Mammal Conservation

- Create a Marine Mammal Regional Activity Network (RAN) by strengthening existing regional institutional frameworks, partnerships, and collaborative data sharing and building on the foundations of CARI'MAM. This could be achieved by designating collaborative regional and national partners and institutions selected for the purpose of coordinating and supporting the implementation of MMAP activities in accordance with the adopted CEP RAC/RAN Guidelines.⁸²⁴ This would include the development of a strategic RAN workplan and identification of country coordinators, and would emulate the successful WIDECAS model operating under the SPAW Programme for decades.
- Formalize a Caribbean Marine Mammal Commission or Advisory Board within CEP, building upon the existing SPAW experts working group on marine mammals, which should serve to support the work of a marine mammal RAN proposed above and enlist additional expertise from within, and outside, the Region. The Commission could look to the model of GCRMN (Global Coral Reef Monitoring Network), where each country proposes experts to sit on the Commission that would meet biennially under the leadership of a steering committee.
- Establish a formal regional listserve (analogous to the MARMAM listserv), central repository, or clearinghouse to disseminate regional marine

mammal information to be hosted by a SPAW partner organisation, academic institution, or NGO.

- Consider the development of regional species or issue-specific multi-stakeholder consortia in the Region (e.g., Right Whale Consortium that operates in the U.S./Canada) for those issues or species with 'critical' status.
- Conclude pending Memorandum of Understanding (MOU) with the IWC, considering high priority areas of cooperation such as bycatch mitigation initiatives, strandings response training, and vessel strike action plan/database, as well as development of joint programming on a biennial basis with reporting to SPAW STAC/COP.

2. National Legislation and Action Plans

- Develop a model national marine mammal action or recovery plan, with the main elements identified to serve as guidance for countries to assist in the process of developing national marine mammal action or recovery plans. Examples of model recovery plans exist at national, regional and global levels (e.g., WIDECAS national Sea Turtle Recovery Action Plans [STRAPs]).
- Encourage and support the convening of national level planning workshops as a process to identify marine mammal priorities, gaps, and needs to enhance capacities and cooperation for MMAP implementation, and where appropriate, towards the construction of National Action Plans and/or Species Recovery Plans. Consideration of national legislation, regulations and guidelines would be an integral part of this process, as well as the inclusion of diverse national stakeholders, including representatives from the tourism, fisheries, protected areas, law enforcement, and governmental management authorities.
- In collaboration with the IUCN and their new Integrated Conservation Planning for Cetaceans (ICPC) initiative, create a regional 'Red List' for Caribbean marine mammals to identify the most endangered and threatened species in the Region and to guide the prioritization of national action/recovery plans. Some countries have already completed country Red Lists for marine mammal species.

- Special consideration should be given to the implementation of the SPAW Regional Management Plan for the West Indian manatee. Similarly, SPAW-listed otter species as well as river dolphin species should receive consideration and inclusion within national action and recovery plans as species occupying marine and estuarine habitats and requiring management by SPAW Parties.

3. Fisheries Interactions

- Increase collaboration with FAO, CFRM, and other regional and global fisheries organisations to assess marine mammal bycatch in local and regional fisheries and potential impact on populations. Enhancing the involvement of the fisheries sector (national authorities and resource users) in research, planning, and coordination to establish national and regional policies impacting the conservation of marine mammals is required. Doing so may improve the growing gap between conservation advocates and those advocating sustainable use and development.

Areas and initiatives for potential collaboration could include:

- Capacity-building of Regional Fisheries Organisations (WECAFC, CRFM, GCFI, etc.) to incorporate non-fish bycatch (marine mammals) in stock assessments and scientific reviews;
- Development and implementation of national marine mammal observer programmes onboard large fishing boats and/or rapid bycatch assessment survey for artisanal fisheries. The IWC's Bycatch Mitigation Initiative (BMI) could be enlisted to assist with such an assessment;
- A regional review of entanglements in FADs, taking into account the findings of the recent global review by FAO⁸²⁵ and building upon recommendations that could support regional and country level initiatives in the WCR. This would include the quantification of FAD loss due to shipping and resulting ghost gear, and assessment of FAD materials utilized to identify sustainable options and mitigation measures.
- Development of a marine mammal bycatch training module (e.g., safe handling and release, gear marking, identification guides, monitoring and reporting, data collection) for inclusion in regional fisheries training workshops and outreach to local and regional fisher communities, serving to guide efforts in establishing/enhancing observer programmes and opportunistic data collection. Guidance for such a training module should include collaboration with the IWC's Bycatch Mitigation Initiative;
- Creation of formal outreach programme to fisher communities, including the use of surveys, which is critical to assess sightings, characterize fishing practices, and enlist traditional ecological knowledge. Encourage the collection of more detailed information to identify species caught through the distribution of simplified marine mammal species identification guides;
- Creation of a centralized database, to be resident within a regional fisheries organization or academic institution, for collecting and analyzing marine mammal-fisheries interaction data;
- Identification of targeted hotspot areas where entanglements have occurred for local training on entanglement and stranding on a biennial basis, and including local fisher folk. Local and traditional knowledge should be incorporated into these training workshops so as to better understand fishing methods, effort, and possible alternative methods or gear modification that could be deployed to reduce interactions;

- Collaborate with the FAO and International Whaling Commission's (IWC) Bycatch Mitigation Initiative and expert panel to assist in capacity-building in the Region⁸²⁶ and characterization of fisheries and bycatch in the WCR through a series of pilot projects. Specifically, capacity building is needed to enable countries to:

- Compile data on the type, scope and location of fishery activities in the Wider Caribbean;
- Collect data through strandings events (e.g., necropsies) to document and determine the cause of death of stranded animals;

- Conduct photo-identification work to document injuries and entanglements;
 - Consolidate and collect local distribution of cetaceans in the area to highlight potential areas of overlap and conflict;
- SPAW Parties should be encouraged to enact legislation that requires the reporting of marine mammal bycatch in fisheries operations.
- Enlist the Global Ghost Gear Initiative (GGGI), or other collaborative entities, to hold gear removal training in hotspot areas (or as part of Marine Protected Areas trainings) assessed through regional collaboration with fisheries organizations (e.g. GCFI, CRFM, etc.). CRFM and GGGI are currently developing an MOU to strengthen and formalize ongoing collaboration.
- All Parties to SPAW must enact legislation and enforce measures to implement the prohibitions in Article 11.1(b).⁸²⁷
- Where marine mammals are taken for reportedly 'traditional purposes,' an exemption must be reported through the SPAW Exemption Process.
 - Parties that intend to claim an exemption to meet a traditional subsistence and cultural need under Article 14 of the Protocol⁸²⁸ should demonstrate no substantial risk or reduction in the number of individuals within species or populations. *This will require the collection and reporting of catch data, as well as population assessments. As no exemptions have been sought under Article 14 since the inception of the Protocol, the process for reporting and evaluating such exemptions needs to be clarified.*
 - Where the consumption of cetaceans and/or manatees occurs, Parties should consider the establishment of health programmes to test mercury levels in communities to identify potential health impacts of consuming cetacean or manatee meat.
 - Parties should bring directed take/marine mammal hunting under their fisheries management umbrella and require data collection and research as a key objective for advancing the status of marine mammals in the region.

4. Habitat Degradation and Coastal Development

- Increase collaborative regional efforts with governmental and non-governmental organisations under the SPAW programme to support and enhance protection, ecological integrity, and function of critical habitats to marine mammals and their prey, including increased protection for coral reefs, mangroves, and seagrass beds.
- Integrate specific actions or initiatives relating to the conservation and management of marine mammals into joint programming among regional organisations focused on coastal planning and development to implement policies, strategies, and action plans for the protection of marine biodiversity and coastal ecosystems.
- Promote integration and identification of potential actions of relevance to marine mammals in follow-up to SPAW projects and products pertaining to the sound management of coastal and marine ecosystems, e.g. the Regional Strategy and Action Plan for the valuation, protection and/or restoration of key marine habitats in the CLME+;⁸²⁹ Italian-funded project "Biodiversity for Sustainable Development in the Caribbean (EBM);"⁸³⁰ BEST Initiative and Caribbean Coast executed through the SPAW-RAC.
- Support the compilation of a 'tool kit' with instruments to guide and prevent significant damage to critical marine mammal habitats in the WCR; e.g., EIAs, Coastal Zone Management policies/action plans; guidelines/practices for key industries such as tourism, including the promotion of impact assessment studies that consider marine mammals before any construction work is planned in coastal areas. Regional guidelines could be developed on how to mitigate/monitor such impacts on marine mammals.
- Increase outreach, cooperation, and partnerships with industry and commercial sectors such as fishing, mining, oil and gas, agriculture, tourism, and private enterprises to mobilize engagement and promote the principles and values of good governance for the conservation and management of marine ecosystems in the region.

5. Pollution and Marine Mammal Health

- Convene a regional workshop in the three SPAW languages (English, French and Spanish) to assess existing contaminants data for the region and their effects on marine mammal health, in line with the previous priority recommendation identified in the MMAP. Enlist the IWC's new 'expert panel' on marine mammal health and strandings to assist, and the regional Minamata Convention node on Antigua.
- Convene a regional response training workshop in cooperation with Parties to the CEP Oil Spills Protocol and RAC/REMPEITC focusing on marine mammals and particularly for those countries that are actively pursuing fossil fuel extraction and/or transport, including Barbados, Bahamas, Venezuela, Guyana and Trinidad and Tobago; noting that countries have engaged with the RAC/REMPEITC in the past to inform oil spill contingency trainings.⁸²⁹
- Establish or collaborate with existing sampling programmes for the testing of mercury and other heavy metals in fish, sargassum and marine mammal resources that are harvested for human consumption; and engage with the regional node for the Minamata Convention based on Antigua to centralize data management and analysis;
- Establish sampling programmes for emerging contaminants (micro and nano-plastics and associated chemical residues) in marine mammal resources that are harvested for human consumption;
- Collaborate with regional fisheries organisations to prioritize the development of a regional survey dedicated to collecting data on abandoned, lost, discarded fishing gear (ALDFG) as an important source of marine debris and associated impacts to marine mammals. Resulting data should be consolidated and shared with the Global Ghost Gear (GGGI) Data Portal.
- Develop partnerships and increase dialogue with oil and gas industry stakeholders in the region to mobilize engagement and support for national marine mammal baseline studies, noise pollution studies, and independent observation/

monitoring, all of which should be considered an integral requirement for oil surveys, exploration and development.

6. Protected Areas and Other Management Regimes

- In consideration of the uniqueness of the region and its diverse marine mammal fauna and its importance as breeding ground for humpback whales; the Sister Sanctuary Programme and 5 participating sanctuaries; and the listing process of MPAs under the SPAW Protocol, prepare a concept strategy evaluating the benefits of designating the entire Wider Caribbean as a Marine Mammal Sanctuary.
- Reach out proactively to recruit and engage MPA managers and others to the CARI'MAM network to build upon the recommendations and findings emanating to date from the CARI'MAM Project; for example, using CaMPAM network, IUCN Biopama, and other partner organisations in the WCR.
- Enhance management effectiveness of individual sites by promoting collaboration among ecologically connected marine and coastal protected areas and their managers/practitioners through the formal establishment of a cooperative network of listed protected areas under the SPAW Protocol. The MPA network framework should also provide elements of added value, incentives, direct benefits, and common goals for collaborating as a network under the Protocol, and recognize that no protected area can conserve marine mammals in isolation.
- Liaise and collaborate with other organizations involved in marine mammal protected area research and development, including the IUCN Marine Mammal Protected Areas Task Force/Important Marine Mammal Areas (IMMAs)⁸³⁰ and IWC in order to identify potential new MPAs for marine mammals. Designation of regional IMMAs addresses the gaps left by traditional MPAs that often overlook the specific vulnerabilities of marine mammals and their utility to leverage spatial protection measures. Collaboration with Conservation International's Rapid Assessment Program (RAP) could work to integrate existing marine mammal and ecosystem data to identify key sites for marine mammal conservation in the Region.

- Conduct learning and sharing of best practices (e.g., research, viewing guidelines, strandings response, enforcement, conservation measures) among the SPAW MPA networks to enhance management capacities for marine mammals and encourage other MPAs to join the network. This would include the development of a 'Marine Mammal module' to be used in 'Training of Trainers programme' under CaMPAM and other similar training and capacity-building opportunities in the region.
- Parties should consider marine mammal conservation needs in the development, review or consolidation of Protected Areas systems and respective management plans, especially in the case of MPAs which may not have been designed with this management objective specifically. Utilization of the TransAtlantic MPA Management Tool and Yarari Marine Mammal Sanctuary Action Plan are useful tools to assist.
- Strengthen the Sister Sanctuary programme through the development of a Framework MOU, whereby countries could join as signatories upon designation of a new sanctuary, outlining areas of cooperation based on lessons learned to date from the programme, as well as considering joint programming for activities in the WCR. Research indicates that other countries/territories are interested in joining the partnership, allowing for the development of a common strategy for conservation and joint scientific actions.
- Parties should consult available species distribution maps generated by the LifeWeb Project to identify any gaps in current protected areas nationally, and consider the creation of additional marine mammal sanctuaries.

7. Whale Watching and Associated Activities

- Build upon the CARI'MAM Project initiative to develop a pilot programme for a sustainable and voluntary whale watching certification, label, or outreach scheme to amplify best practices and endorsed SPAW guidelines in the Region.
- Encourage SPAW Parties to limit the number of marine mammal viewing operators based on a permitting system that places limits on the

maximum numbers of operators allowed and/or restrictions on areas of operation (e.g., no-go zones in sensitive or marine protected areas), alongside mandatory training of operators in order to receive and renew permits or licenses.

- Distribute SPAW marine mammal watching guidelines through a dedicated outreach programme, focusing as a priority on Marine Protected Area managers, that would include training and that could be transported throughout the region.
- Encourage SPAW Parties to develop their own national guidelines, or adopt the SPAW marine mammal viewing guidelines, to regulate emerging or existing whale watch operations in their waters, including development of local voluntary guidelines for responsible viewing (e.g., Bimini dolphin tour operator code,⁸³¹ Dolphin SMART programme in Florida⁸³²).
- Prioritize the creation of a laminated marine mammal field identification guide with a summary of regional best practice guidelines to distribute to fishing cooperatives and fisheries associations, marine mammal viewing operations, cruise and other recreational platforms, and other outlets to assist in collecting data (distribution and occurrence), reporting events of interest and concern (e.g., entanglements, strandings), and raising awareness.
- Encourage the SPAW Programme and SPAW-RAC to collaborate with the IWC on the convening of additional whale watching workshops and outreach, aligning with its 2018-2024 strategic plan⁸³³ which includes capacity building, integrated research and data collection, and information sharing (e.g. IWC's digital whale watching handbook, available at <https://wwhandbook.iwc.int/>).
- Reactivate CaribWhale or other regional whale watch operators' association to coordinate support for whale watch operators in the Region.
- Collaborate with the IWC Conservation Committee and Whale Watch Subcommittee of the IWC Scientific Committee to promote responsible marine mammal viewing activities in the Region through the IWC WW Handbook⁸³⁴ and other outreach materials.

8. Research

- Publish LifeWeb data in ObisMAP⁸³⁵ or other public data platform to recruit collaboration from researchers outside the Region and increase scientific interest (and funding) in the Region.
- Ensure the accessibility of LifeWeb project Mapping Tool on SPAW-RAC Website.
- Given recent research showing that cetacean culture and social complexity are important to conservation, and recognizing that populations of some cetacean species are better delineated by cultural behaviour rather than genetic structure,⁸³⁶ integrate cultural behaviors and boundaries into the evaluation of the status of species and subpopulations in the Region for conservation purposes.⁸³⁷ Understanding the importance of cultural and behavioral diversity through research will assist Parties in the assessment of the status of potentially vulnerable populations (e.g., when delineating units to conserve) and when devising effective conservation strategies (e.g., by identifying key repositories of social knowledge within species, or where specific measures would be most successful).⁸³⁸
- Utilize focal or sentinel species with evidence of population declines to mobilize species-specific workshops to address cumulative regional threats to local populations. (e.g., documented critical declines of the Eastern Caribbean Sperm Whale population⁸³⁹). Consider the development of species or issue-specific research consortia (e.g., Right Whale Consortium in the U.S./Canada).
- Promote and provide support to citizen-based initiatives to increase the collection of marine mammal sightings, strandings, and other data through the development of protocols to guide best practices, data collection, data storage and dissemination; the identification and endorsement of a consistent reporting platform (software application) that is accessible to all is a necessary part of this process (e.g., Flukebook, Obsenmer, etc.).
- Streamline and reform national permitting for genetics research in countries where such permits are not available to increase the collection of data to inform population-level research.
- Promote the cooperation between existing regional research networks (e.g. Solamac/Sociedad Latino Americana de Especialistas en Mamiferos Acuaticos; SOMEMMA/Sociedad Mexicana de Mamiferos Marinos; CARI'MAM; Caribbean-wide Orca Project, Network of Central American and Caribbean Marine Mammal Researchers; Society for Marine Mammalogy; European Cetacean Society; Caribbean Cetacean Society, NOAA) including collaborative field surveys and data exchange.
- Develop monitoring protocols and research guidelines, including guidelines regarding the use of invasive research (e.g., biopsy, tagging) and other methods, such as the collection of environmental DNA, and sharing of data.
- When designing future research projects, consider the recommendations, lessons learned, and findings emanating from the LifeWeb Project, MEGARA project, REMMOA aerial surveys, CARI'MAM hydrophone surveys, and AGOA boat campaigns.

9. Strandings

- Create a centralized reporting, collection, and storage mechanism for strandings data. This database would be centrally located and widely accessible to be used as an informational tool to assess causes and develop intervention measures to respond to future strandings. This function could be coordinated and assigned as part of the function of a marine mammal RAN. Data would include location, species, number of animals, state of decomposition, response, outcome, and where possible, cause of stranding(s). This would increase collaboration among Parties in the region to support the development and/or strengthening of existing national stranding networks.
- Solicit funding for the enhancement of the current regional Caribbean Stranding Network located at the Caribbean Manatee Conservation Center and Inter-American University of Puerto Rico.
- Develop marine mammal educational modules, training materials, and coursework for regional veterinary schools and universities to raise the profile of marine mammal medicine and stranding response.

- When conducting future training workshops on stranding response, they should include the coast guard, marine patrols, environmental and fisheries ministries, nonprofit organizations, and animal care and response communities.
- Identify national focal points to serve as liaisons and stranding points of contact to coordinate with regional Caribbean Stranding Network, and promote increased connectivity to existing national networks.
- The CEP, in coordination with the RAC, should conduct an outreach campaign aimed at disseminating the existing stranding field guide⁸⁴⁰ (or revised laminated identification or field guide) to focal points, relevant authorities, and organizations involved in strandings response in the region.
- Engage the expertise of the IWC Scientific Committee and the IWC Expert Panel on Strandings to assist with the above recommendations.

10. Captivity

- Parties should maintain an inventory of all facilities that hold captive marine mammals for research, rescue and rehabilitation, or public display, including a full national inventory of captive marine mammals, their origin, and disposition (e.g., living, dead, transfers). The inventory could be managed by the RAC, or coordinating unit of a marine mammal Regional Activity Network (RAN), with reporting from Parties on an annual basis via the Cartagena Reporting format or a special format developed for these purposes.⁸⁴¹
- Parties should report all live captures, and imports and/or exports of marine mammals for captivity. Such reporting should accompany an Exemption Report under Article 11(2) of the SPAW Protocol.
- Parties should develop, adopt, monitor and enforce the application of regulations and/or guidelines governing the acquisition, care, and maintenance of marine mammals in captivity, irrespective of the type of facility.

11. Acoustic Disturbance

- Develop and execute regional guidelines for seismic survey operations, using those guidelines

developed for the Northern part of South America (MaMa CoCo Sea region - Marine Mammal Conservation Corridor for Northern South America) as a model.

- Increase cooperation with regional/local maritime traffic sectors, e.g., through on-going work under RAC/REMPEITC-Caribe, to support countries in the development of programmes to monitor, mitigate, and/or eliminate persistent, intense maritime/coastal underwater noise.
- Support countries in the development of IMO shipping lanes to limit the locations of noise-emitting vessels.

12. Vessel Strikes

- Work with IMO and IWC to develop an appropriate protocol to enable consideration of cetacean distribution and occurrences for proposed new or revised routing schemes or speed restrictions.
- The IWC spearheaded a workshop,⁸⁴² co-sponsored with ACCOBAMS and the IUCN, to advance the idea of identifying areas of high risk for vessel strikes, by overlaying Important Marine Mammal Areas identified in the Mediterranean Sea with AIS shipping data. A similar exercise to identify ship strike 'hot spots' should be undertaken for the Caribbean, and utilizing LifeWeb co-occurrence maps (species distribution and threats).
- Parties and responders should report all incidents of vessel strikes to the IWC ship strike database to begin to consolidate data from the WCR.⁸⁴³ Because an existing mechanism and database already exists, Parties should consolidate national information and report to the IWC database which is currently devoid of data from the WCR.⁸⁴⁴
 - Develop a Caribbean Ship Strike Database or inventory using the IWC or Pelagos Sanctuary ship strike inventory for the Mediterranean as models, and through the identification of a monitoring and evaluation partner.⁸⁴⁵ A regional database could streamline reporting from the Region to the larger IWC ship strike databases.
 - National authorities should collaborate with whale watch and other recreational operators (e.g., Regatas) to encourage reporting of vessel

strikes (and entanglements/strandings) or other injuries to a designated location/entity to consolidate data for reporting to the IWC database, while devising avoidance strategies when operating in migratory corridors or seasonal aggregations (e.g., humpback whales).

- National authorities should identify local high-risk areas of concern based on the overlap of shipping and whale distribution data, or a high number of reported incidents. The identification of resident populations of marine mammals is especially important, in addition to known migratory corridors within designated shipping channels.
 - For critically endangered marine mammal species, a mandatory vessel strike reporting system should be established.⁸⁴⁶
 - Once high-risk areas are identified (e.g., Panama for bottlenose dolphins [Bocas del Toro] and Humpback whales), appropriate measures such as speed restrictions, time-area closures, rerouting, or other mitigation measures should be introduced. For example, the movement of whales in the Gulf of Panama coincides with major commercial maritime routes. A mitigation strategy implemented in December 2014 includes a 4-month restriction on vessel speed (i.e., 10 knots) when humpback whales are present.⁸⁴⁷
 - Incorporate elements of the IWC Ship Strike Strategic Plan into national and local Marine Mammal Action Plans.⁸⁴⁸
- Outreach materials should be developed that can be shared to raise mariners' awareness of the issue of collisions with large cetaceans. Distribution should go beyond the shipping industry to include national coast guards, marine police, marine protected area managers, military sector (Navy), cruise and leisure boaters, and recreational and commercial fishing charters.⁸⁴⁹ Whale Alert may be a useful platform to encourage reporting of vessel interactions with these stakeholders.⁸⁵⁰
- Engage with the Florida Caribbean Cruise Association and cruise operators and industry associations regarding the development of protocols

to monitor and mitigate the risk of vessel operations in migratory corridors and other important or biologically sensitive areas in the Region.

13. Climate Change

- Seek funding and support for the development and adoption of climate mitigation activities, including the enhancement and protection of coastal ecosystems (coral reef, mangrove, and seagrass bed restoration) that ultimately benefit marine mammal populations.
- Incorporate marine mammal considerations, especially for coastal species such as the manatee and estuarine dolphin species, into national climate change mitigation action plans and strategies.
- Compile an overview on main lessons learned from the implementation of key climate change projects, programmes, and strategies in the Region that address the direct or indirect effects on marine mammals, as means of providing specific future directions to mitigation measures that Parties may adopt.
- Identify key data that might be collected by WCR stranding networks, that can be used as indicators of potential disease and parasite impacts from warming waters.

ANNEX I: Marine and Aquatic Mammal Species Listed Under the SPAW Protocol

All cetacean species are listed on Annex II of the Protocol Concerning Specially Protected Areas and Wildlife (SPAW Protocol) of the Cartagena Convention. Of these, 14 species are mysticetes (baleen whales), and the rest are odontocetes (toothed whales).^{851, 852, 853} These species were listed in 1991 and have remained on the Annex since the Protocol came into force in 2000. The table also includes three species in the family Sirenia, and two in the family Mustelidae.

Key:

DD: data deficient

LC: least concern

NT: near threatened

VU: vulnerable

EN: endangered

CR: critically endangered

FAMILY – FAMILLE – FAMILIA	SCIENTIFIC NAME – NOM SCIENTIFIQUE – NOMBRE CIENTÍFICO	COMMON NAME	NOM COMMUN	NOMBRE COMÚN	IUCN STATUS	CITES	OBSERVED IN WCR AND VALIDATED BY SPAW EXPERTS IN 2020
Order/ Ordre/ Orden: CETACEA (All spp.)							
Balaenidae	<i>Balaena mysticetus</i>	Bowhead whale, Greenland whale	Baleine du Groenland	Ballena de Groenlandia	LC	I	
Balaenidae	<i>Eubalaena glacialis</i>	North Atlantic right whale	Baleine franche de l'Atlantique Nord	Ballena franca del norte	CR	I	Yes
Balaenidae	<i>Eubalaena japonica</i>	North Pacific right whale	Baleine franche du Pacifique Nord	Ballena franca del Pacífico norte	EN	I	
Balaenidae	<i>Eubalaena australis</i>	Southern right whale	Baleine franche australe	Ballena franca Austral	LC	I	
Neobalaenidae	<i>Caperea marginata</i>	Pygmy right whale	Baleine Pygmée	Ballena franca pigmea	LC	I	
Eschrichtiidae	<i>Eschrichtius robustus</i>	Gray whale	Baleine grise	Ballena gris	LC	I	
Balaenopteridae	<i>Balaenoptera acutorostrata</i>	Common minke whale	Petit rorqual	Ballena minke	LC	I	Yes
Balaenopteridae	<i>Balaenoptera bonaerensis</i>	Antarctic minke whale	Petit rorqual antarctique	Ballena minke Antártica	NT	I	
Balaenopteridae	<i>Balaenoptera borealis</i>	Sei whale	Rorqual boréal	Ballena sei	EN	I	Yes
Balaenopteridae	<i>Balaenoptera edeni</i>	Bryde's whale	Rorqual de Bryde	Ballena de Bryde	LC	I	Yes
Balaenopteridae	<i>Balaenoptera musculus</i>	Blue whale	Rorqual bleu	Ballena azul	EN	I	Yes
Balaenopteridae	<i>Balaenoptera omurai</i>	Omura's whale	Rorqual d'Omura	Rorcual de Omura	DD	I	
Balaenopteridae	<i>Balaenoptera physalus</i>	Fin whale	Rorqual commun	Rorcual común, ballena de aleta	VU	I	Yes
Balaenopteridae	<i>Balaenoptera ricei</i>	Rice's whale	Rorqual de Rice	Ballena de Rice			*Confirmed as a new species for the GOM ⁸⁴³
Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback whale	Baleine à bosse	Ballena jorobada	LC	I	Yes

Physeteridae	<i>Physeter macrocephalus</i>	Sperm whale, cachalot	Cachalot	Cachalote	VU	I	Yes
Kogiidae	<i>Kogia breviceps</i>	Pygmy sperm whale	Cachalot pygmée	Cachalote pigmeo	DD	II	Yes
Kogiidae	<i>Kogia sima</i>	Dwarf sperm whale	Cachalot nain	Cachalote enano	DD	II	Yes
Ziphiidae	<i>Berardius arnuxii</i>	Arnoux's beaked whale	Bérardie d'Arnoux	Ballena de pico de Arnoux	DD	I	
Ziphiidae	<i>Berardius bairdii</i>	Baird's beaked whale	Baleine à bec de Baird	Ballena de pico de Baird	DD	I	
Ziphiidae	<i>Hyperoodon ampullatus</i>	Northern bottlenose whale	Hyperoodon Boréal	Ballena nariz de botella del Norte	DD	I	
Ziphiidae	<i>Hyperoodon planifrons</i>	Southern bottlenose whale	Hyperoodon Austral	Ballena nariz de botella del Sur	LC	I	
Ziphiidae	<i>Indopacetus pacificus</i>	Longman's beaked whale, Indo-Pacific beaked whale	Baleine à bec de Longman	Zifio de Longman	DD	II	
Ziphiidae	<i>Mesoplodon bidens</i>	Sowerby's beaked whale	Mésoplodon de Sowerby	Ballena de pico de Sowerby	DD	II	Yes
Ziphiidae	<i>Mesoplodon bowdoini</i>	Andrews' beaked whale	Mésoplodon De Andrew	Ballena de pico de Andrew	DD	II	
Ziphiidae	<i>Mesoplodon carlhubbsi</i>	Hubbs' beaked whale	Mésoplodon De Hubbs	Ballena de pico de Hubbs	DD	II	
Ziphiidae	<i>Mesoplodon europaeus</i>	Gervais' beaked whale	Baleine à bec de Gervais	Ballena de pico de Gervais	DD	II	Yes
Ziphiidae	<i>Mesoplodon ginkgodens</i>	Ginkgo-toothed beaked whale	Mésoplodon De Nishiwaki	Zifio de Nishiwaki	DD	II	
Ziphiidae	<i>Mesoplodon grayi</i>	Gray's beaked whale	Mésoplodon De Gray	Ballena de pico de Gray	DD	II	
Ziphiidae	<i>Mesoplodon hectori</i>	Hector's beaked whale	Mésoplodon De Hector	Ballena de pico de Héctor	DD	II	
Ziphiidae	<i>Mesoplodon hotaula</i>	Deraniyagala's beaked whale	Mesoplodon de Nishiwaki	Zifio de Deraniyagala	DD	II	
Ziphiidae	<i>Mesoplodon layardii</i>	Strap-toothed beaked whale, Layard's beaked whale	Mésoplodon de Layard	Ballena de pico de Layard	DD	II	
Ziphiidae	<i>Mesoplodon mirus</i>	True's beaked whale	Mésoplodon de True	Ballena de pico de True	DD	II	Yes
Ziphiidae	<i>Mesoplodon perrini</i>	Perrin's beaked whale	Mésoplodon De Perrin	Zifio de Perrin	DD	II	
Ziphiidae	<i>Mesoplodon peruvianus</i>	Pygmy beaked whale	Mésoplodon Pygmée	Zifio peruano	DD	II	
Ziphiidae	<i>Mesoplodon stejnegeri</i>	Stejneger's beaked whale	Mésoplodon De Stejneger	Ballena de pico de Stejneger	DD	II	
Ziphiidae	<i>Mesoplodon traversii</i>	Spade-toothed whale	Mésoplodon De Bahamonde	Zifio de Bahamonde	DD	II	
Ziphiidae	<i>Mesoplodon densirostris</i>	Blainville's beaked whale	Baleine à bec de Blainville	Ballena de pico de Blainville	DD	II	Yes
Ziphiidae	<i>Tasmacetus shepherdi</i>	Shepherd's beaked whale	Tasmacète de Shepherd	Ballena picuda de Shepherd	DD	II	
Ziphiidae	<i>Ziphius cavirostris</i>	Cuvier's beaked whale, goose-beaked whale	Baleine à bec de cuvier	Ballena de Cuvier	LC	II	Yes
Platanistidae	<i>Platanista gangetica</i>	South Asian river dolphin, Indian river dolphin	Plataniste du Gange	Delfín del Ganges	EN	I	
Iniidae	<i>Inia geoffrensis</i>	Amazon river dolphin, Pink dolphin, boto	Dauphin de l'Amazonie	Tonina rosada, tonina del Orinoco, bufeo	EN	II	Yes
Lipotidae	<i>Lipotes vexillifer</i>	Yangtze river dolphin (possibly extinct)	Baiji	Baiji	CR	I	

Pontoporiidae	<i>Pontoporia blainvillei</i>	La Plata River Dolphin, Franciscana	Dauphin de La Plata	Franciscana, Delfín de La Plata, Tonina	VU	II	
Monodontidae	<i>Delphinapterus leucas</i>	Beluga, white whale	Bélouga, Dauphin blanc	Ballena blanca	LC	II	
Monodontidae	<i>Monodon monoceros</i>	Narwhal	Narval	Narval	LC	II	
Delphinidae	<i>Cephalorhynchus commersonii</i>	Commerson's dolphin	Dauphin de Commerson	Delfín de Commerson, delfín pío	LC	II	
Delphinidae	<i>Cephalorhynchus eutropia</i>	Chilean dolphin	Dauphin du Chili	Delfín Chileno	NT	II	
Delphinidae	<i>Cephalorhynchus heavisidii</i>	Heaviside's dolphin, Haviside's dolphin	Dauphin de Heaviside	Delfín de Heaviside	NT	II	
Delphinidae	<i>Cephalorhynchus hectori</i>	Hector's dolphin	Dauphin d'Hector	Delfín de Hector	EN	II	
Delphinidae	<i>Delphinus delphis</i>	Common dolphin (short-beaked), saddleback dolphin	Dauphin commun	Delfín común de pico corto	LC	II	Yes
Delphinidae	<i>Delphinus capensis</i>	Common dolphin(long-beaked)		Delfín común de pico largo	DD	II	
Delphinidae	<i>Feresa attenuata</i>	Pygmy killer whale	Orque pygmée	Orca pigmea	LC	II	Yes
Delphinidae	<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	Globicéphale tropical	Calderón de aleta corta	LC	II	Yes
Delphinidae	<i>Globicephala melas</i>	Long-finned pilot whale	Globicéphale noir	Calderón negro	LC	II	
Delphinidae	<i>Grampus griseus</i>	Risso's dolphin	Dauphin de Risso	Delfín de Risso	LC	II	Yes
Delphinidae	<i>Lagenodelphis hosei</i>	Fraser's dolphin	Dauphin de Fraser	Delfín de Fraser, Borneo	LC	II	Yes
Delphinidae	<i>Lagenorhynchus acutus</i>	Atlantic white-sided dolphin	Dauphin à flancs blancs	Delfín de costados blancos	LC	II	
Delphinidae	<i>Lagenorhynchus albirostris</i>	White-beaked dolphin	Dauphin à bec blanc	Delfín de hocicio blanco	LC	II	
Delphinidae	<i>Lagenorhynchus australis</i>	Peale's dolphin	Dauphin de Peale	Delfín austral	LC	II	
Delphinidae	<i>Lagenorhynchus cruciger</i>	Hourglass dolphin	Dauphin Crucigère	Delfín cruzado	LC	II	
Delphinidae	<i>Lagenorhynchus obliquidens</i>	Pacific white-sided dolphin	Lagénorhynque à flanc blanc du Pacifique	Delfín lagenorringo	LC	II	
Delphinidae	<i>Lagenorhynchus obscurus</i>	Dusky dolphin	Lagénorhynque sombre	Delfín obscuro	LC	II	
Delphinidae	<i>Lissodelphis borealis</i>	Northern right-whale dolphin	Dauphin aptère boréal	Delfín liso del norte	LC	II	
Delphinidae	<i>Lissodelphis peronii</i>	Southern right-whale dolphin	Dauphin aptère austral	Delfín liso austral, tunina sinaleta	LC	II	
Delphinidae	<i>Orcaella brevirostris</i>	Irrawaddy dolphin	Orcelle	Delfín del Irrawaddy	EN	I	
Delphinidae	<i>Orcaella heinsohni</i>	Australian snubfin dolphin	Dauphin à aileron retroussé d'Australie	Delfín beluga de Heinsohn o delfín de aleta chata australiano	VU	I	
Delphinidae	<i>Orcinus orca</i>	Killer whale, orca	Orque	Orca	DD	II	Yes
Delphinidae	<i>Peponocephala electra</i>	Melon-headed whale	Péponocéphale	Delfín cabeza de melón	LC	II	Yes
Delphinidae	<i>Pseudorca crassidens</i>	False killer whale	Pseudorque, faux orque	Orca falsa	NT	II	Yes

Delphinidae	<i>Sousa teuszii</i>	Atlantic humpback dolphin	Dauphin Du Cameroun, Dauphin à bosse de l'Atlantique	Bueo Africano, Delfín blanco Africano, Delfín jorobado del Atlántico	CR	I	
Delphinidae	<i>Sousa chinensis</i>	Indo-Pacific humpback dolphin	Dauphin à bosse de l'Indo-Pacifique	Delfín jorobado del Indo-Pacífico	VU	I	
Delphinidae	<i>Sousa plumbea</i>	Indian Ocean humpback dolphin	Dauphin à bosse	Delfín giboso índico	EN	I	
Delphinidae	<i>Sousa sahalensis</i>	Australian humpback dolphin, Sahul dolphin	Dauphin à bosse de l'Australie	Delfín jorobado de Australia	VU	I	
Delphinidae	<i>Sotalia fluviatilis</i>	Tucuxi, estuarine dolphin	Tucuxi	Tucuxi	EN	I	Yes
Delphinidae	<i>Sotalia guianensis</i>	Guiana dolphin, costero, sotalia	Dauphin de Guyane, Sotalie	Tonina costera	NT	I	Yes
Delphinidae	<i>Stenella attenuata</i>	Pantropical spotted dolphin	Dauphin tacheté pantropical	Delfín manchado pantropical	LC	II	Yes
Delphinidae	<i>Stenella clymene</i>	Clymene dolphin	Dauphin de Clymène	Delfín de Clymene	LC	II	Yes
Delphinidae	<i>Stenella coeruleoalba</i>	Striped dolphin	Dauphin bleu et blanc	Delfín listado	LC	II	Yes
Delphinidae	<i>Stenella frontalis</i>	Atlantic spotted dolphin	Dauphin tacheté de l'Atlantique	Delfín manchado del Atlántico	LC	II	Yes
Delphinidae	<i>Stenella longirostris</i>	Spinner dolphin	Dauphin à long bec	Delfín rotador	LC	II	Yes
Delphinidae	<i>Steno bredanensis</i>	Rough-toothed dolphin	Sténo	Delfín de dientes rugosos	LC	II	Yes
Delphinidae	<i>Tursiops aduncus</i>	Indo-pacific bottlenose dolphins	Grand dauphin de l'Océan Indien	Delfín mular del oceano indico	NT	II	
Delphinidae	<i>Tursiops truncatus</i>	Common bottlenose dolphin	Grand dauphin	Delfín nariz de botella	LC	II	Yes
Phocoenidae	<i>Neophocaena phocaenoides</i>	Indo-Pacific finless porpoise	Marsouin noir, marsouin de l'Inde	Marsopa sin aleta, marsopa negra	VU	I	
Phocoenidae	<i>Neophocaena asiaeorientalis</i>	Narrow-ridged finless porpoise	Marsouin aptère	Marsopa lisa	EN	I	
Phocoenidae	<i>Phocoena dioptrica</i>	Spectacled porpoise	Marsouin de Lahille, Marsouin à lunettes	Marsopa de anteojos	LC	II	
Phocoenidae	<i>Phocoena phocoena</i>	Harbor porpoise	Marsouin commun	Marsopa común	LC	II	
Phocoenidae	<i>Phocoena sinus</i>	Vaquita, Gulf of California harbor porpoise	Marsouin du golfe de Californie	Vaquita marina o cochito	CR	I	
Phocoenidae	<i>Phocoena spinipinnis</i>	Burmeister's porpoise	Marsouin de Burmeister	Marsopa espinosa	NT	II	
Phocoenidae	<i>Phocoenoides dalli</i>	Dall porpoise	Marsouin de Dall	Marsopa de Dall	LC	II	
Order/ Ordre/ Orden: SIRENIA (All spp.)							
Trichechidae	<i>Trichechus manatus</i>	West Indian manatee	Lamantin des Antilles/des Caraïbes	Manatí antillano/ caribeño	VU	I	Yes
Trichechidae	<i>Trichechus inunguis</i>	Amazonian Manatee	Lamantin de l'Amazonie	Manatí Amazónico	VU	I	Yes
Trichechidae	<i>Trichechus senegalensis</i>	African manatee	Lamantin d'Afrique	Manatí de Africa	VU	I	
Dugongidae	<i>Dugong dugon</i>	Dugong	Dugong	Dugon	VU	I	
Order/ Ordre/ Orden: CARNIVORA							
Mustelidae	<i>Pteronura brasiliensis</i>	Giant Otter		Nutria gigante	EN	I	Yes
Mustelidae	<i>Lontra longicaudis</i>	Southern neotropical otter		Nutria neotropical	NT	I	Yes

ANNEX II: Contracting Parties to the SPAW Protocol

STATUS OF RATIFICATION OF THE SPAW PROTOCOL	
STATE	DATE OF RATIFICATION OR ACCESSION
The Bahamas	24-Jun-10
Barbados	14-Oct-02
Belize	04-Jan-08
Colombia	05-Jan-98
Cuba	04-Aug-98
Dominican Republic	24-Nov-98
France	05-Apr-02
Grenada	05-Mar-12
Guyana	14-Jul-10
Honduras	13-Oct-18
Netherlands	02-Mar-92
Panama	27-Sept-96
Saint Lucia	18-May-00
Saint Vincent and the Grenadines	26-Jul-91
Trinidad and Tobago	10-Aug-99
United States of America	16-Apr-03
Venezuela	28-Jan-97

ANNEX II: SPAW Whale Watching Guidelines

OVERARCHING PRINCIPLES AND BEST PRACTICE GUIDELINES FOR MARINE MAMMAL WATCHING IN THE WIDER CARIBBEAN REGION (WCR) 2011

Management Considerations [abbreviated]

National licensing or permitting schemes to regulate:

- The number, size and type of vessels,
- Standards of operation
- Site specific and species-specific requirements
- Research and media
- Training for operators

Guidelines for Watching Marine Mammals

- Do not touch a marine mammal.
- Do not feed a marine mammal.
- Do not make any loud or sudden noises that are transmittable under water.
- Do not make sudden or repeated changes in direction or speed.
- Do not carry out any activities that might condition marine mammals to approach watercraft.
- Do not throw litter into the water.
- Dedicated observer(s) should be on duty, in addition to the captain of the vessel.
- Do not place a vessel in a position where it will drift into marine mammals.
- When watercraft are in known manatee habitat, speed should not exceed 5 knots.
- Leave boat engine on and in idle, or drop sails, when watching marine mammals.
- Do not disperse or separate a group of marine mammals.
- Watercraft should not chase, encircle, leap-frog, block the direction of travel of marine mammals or access to the open sea, or position itself in the middle of a group.
- If marine mammals approach the watercraft, slow down gradually, put engines in idle or drop sails.
- If dolphins approach a vessel to bow-ride or wake-ride, maintain a steady speed and avoid changes in course.
- When departing from marine mammals, determine where the animals are relative to the watercraft

to avoid collisions or coming too close to the animals, and increase speed gradually only after confirmation that the animals are outside the no approach zone.

- Watching marine mammals for more than 30 minutes, or 3 dive sequences with sperm whales, is discouraged.
- Any accidents or collisions with marine mammals should be documented and reported to relevant authorities

Watercraft

Certain watercraft should not be used for marine mammal watching. These include jet skis and similar crafts (e.g. all motorized personal watercraft), parasail, remotely operated craft, wing in ground effect craft, hovercraft, windsurfers, kite surfers. The use of aircraft and helicopters for marine mammal watching is discouraged, except in the case of permitted scientific research and media

Angles And Distances of Approach

The most appropriate method for approaching a whale or a dolphin is from the side and slightly to the rear of the animal. Avoid approaches from head on or directly from behind. In the case of sperm whales, approach animals from the rear and slightly to the side

A caution zone is an area in which watercraft should proceed at a no-wake speed (6 knots or less). The caution zone is the area within 300m from a whale, 150m from a dolphin and 50m from a manatee. Within 50m of a manatee, engines should be shut off.

- No more than 3 watercraft should be in the caution zone of a marine mammal at a time.
- When there is more than one watercraft in the caution zone, operators should coordinate movements and maintain radio contact.
- Observe marine mammals at a speed not exceeding the speed of the slowest animal.

The no approach zone is the minimum distance to which a watercraft may approach a marine mammal.

Engines should be in neutral, or sails dropped.

- Minimum approach distances for whales in the region range from 50–250m. Minimum approach distances for dolphins in the region range from 30–100m, including the area directly in front of and behind a pod.
- A standardized minimum approach distance of 50m for whales and dolphins recommended but there may be conditions under which it would be recognized that a greater distance would be appropriate e.g. mother-calf pairs.
- Minimum approach distance for manatees is 30m. It was recognized that there may be conditions where greater distances may be appropriate, e.g. mother-calf pairs. 5 21.

Aircraft: If permitted, the group recommended that aircraft may not approach (in height or distance) to within 500m of a marine mammal

Mother and Calf Pairs

- Exercise extreme caution with groups containing calves.
- Site-specific restrictions on length of encounter and distance of approach should be considered for groups with calves

Swimming and Diving with Marine Mammals in the Wild

Scientific studies should be initiated to assess:

a) the associated risk to the safety of the people participating in swim-with activities; and b) the current and potential future impacts of these activities on the target cetacean species. Any accidents should be documented and reported to relevant authorities.

- Particularly sensitive animals (e.g. mothers with calves) and habitats (e.g. calving and feeding grounds) should be provided additional protection (refer to Management Considerations)
- No sub-surface swimming activities should be allowed, including the use of any underwater breathing apparatus and scooters.
- Underwater flash photography or lighted filming should not be allowed.

- An adaptive precautionary approach should be taken when reviewing swim-with operating procedures. Consideration should be given to:
 - Regular review of operational standards as credible scientific information on the impacts of swim-with programmes becomes more available;
 - All persons in the water with marine mammals should be accompanied by an appropriately trained local guide;
 - Limiting the maximum number of vessels permitted to undertake swim with activities in a region;
 - Limiting the number of swimmers allowed in the water at any one time with a marine mammal or group of marine mammals;
 - Limiting the maximum amount of in-water time allowed with a marine mammal or group of marine mammals per day, including maximum swim time for each interaction, time required between successive swims with 6 each animal and maximum cumulative interaction time with each animal per day;
 - Appropriate drop-off distance for swimmers and minimum swimmer distance from animals;
 - Entering the water with marine mammals during behaviorally sensitive situations should be discouraged;
 - Swimming with mothers and calves should be discouraged;
 - Prohibit leap-frogging and limit the number of swimmer drop offs or attempts.

FOOTNOTES AND REFERENCES

1. The neotropical river otter is not a listed species on SPAW Annex II; it is listed on SPAW Annex III.
2. According to Article 11(b): "Parties shall adopt cooperative measures to ensure the protection and recovery of endangered and threatened species fauna listed in Annexes II by prohibiting the taking, possession or killing (including, to the extent possible, the incidental taking, possession or killing) or commercial trade in such species, their eggs, parts or products." Also included in these prohibitions is "to the extent possible, the disturbance of such species, particularly during periods of breeding, incubation, estivation or migration and other periods of biological stress." Article 11.2 allows limited exemptions, as follows: "Each Party may adopt exemptions to the prohibitions prescribed for the protection and recovery of the species listed in Annexes I and II for scientific, educational or management purposes necessary to ensure the survival of the species or to prevent significant damage to forests or crops. Such exemptions shall not jeopardize the species and shall be reported to the Organization in order for the Scientific and Technical Advisory Committee to assess the pertinence of the exemptions granted."
3. This mechanism may build upon the network established by the CARIMAM Project.
4. Several versions of a more comprehensive MMAP were eventually streamlined to a proposed MMAP that focused on a five-year plan of action. UNEP(DEPI)/CAR WG.27/2. Rev.3 (August 2005) is the original action plan with comprehensive recommendations. UNEP(DEPI)/CAR IG.25/4 (November 2006) was the first iteration of the Priority Actions and Five-Year Plan presented to COP4.
5. MMAP as adopted in September 2008 at COP5. UNEP(DEPI)/CAR IG.29/INF.4 (November 2008)
6. UNEP(DEPI)/CAR IG.29/INF.4 (September 2010)
7. Interim reports on MMAP implementation activities were provided to SPAW COP6 (Montego Bay, Jamaica) in October 2010 and COP8 (Cartagena, Colombia) in December 2014. [UNEP(DEPI)/CAR IG.29/INF.4 and UNEP(DEPI)/CAR WG.36/INF.6]
8. UNEP(DEPI)/CAR WG.31/INF.14. (April 2008). Draft compilation of capacities for marine mammals. United Nations Environment Programme. (presented to SPAW STAC4. Gosier, Guadeloupe, July 2008)
9. MMAP as adopted in September 2008 at COP5, including 5-year prioritised objectives and outputs. UNEP(DEPI)/CAR IG.29/INF.4 (November 2008)
10. A separate data sheet was prepared for each Country, summarizing available data, and supporting the assessments below. These data sheets are not presented within this technical report.
11. http://laws.bahamas.gov.bs/cms/images/LEGISLATION/SUBORDINATE/2005/2005-0080/MarineMammalProtectionGeneralRegulations_1.pdf and http://laws.bahamas.gov.bs/cms/images/LEGISLATION/PRINCIPAL/2005/2005-0012/MarineMammalProtectionAct_1.pdf
12. See for example, FAO. (2016). Fisheries and Aquaculture in The Bahamas: A Review. 79 pp. <https://www.bahamas.gov.bs/wps/wcm/connect/e1d636dd-1a9b-4661-9e38-ba9bf546a534/FINAL+Bahamas+Fisheries+%26+Aquaculture+Sector+Review+17Nov16.pdf?MOD=AJPERES>
13. Bahamas Fisheries Resources (Jurisdiction and Conservation Act) https://elaw.org/sites/default/files/content_type_law_attachment/FisheriesResourcesJurisdictionandConservationAct_1.pdf
14. <https://www.stanielcay.com/pdfs/FisheriesRegulationsBooklet.pdf>
15. Comments from Caribbean Regional Fisheries Mechanism (CRFM), Milton Haughton, September 28, 2020.
16. <http://www.tribune242.com/news/2019/nov/01/stop-disney-group-resumes-campaign/> and <http://www.tribune242.com/news/2019/jul/31/petition-wont-stop-disney-development/> and <https://www.orlandosentinel.com/travel/florida-cruise-guide/os-tr-cru-royal-caribbean-perfect-day-at-cococay-opening-soon-story.html>; <https://www.cruisehive.com/carnival-agrees-to-new-cruise-port-in-the-bahamas/33755>
17. Comments from Caribbean Regional Fisheries Mechanism (CRFM), Milton Haughton, September 28, 2020.
18. <https://thenassauguardian.com/2019/10/21/reearth-calls-for-reversal-of-oil-drilling-license/> and <https://www.miamiherald.com/news/local/environment/article240817596.html>
19. <https://www.bpcplc.com/about-us/about-the-bahamas/oil-exploration-present/>
20. Freeport Container Port on Grand Bahama largest commercial transshipment facility in the region.
21. Ibid.
22. <https://www.itopf.org/knowledge-resources/countries-territories-regions/countries/bahamas/>
23. <https://www.freeportcontainerport.com/>
24. <https://www.wildquest.com/wp-content/uploads/CodeOfConduct.pdf>
25. <http://www.mpatlas.org/region/country/BHS/#:~:text=The%20Bahamas%20is%20part%20of,their%20marine%20environments%20by%202020>.
26. <http://www.thebahamasweekly.com/uploads/17/MPASTMT.pdf>
27. Hoyt, E. (2005). Marine Protected Areas for Whales, Dolphins, and Porpoises. Earthscan, London.
28. <https://www.afcea.org/content/navy-extends-pae-applied-technologies-contract-atlantic-undersea-test-and-evaluation-center-support>
29. Stranded species included two West Indian Manatees. One stranded alive (2009) and later died, and the other (2017) was rescued, rehabbed and released.
30. Strandings data provided by Diane Claridge and Charlotte Dunn of Bahamas Marine Mammal Research Organization (BMMRO).
31. Department of Commerce and Secretary of the Navy. (2001). Joint Interim Report: Bahamas Marine Mammal Stranding Event of 15-16 March 2000. December. Accessible at <https://www.thecre.com/sefReports/wp-content/uploads/2012/12/Evans-D.I..pdf>
32. Filadelfo, R., Mintz, J., Michlovich, E., D'Amico, A., Tyack, P., and Ketten, D. R. (2009). Correlating military sonar use with beaked whale mass strandings: What do the historical data show? *Aquatic Mammals*, 35(4), 435-444.
33. Ibid.
34. <https://www.caribbeanlifeneews.com/the-bahamas-pursues-search-for-oil/>
35. Melillo-Sweeting, K., Yeater, D., and Dudzinski, K. (2015). Dolphin sightings near the coast of Bimini, The Bahamas, 2003-2013. *Aquatic Mammals*, 41(3), 245-251.
36. Bahamas Petroleum Company. (2011). Licenses held by Bahamas Offshore Petroleum Limited in the Commonwealth of The Bahamas. Competent Person's Report. https://d1ssu070pg2v9i.cloudfront.net/pex/bahamas/2017/06/07132506/bahamas_petroleum_company_plc_-_cpr_july_revision.pdf
37. <https://www.bpcplc.com/about-us/about-the-bahamas/oil-exploration-present/>
38. <https://unfccc.int/node/61009>
39. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bahamas%20First/Bahamas_COP-22%20UNFCCC.pdf
40. <https://www.facebook.com/fadtrackers/>
41. <http://extwprlegs1.fao.org/docs/pdf/bar5073.pdf>
42. Barbados focal point response to RAC survey.
43. Romero, A., and Creswell, J. E. (2005). In the land of mermaid: How culture, not ecology, influenced marine mammal exploitation in the Southeastern Caribbean. In *Environmental Issues in Latin America and the Caribbean*, Chapter 1. (eds.) Aldemaro Romero and Sarah West, pp. 3-30.
44. <http://www.fao.org/fishery/facp/BRB/en>
45. Mycoo, M. (2014). Sustainable tourism, climate change and sea level rise adaptation policies in Barbados. *Natural Resources Forum*, 38, 47-57.

46. <http://www.coastal.gov.bb/content/coastal-risk-assessment-and-management-programme>
47. <https://www.stabroeknews.com/2020/02/07/news/regional/barbados/barbados-issues-oil-exploration-licences/>
48. <http://www.fao.org/fishery/facp/BRB/en>
49. Ibid.
50. Government of Barbados. (2018). Barbados' Second National Communication Under the United Nations Framework Convention on Climate Change (UNFCCC). 123 pp.
51. Government of Barbados. (2018). Barbados' Second National Communication Under the United Nations Framework Convention on Climate Change (UNFCCC). 123 pp. https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/4693851_Barbados-NC2-1-Barbados%20SNC%20FINAL%20April%202018.pdf
52. <https://tinyurl.com/y5ne4n92>
53. Ecomar (2015). Status of Antillean Manatees in Belize-ECOMAR Belize. Powerpoint presentation. http://www.ecomarbelize.org/uploads/9/16/7/0/9670208/g___ecorrea_forestdepartment_bel.pdf
54. Belize SPAW focal point feedback (Jamal Galves).
55. Ramos, E. A., Castelblanco-Martinez, N., Jenko, K., Torres, C. A. N., Gomez, N. A. (2016). A review of aquatic mammals in Belize. *Aquatic Mammals*, 42(4), 476-493. (19) (PDF) *A Review of the Aquatic Mammals of Belize*. Available from: https://www.researchgate.net/publication/311207043_A_Review_of_the_Aquatic_Mammals_of_Belize
56. Kiszka, J. (2014). Bycatch assessment of the West Indian Manatee (*Trichechus manatus*) and other megafauna in artisanal fisheries in the Caribbean. Final report to SPAW-RAC.
57. Galves, J., Guy, C., Auil Gomez, N., Bonde, R. K., Powell, J., Alvarez-Aleman, A., and Castelblanco-Martinez, N. Long-term manatee stranding programme in Belize: Can there be a future for Antillean manatees? (*in preparation*).
58. <https://www.edf.org/media/belize-implements-national-sustainable-fisheries-reforms>
59. LaCommare, K. S., Self-Sullivan, C., and Brault, S. (2008). Distribution and habitat use of Antillean Manatees (*Trichechus manatus manatus*) in the drowned cayes area of Belize, Central America. *Aquatic mammals*, 34(1), 35-43.
60. Dick, D. M., and Hines, E. M. (2011). Using distance sampling techniques to estimate bottlenose dolphin (*Tursiops truncatus*) abundance at Turneffe Atoll, Belize. *Marine Mammal Science*, doi: 10.1111/j.1748-7692.2010.000435.x
61. <https://www.openchannels.org/sites/default/files/literature/Belize%20Integrated%20Coastal%20Zone%20Management%20Plan%202016.pdf>
62. <https://qz.com/1173884/belize-is-ending-all-oil-exploration-to-protect-its-coral-reefs/>
63. Gomez, N. A. (2011). The fate of manatees in Belize. In Too precious to drill: The marine biodiversity of Belize (eds) Maria Lourdes D. Palomares and Daniel Pauly, Fisheries Centre Research Reports, 19(6).
64. Ramos, E. A., Castelblanco-Martinez, N., Garcia, J., Arias, J. R., Foley, J. R., Audley, K., Van Waerebeek, K., and Van Bresseem, M. (2018). Lobomycosis-like disease in common bottlenose dolphins *Tursiops truncatus* from Belize and Mexico: bridging the gap between the Americas. *Diseases of Aquatic Organisms*, 128, 1-12. doi: <https://doi.org/10.3354/dao03206>
65. <http://www.racrempeitc.org/sites/default/files/Attachments/Belize%20Draft%202008.pdf>
66. Ramos, E. A., Castelblanco-Martinez, N., Jenko, K., Torres, C. A. N., Gomez, N. A. (2016). A review of aquatic mammals in Belize. *Aquatic Mammals*, 42(4), 476-493. (19) (PDF) *A Review of the Aquatic Mammals of Belize*.
67. O'Connor, S., Campbell, R., Cortez, H., & Knowles, T. (2009). Whale Watching Worldwide: tourism numbers, expenditures and expanding economic benefits, a special report from the International Fund for Animal Welfare, Yarmouth MA, USA, prepared by Economists at Large
68. https://www.tours.com/tours_vacations/belize/whale_watching.htm
69. LaCommare, K. S., Self-Sullivan, C., and Brault, S. (2008). Distribution and habitat use of Antillean Manatees (*Trichechus manatus manatus*) in the drowned cayes area of Belize, Central America. *Aquatic mammals*, 34(1), 35-43.
70. Data from Belize SPAW Focal point.
71. Ecomar. (2015). Status of Antillean Manatees in Belize-ECOMAR Belize. Powerpoint presentation.
72. Dick, D. M., and Hines, E. M. (2011). Using distance sampling techniques to estimate bottlenose dolphin (*Tursiops truncatus*) abundance at Turneffe Atoll, Belize. *Marine Mammal Science*. doi: 10.1111/j.1748-7692.2010.00435.x
73. Ramos, E. A., Castelblanco-Martinez, N., Jenko, K., Torres, C. A. N., Gomez, N. A. (2016). A review of aquatic mammals in Belize. *Aquatic Mammals*, 42(4), 476-493. (19) (PDF) *A Review of the Aquatic Mammals of Belize*. Available from: https://www.researchgate.net/publication/311207043_A_Review_of_the_Aquatic_Mammals_of_Belize
74. <https://www.seewinter.com/research/belize-manatee-conservation/>
75. Fundacion Internacional para la Naturaleza y la Sustentabilidad <https://finsconservation.org/?fbclid=IwAR0-QAbWSD8Beil4QIZxoXPK7lp1GRRTCFDfub-jl0YG0CHen5SsKSzDyJE>
76. <https://www.oceanicsociety.org/projects/belize-manatee-research>
77. Galves, J., Guy, C., Auil Gomez, N., Bonde, R. K., Powell, J., Alvarez-Aleman, A., and Castelblanco-Martinez, N. Long-term manatee stranding programme in Belize: Can there be a future for Antillean manatees? (*in preparation*).
78. Personal communication with researcher Eric Angel Ramos, October 12, 2020.
79. Anecdotal information provided by M. Houghton, CRFM, September 28, 2020.
80. LaCommare, K. S., Self-Sullivan, C., and Brault, S. (2008). Distribution and habitat use of Antillean Manatees (*Trichechus manatus manatus*) in the drowned cayes area of Belize, Central America. *Aquatic mammals*, 34(1), 35-43.
81. Galves, J., Guy, C., Auil Gomez, N., Bonde, R. K., Powell, J., Alvarez-Aleman, A., and Castelblanco-Martinez, N. Long-term manatee stranding programme in Belize: Can there be a future for Antillean manatees? (*in preparation*).
82. Galves, J., Beck, C. A., Bonde, R. K., Powell, J. A., and Auil-Gomez, N. Boat-induced scars on living Antillean manatees (*Trichechus manatus manatus*) in Belize. (*in preparation*).
83. Garcia, J. (2016). Changes in *Tursiops truncatus* distribution and behavior in the Drowned Cayes, Belize, and correlation to human impacts. Master's thesis. Nova Southeastern University. Retrieved from NSUWorks, (419) https://nsuworks.nova.edu/occ_stuetd/419.
84. <https://www.nationalgeographic.com/news/2018/04/belize-restores-coral-reefs-oil-drilling-ban-environment/>
85. Ibid.
86. FAO. (2012). Disaster risk management and climate change adaptation in the CARICOM and wider Caribbean region. Regional Workshop Report, Kingston, Jamaica, December 10-12.
87. E.g., Directiva Permanente, 01 July 2001, Dirección General Marítima – DIMAR on responsible watching of humpback whales in the Pacific.
88. Caicedo-Herrera, D., Trujillo, F., Rodríguez, C., and Rivera, M. (Eds.). (2005). *Programa Nacional de Manejo y Conservación de Manatíes en Colombia*. Ministerio de Ambiente, Vivienda y desarrollo Territorial y Fundación Omacha. Bogotá, Colombia
89. IWC. (2020). Scientific Committee Paper, SC/68B/CMP/21. Cambridge, UK.
90. Trujillo, F., Caicedo, D., and Diazgranados, M. C. (Eds.). 2014. Plan de acción nacional para la conservación de los mamíferos acuáticos de Colombia (PAN mamíferos Colombia). Ministerio de Ambiente y Desarrollo Sostenible, Fundación Omacha, Conservación Internacional y WWF. Bogotá, 54 pp.
91. Naranjo, L. G., and J.D. Amaya-Espinell (Eds.). (2009). Plan Nacional de las especies migratorias. *Diagnóstico e identificación de acciones para la conservación y el manejo sostenible de las especies migratorias de la biodiversidad en Colombia*. Ministro de Ambiente, Vivienda y Desarrollo Territorial, WWF Colombia. Cali, Colombia.

92. Trujillo, F., Gärtner, A., Caicedo, D., and Diazgranados, M. C. (Eds.). (2013). *Diagnóstico del estado de conocimiento y conservación de los mamíferos acuáticos en Colombia*. Ministerio de Ambiente y Desarrollo Sostenible, Fundación Omacha, Conservación Internacional y WWF. Bogotá, 312 pp.
93. Palacios, D.M. (1993). Más sobre varamientos causados por explosiones submarinas. *El Observador Informativo* – Fundación Ecuatoriana para el Estudio de Mamíferos Marinos, 5(1), 2.
94. Plan Nacional de Restauración: restauración ecológica, rehabilitación y recuperación de áreas disturbadas. (2015). Bogotá, D.C.: Colombia. Ministerio de Ambiente y Desarrollo Sostenible, 92pp.
95. Mosquera-Guerra, F., Trujillo, F., Parks, D., Oliveira da Costa, M., Van Damme, P., Echeverría, A., Franco, N., Carvajal-Castro, J., Mantilla-Meluk, H., Marmontel, M and D. Armenteras. (2019). Mercury in populations of river dolphins of the Amazon and Orinoco basins. *EcoHealth*, 16, 743-758.
96. Ibid.
97. <https://www.minambiente.gov.co/index.php/temas-asuntos-marinos-costeros-y-recursos-acuaticos/12-tema-final>; <http://www.invemar.org.co/>
98. INVEMAR (2017). Informe del estado de los ambientes y recursos marinos y costeros en Colombia, 2016. Serie de Publicaciones Periódicas No. 3. Santa Marta. 200 pp.
99. Guía de avistamiento responsable de mamíferos acuáticos en Colombia. Eds., Comps.: Ministerio de Ambiente y Desarrollo Sostenible. Dirección de Asuntos Marinos Costeros y Recursos Acuáticos: González D., Ana María, Quintero G., Julio A., Asocars. Textos: Lara, Gustavo, Parques Nacionales: Osorio, Clara E.; Fundación Omacha. Textos: Trujillo Fernando; Caicedo H. Dalila; Duque, Lylie; Becerra, Carolina; Rosso, María Camila; Ortiz, Erika. Bogotá, D.C. Colombia. Ministerio de Ambiente y Desarrollo Sostenible, 2017. 48 pp.
100. Colombia: Whale and dolphin watching country profile. IWC (2018) Online. Whale Watching Handbook. <https://wwhandbook.iwc.int/en/>
101. CARDIQUE, CARSUCRE, CODECHOCO, CORALINA, CORPAMAG, CORPOGUAJIRA, CORPONARINO, CORPOURABA, CRA, CRC, CVC, CVS, INVEMAR, MADS, PNN. (2016). Plan de Acción del Subsistema de Áreas Marinas Protegidas - SAMP 2016-2023: Lineamientos para su consolidación en el marco de los Subsistemas Regionales de Áreas Protegidas del Pacífico y del Caribe. Editado por: A. P. Zamora-Bornachera. Proyecto COL75241, PIMS # 3997, Diseño e implementación de un Subsistema Nacional de Áreas Marinas Protegidas (SAMP) en Colombia. Invemar, MADS, GEF y PNUD. Serie de publicaciones Generales del Invemar # 85, Santa Marta. 60 pp.
102. Alonso, D., Barbosa, H., Duque, M., Gil, I., Morales, M., Navarrete, S., Nieto, M., Ramírez, A., Sanclemente, G., and Vásquez, J. (2015). Conceptualización del Subsistema de Áreas Marinas Protegidas en Colombia. Documento de Trabajo (Versión 1.0). Proyecto COL75241 Diseño e implementación de un Subsistema Nacional de Áreas Marinas Protegidas (SAMP) en Colombia. Invemar, MADS, GEF y PNUD. Serie de Publicaciones Generales del Invemar No 80, Santa Marta. 80 pp.
103. Trujillo, F., Gärtner, A., Caicedo, D., and Diazgranados, M. C. (Eds.). (2013). *Diagnóstico del estado de conocimiento y conservación de los mamíferos acuáticos en Colombia*. Ministerio de Ambiente y Desarrollo Sostenible, Fundación Omacha, Conservación Internacional and WWF. Bogotá, 312 pp.
104. Morales, N and Jauregui, A. 2012. Cetáceos presentes en el Caribe Nororiental Colombiano (2004-2012). *MUTIS Revista de la Universidad Jorge Tadeo Lozano*. 2(2), 60 -75.
- Mutis, M.A. and Polanco F., A. (2019). First stranding record of Kogia sima (Owen, 1866) in the Colombian Caribbean. *Latin American Journal of Aquatic Mammals*, 14(1), 18-26. <https://doi.org/10.5597/lajam00250>
- Pardo, M. A., C. Jiménez-Pinedo, and Palacios, D. M. (2009). The false killer whale (*Pseudorca crassidens*) in the southwestern Caribbean: first stranding record in Colombian waters. *Latin American Journal of Aquatic Mammals*, 7, 63-67. Doi:10.5597/LAJAMOO136
- Pardo M. A. and Palacios, D. (2006). Cetacean occurrence in the Santa Marta region, Colombian Caribbean, 2004-2005. *Latin American Journal of Aquatic Mammals*, 2, 129-134.
105. Palacios, D.M. (1993). Más sobre varamientos causados por explosiones submarinas. *El Observador Informativo* – Fundación Ecuatoriana para el Estudio de Mamíferos Marinos, 5(1), 2.
106. <http://acuariorodadero.com/>; and <https://oceanario.co/home/>
107. www.cetabase.org
108. Fundación Omacha y Corporación Autónoma de los Valles del Sinú y San Jorge CVS. 2009. Segunda fase de la Implementación del Plan de Manejo y Conservación del manatí *Trichechus manatus* en la cuenca Baja y Media del río Sinú, departamentode Córdoba. Bogotá.
109. Morales, N. (2011). Contribución al estudio etológico de *Tursiops truncatus* (Montagu, 1821) y *Sotalia guianensis* (van Bénédén, 1864) en el Acuario y Museo del Mar El Rodadero, Santa Marta. Bogotá, Facultad de Ciencias Naturales e Ingeniería, Universidad Jorge Tadeo Lozano. B.Sc. Thesis, 111pp.
110. A review of seismic mitigation measures used along the coast of Northern South America, from North Brazil up to Colombia. (2015). Reference Document for the MaMa CoCo SEA Steering Committee. 76pp. http://www.car-spaw-rac.org/IMG/pdf/seismic_mitigation_measures_review_mamacocosea.pdf
111. Pardo, M. A., and Palacios, D. (2006). Cetacean occurrence in the Santa Marta region, Colombian Caribbean, 2004-2005. *Latin American Journal of Aquatic Mammals*, 5(2), 129-134. <http://dx.doi.org/10.55.97/lajam00105>
112. Trujillo, F., Gärtner, A., Caicedo, D., and Diazgranados, M. C. (Eds.). (2013). *Diagnóstico del estado de conocimiento y conservación de los mamíferos acuáticos en Colombia*. Ministerio de Ambiente y Desarrollo Sostenible, Fundación Omacha, Conservación Internacional and WWF. Bogotá, 312 pp.
113. Resolución 160/2011, Ministerio de Ciencia, Tecnología y Medio Ambiente (CITMA), significant species and vulnerable to extinction.
114. 1981: Ley de Protección del Medio Ambiente y los Recursos Naturales 1995: Sistema Legal Jerárquico de Regulaciones Ambientales. 1996: Constitución de la República de Cuba. Art. 27. 1996: Ley de Pesca. 1997: Ley 81 Ley de Medio Ambiente. 1999 Ley de Sistema Nacional de Áreas Protegidas. 2000: Ley de Gestión de Zonas Costeras. 2000: Estrategia Nacional de Medio Ambiente 2002 Estrategia Nacional de la Diversidad Biológica. and Environmental Law 81, the Fishery Decree-Law 164, the Coastal Zone Decree-Law 212, and the Protected Areas Decree-Law 201.
115. Alvarez-Alemán, A., Angulo Valdes, J., and Powell, J. (2013). ABSTRACT Manatee research and conservation in Cuba. Congreso de Biología y Conservación, Habana, Cuba.
116. Espinosa, J., and Orta, J. (2007) Biota Marina. Pages 72-141 in González, H.A. (Ed) *Biodiversidad de Cuba*, Ciudad de Guatemala.
117. Alvarez-Alemán, A., García Alfonso, E., Forneiro Martin-Vianna, Y., Hernández Gonzalez, Z., Escalona Domenech, R., Hurtado, A., Powell, J., Jacoby, C. A., and Frazer, T. K. (2018). Status and conservation of manatees in Cuba: historical observations and recent insights. *Bulletin of Marine Science*, 94(2), 313-327.
118. Resolución No. 503/2012 - Ministerio de la Industria Alimentaria. It prohibits the use of trawlers for scale fishing on the Cuban platform, due to the aggressive nature of this fishing gear on habitats and on species captured due to its low selectivity.
119. <http://www.granma.cu/ciencia/2015-10-09/luz-roja-a-la-caza-del-manati> [accessed 3 July 2020]
120. Rey Santos, O., Cruz Sardiñas, T., López García, A.C., Whittle, D., and Kanepa, C. (2008). Manual de legislación ambiental para la gestión de la zona costera de Cuba. 60pp.
121. The Coastal Zone Decree-Law 212
122. <http://www.racrempeitc.org/sites/default/files/Cuba%20-%20Country%20Profile%202008.pdf>
123. Perera-Valderrama, S., Hernández-Ávila, A., González-Méndez, J., Moreno-Martínez, O., Cobián-Rojas, D., Ferro-Azcona, H., Milián-Hernández, E., Caballero-Aragón, H., Alcolado, P. M., Pina-Amargós, F., Hernández-González, Z., Espinosa-Pantoja, L., Rodríguez-Farrat, L. F. (2018). *Bulletin of Marine Science*, 94(10), 1-20.
124. Alvarez-Alemán, A.; García Alfonso E, Forneiro Martin-Vianna, Y., Hernández Gonzalez, Z., Escalona Domenech, R., Hurtado, A., Powell J., Jacoby, C. A., and Frazer, T. K. (2018). Status and conservation of manatees in Cuba: historical observations and recent insights. *Bulletin of Marine Science*, 94(2), 313-327.
125. Whitt, A. D., Jefferson, T. A., Blanco, M., Fertl, D., and Rees, D. (2011). A review of marine mammal records of Cuba. *Latin American Journal of Aquatic Mammals*, 9(2), 65-122.
126. <https://www.sarasotadolphin.org/2011-dolphin-health-assessment/>

127. Cruz, D., Rodriguez, M., Kouri, V., Soto, Y., Zamora, L., Rodriguez, D., Barrera, M., and Rehtanz, M. (2014). Concurrent papillomavirus- and herpesvirus-infection in Atlantic bottlenose dolphins (*Tursiops truncatus*) inhabiting the Cuban coast. *Marine Mammal Science*, doi:10.1111/mms.12124 <http://desg.acuacionacional.cu:8080/acuawifi/datos/mediateca/datos/salud-animal/publicaciones/147.pdf>
128. Blanco, M. 2008. Varamientos y avistamientos de ballenas edentadas (cetacea: Mysticeti) en costas y aguas cubanas. *Revista de Investigaciones Marinas*, 29(1), 81-85.
129. Blanco, M. (2013). Varamientos y avistamientos de *Physeter macrocephalus* (Mammalia: Physeteridae) en las costas y aguas de la plataforma Cubana. *Revista cubana de ciencias biológicas*, 2(1), 46-50.
130. Blanco, M. and Olachea, A. (1996). Morfometría del delfín nariz de botella (*Tursiops truncatus*), en la zona de Varadero, Cuba. *Memorias de la Jornada Científica 35 Aniversario*. 21-22 December 1996, Acuario Nacional de Cuba, La Habana, Cuba. Blanco, M. and Olachea, A. (2000) Morfometría del delfín nariz de botella *Tursiops truncatus*, en la costa norte de la zona central de Cuba. *MarCuba 2000*, Congreso de Ciencias del Mar, 5. 4-8 December 2000. La Habana, Cuba.
131. <https://holiplus.com/en/tour/5225k/excursion-specialized-swim-with-dolphins-in-varadero>
132. <https://www.alamy.com/stock-photo-swimming-with-dolphins-in-rancho-cangrejo-varadero-cuba-rancho-cangrejo-83616104.html>
133. www.cetabase.org
134. <https://www.adaptation-undp.org/explore/caribbean/cuba>
135. Resolución No. 01/2008 que aprueba el Reglamento sobre la Tenencia, Manejo y Exhibición de Especies de Mamíferos Marinos en la República Dominicana
• Resolución No. 43/2018 que aprueba el Reglamento Técnico Ambiental para la Observación de Ballenas de los Bancos de La Plata y La Navidad;
• Resolución No. 44/2018 que modifica el Procedimiento de Solicitud de Autorización para la Observación de Mamíferos Marinos en la Bahía de Samaná y en La Bahía de Samaná Reglamento Técnico Ambiental para la Observación de Ballenas de los Bancos de La Plata y la Navidad en La Bahía de Samaná
136. Plan de Manejo del Santuario de Mamíferos Marinos de los Bancos de La Plata y La Navidad. (2015). Ministerio de Medio Ambiente y Recursos Naturales, Santo Domingo, D.N. Republica Dominicana. 144pp.
137. <https://iwc.int/building-the-global-whale-entanglement-response-ne>
138. Dominican Republic questionnaire response [Ministry of Environment and Natural Resources-MARENA]
139. Ibid
140. Procedures for Permit issuance to observe Marine Mammals in Samana Bay (Resolución No. 44/2018)- La modificación del Procedimiento de Solicitud de Autorización para la Observación de Mamíferos Marinos en la Bahía de Samaná
141. IWC. (2018). *Online Whale Watching Handbook*. <https://www.handbook.iwc.int/en/case-studies/dominican-republic-saman%C3%A1-bay>
142. Santuario de Mamíferos Marinos Estero Hondo - Plan de Manejo 2014 – 2019 (2014). Ministerio de Medio Ambiente Y Recursos Naturales, Viceministerio de Areas Protegidas y Biodiversidad, Direccion de Areas Protegidas. Proyecto de Reingeniería del Sistema Nacional de Áreas Protegidas para Alcanzar la Sostenibilidad Financiera. UNDP/GEF. 70 p.
143. Plan de Negocio del Santuario de Mamíferos Marinos Estero Hondo 2014-2019 (2014). Ministerio de Medio Ambiente Y Recursos Naturales, Viceministerio de Areas Protegidas y Biodiversidad, Direccion de Areas Protegidas. Proyecto de Reingeniería del Sistema Nacional de Áreas Protegidas para Alcanzar la Sostenibilidad Financiera. UNDP/GEF. 22 pp.
144. Draheim, M., Bonnelly, I., Bloom, Rose, N., and Parsons, E. C. M. (2010). Tourist Attitudes Towards Marine Mammal Tourism: An Example from the Dominican Republic. *Tourism in Marine Environments*, 6(4), 175-183.
145. Dominican Republic response questionnaire.
146. Ibid.
147. Decree No. 601-08 – creates National Climate Change Council 'Consejo Nacional para el Cambio Climático y Mecanismo de Desarrollo Limpio'
- Law No. 1-12 – establishes the National Development Strategy 2030 'Estrategia Nacional de Desarrollo 2030'
- Decree No. 269-15 – established the National Climate Change Policy – 'Política Nacional de Cambio Climático (PNCC)'
- Decree No. 23/16 – creates High Level Interinstitutional Commission la Comisión Interinstitucional de Alto Nivel para el Desarrollo Sostenible National Climate Change Adaptation Plan- 'Plan Nacional de Adaptación para el Cambio Climático en la República Dominicana 2015-2030 (PNACC RD)'
148. <https://www.adaptation-undp.org/explore/caribbean/dominican-republic>
149. <https://www.dolphin-academy.com/>
150. Luksenburg, J. A. (2014). Prevalence of external injuries in small cetaceans in Aruban waters, Southern Caribbean. *PLoS One*, 9(2): e88988. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3929637/>
151. Luksenburg, J. A. (2013). The cetaceans of Aruba, southern Caribbean. *Journal of Marine Biological Association of the UK*, doi: 10.1017/S0025315413000337
152. <https://www.dcnanature.org/yarari-sanctuary-established/>
153. <http://caribischnetwork.nl/2015/01/10/ongezuiverd-rioolwater-maakt-mens-en-dier-ziek/>
154. de Bettencourt, J., and Imminga-Berends, H. (2015). Overseas Countries and Territories: Environmental Profiles. Final Report: Section A-Caribbean Region; EuropeAid/127054/C/SER/multi, Request no. 2013/325768. 54 pp.
155. Ibid.
156. de Bettencourt, J., and Imminga-Berends, H. (2015). Overseas Countries and Territories: Environmental Profiles. Final Report: Section A-Caribbean Region; EuropeAid/127054/C/SER/multi, Request no. 2013/325768. 54 pp.
157. Ibid.
158. <https://www.dcnanature.org/yarari-sanctuary-established/>
159. <https://www.arubanationalpark.org/main/management-plan-marine-park/>
160. Geelhoed, S. C. V., Janinhoff, N., Verdaat, J. P., van Bemmelen, R. S. A., and Scheidat, M. (2013). Aerial surveys of marine mammals and other fauna around Aruba, Curaçao and Bonaire, November 2013. IMARES, 22 pp.
161. Luksenburg, J. A. (2013). The cetaceans of Aruba, southern Caribbean. *Journal of Marine Biological Association of the UK*, doi: 10.1017/S0025315413000337
162. <https://www.dcnanature.org/wp-content/uploads/2019/02/BioNews-Yarari-MarineMammals.pdf>
163. Ibid.
164. Personal communication, Paul Hoetjes. May 18, 2020.
165. SPAW focal point feedback. October 21, 2020.
166. Luksenburg, J. A. (2014). Prevalence of external injuries in small cetaceans in Aruban waters, Southern Caribbean. *PLoS One*, 9(2): e88988. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3929637/>
167. <https://www.dcnanature.org/climate-change-impacts-within-the-dutch-caribbean/>
168. <https://nca2018.globalchange.gov/chapter/20/>
169. <https://www.netherlandsworldwide.nl/countries/united-states/about-us/aruba-and-you/sustainability-in-aruba>
170. <https://www.curacaochronicle.com/post/main/together-we-can-build-resilience-against-climate-change/>
171. <https://wetten.overheid.nl/BWBR0028413/2010-10-10>
172. Personal conversation with Yoeri Devries, SPAW Focal Point, March 10, 2020.
173. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management and implementation for marine mammal conservation in the Saba sector of the Yarari Sanctuary. Wageningen, Wageningen Marine Research (University and Research Center), Wageningen Marine Research Report C097/17. 103 pp.
174. Wolfs, E., Schep, W., Gallegos, V. J., and van Beukering, P. (2015). What is Bonaire's cruise tourism worth? Report for the Institute for Environmental Studies. 72 pp.

175. Ministry of Economic Affairs. (2014). Convention on Biological Diversity: Fifth National Report of the Kingdom of the Netherlands. <https://www.cbd.int/doc/world/nl/nl-nr-05-en.pdf>
176. Ibid.
177. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management and implementation for marine mammal conservation in the Saba sector of the Yarari Sanctuary. Wageningen, Wageningen Marine Research (University and Research Center), Wageningen Marine Research Report C097/17. 103 pp.
178. de Bettencourt, J., and Imminga-Berends, H. (2015). Overseas Countries and Territories: Environmental Profiles. Final Report: Section A-Caribbean Region; EuropeAid/127054/C/SER/multi, Request no. 2013/325768. 54 pp.
179. de Bettencourt, J., and Imminga-Berends, H. (2015). Overseas Countries and Territories: Environmental Profiles. Final Report: Section A-Caribbean Region; EuropeAid/127054/C/SER/multi, Request no. 2013/325768. 54 pp.
180. Scheidat, M., Boman, E., Davaasuren, N., Geelhoed, S., and de Graaf, M. (2015). Monitoring cetacean occurrence in coastal waters of the Caribbean Netherlands (Saba, St. Eustatius & Bonaire) using port sampling. IMARES, Wageningen UR, report number C038/15.
181. Several research groups including Wageningen Marine Research (formerly IMARES), University of Groningen and local nature management organizations have been collecting data about local species. Summarized here: <https://www.dcnanature.org/wp-content/uploads/2019/02/BioNews-Yarari-MarineMammals.pdf>
182. <https://www.dcnanature.org/wp-content/uploads/2019/02/BioNews-Yarari-MarineMammals.pdf>
183. Ibid.
184. STENAPA newsletter, October 2011. <https://ufdcimages.uflib.ufl.edu/UF/00/10/01/00/00027/10-2011.pdf>
185. Conversation with Netherlands focal point. March 13, 2020
186. Ibid.
187. Conversation with Netherlands focal point. March 13, 2020
188. https://unfccc.int/process/parties-non-party-stakeholders/parties-convention-and-observer-states?field_partys_partyto_target_id%5B51%5D=511
189. <https://www4.unfccc.int/sites/ndcstaging/pages/Party.aspx?party=NLD>
190. <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Netherlands%20First/LV-03-06-EU%20INDC.pdf>
191. <https://www.Curaçaochronicle.com/post/main/together-we-can-build-resilience-against-climate-change/>
192. While recognising the different environmental context of French Guiana, setting it apart from the other four insular French territories in the WCR, all territories are highlighted together in France's country assessment for the sake of consistency and logistical considerations in this report.
193. Projects conducted by Groupe d'étude et de protection des oiseaux de Guyane (CEPOG), WWF and Kwata NGOs and a Project on the Development of knowledge acquisition work for the identification of thresholds and the reduction of pressures in the West Indies: definition of thresholds for the indicators of the management plan of the Agoa Sanctuary.
194. <https://iwc.int/iwc-entanglement-training-in-eastern-caribbean>
195. <https://observatoire-pelagis.cnrs.fr/publications/ouvrages/Guide-des-echouages>
196. Dars, C., Dabin, W., Demaret, F., Dorémus G., Meheust E., Mendez-Fernandez P., Peltier E., Spitz, J., and Van Canneyt, O. (2019). Les échouages de mammifères marins sur le littoral français en 2018. Rapport scientifique de l'Observatoire PELAGIS, La Rochelle Université et CNRS. 39pp. <https://www.observatoire-pelagis.cnrs.fr/IMG/pdf/rapportechouages2018.pdf>
197. MamaCocoSea Project. (2013). Marine Mammal Conservation Corridor for Northern South America Follow-Up Workshop Proceedings. 18-20 March 2013, Paramaribo, Suriname. 63pp.
198. Personal communication, Caroline Rinaldi, November 19, 2020.
199. CLME+. (2013). The Strategic action programme for the sustainable management of the shared living marine resources of the Caribbean and the North Brazil Shelf Large Marine Ecosystems (CLME+ SAP). 99pp.
200. Dars C., Dabin W., Demaret F., Dorémus G., Meheust E., Mendez-Fernandez P., Peltier E., Spitz J. Van Canneyt O., 2019. Les échouages de mammifères marins sur le littoral français en 2018. Rapport scientifique de l'Observatoire PELAGIS, La Rochelle Université et CNRS. 39pp.
201. Mayol, P., de Mongolfier, B., Ratel, M., Bordes, R., Costales, L., Iatropoulos, D., Ortolé, C., and Belhadjer, A. (2015). Caractérisation des activités d'observation commerciale des cétacés à l'échelle du sanctuaire Agoa. Etude commandée par le sanctuaire Agoa Co-financée par l'Agence des aires marines protégées et la DEAL Martinique Maitrise d'œuvre réalisée par Souffleurs d'Écume en partenariat avec Aquasearch. Décembre 2015. 110 pp.
202. Martinez, L., Galdes, D., Suardi, A., Wyss, V., Dutrieux, E., and Chaîneau, C. H. (2019). New sightings records of marine mammals and seabirds off French Guiana. *Latin American Journal of Aquatic Research*, 47(5), 753-763.
203. Rinaldi, C., Rinaldi, R., Laine, J., and Barbraud, C. (2020). Etat des lieux des connaissances des cétacés en côte sous le vent de la Guadeloupe 1998-2018 - Occurrence - suivi des populations. in progress.
204. Online report at <http://www.side.developpement-durable.gouv.fr>
205. Online report at http://oceansciencelogistic.org/?page_id=286
206. Bordin, A., Pracontal, N., Hauselman, A., Rinaldi, R., and Renaudier, A. (2012). *Résultats de l'inventaire pélagique 2011/2012. Traitement et analyse des données d'observation d'oiseaux marins et de cétacés dans la ZEE guyanaise. Rapport GEPOG/DEAL*. 67 pp. <https://inpn.mnhn.fr/espece/jeudonnees/2997?g=en>
207. <https://www.wwf.fr/projects/ameliorer-les-connaissances-sur-le-dauphin-de-guyane>
208. Pusineri, C. and Berzins, R. (2016). Réseau de suivi des échouages de mammifères marins et de tortues marines en Guyane : Bilan des deux premières années de fonctionnement 2014-2015. Technical Report. 26pp.
209. Rinaldi, C. (2019). 20 ans de recensement des échouages et détresses de mammifères marins Guadeloupe et îles du nord 1998-2017. colloque RNE 2019 Martinique and personal conversation with Caroline Rinaldi, Association Evasion Tropicale, November 19, 2020
210. <https://abcnews.go.com/International/wireStory/france-ban-wild-animals-circuses-marine-parks-73307384#:~:text=PARIS%20%2D%2DFrance's%20environment%20minister,raising%20mink%20on%20fur%20farms.>
211. MamaCocoSea Project. (2015). A review of seismic mitigation measures used along the coast of northern South America, from north Brazil up to Colombia, Reference document for the MamaCocoSea Steering Committee. 76pp. http://www.car-spaw-rac.org/IMG/pdf/seismic_mitigation_measures_review_mamacocosea.pdf
212. http://www.guyane.developpement-durable.gouv.fr/IMG/pdf/2016_guidesismique_osl_vf.pdf
213. <https://www.ecologie.gouv.fr/sites/default/files/Guide%20preconisations%20pour%20limiter%20l%20impact%20des%20bruits%20sous-marins%20sur%20la%20faune%20marine.pdf>
214. <https://ecologie.gouv.fr/sites/default/files/Guide%20preconisations%20pour%20limiter%20l%20impact%20des%20bruits%20sous-marins%20sur%20la%20faune%20marine.pdf>
215. Personal conversation with Jeff Bernus, Scientific Officer with CARIMAM, October 28, 2020.
216. Grenada National Protected Area System Gap Assessment. The Nature Conservancy. <https://www.cbd.int/doc/pa/tools/Grenada%20National%20Protected%20Area%20System%20Gap%20Assessment.pdf> Blue Growth Coastal Master Plan, including the Integrated Coastal Zone Management Policy approved in 2016. Policy outlines principles of integrated coastal zone management to be adopted by Grenada Integrated Management Bill Section 13 provides for stiffer measures for protection of beaches :-Grenada Fisheries Act 1986;-Grenada Birds and Other Wildlife Protection Act 1957;- Fisheries Conservation Regulations (SRO#24, 1995) :- Fisheries (Marine Protected Areas) Order (SRO#77, 2001) - Fishing Vessels Safety Regulations (SRO#3, 1990) :- Forest, Soil and Water Conservation Act Cap 116;- National Parks and Protected Areas Cap 203;- Oil in Navigable Waters Act Cap 206;-

- Physical Planning and Development Control Act, No. 25 of 2002 - Ports Authority Act Cap 247;- Territorial Sea and Maritime Boundaries Act Cap 318;- Tourist Board Act Cap 321;- Yachting Act #17, 2000
217. Portal of the Government of Grenada. <https://www.gov.gd/mocr/fisheries>
218. Romero, A., and Hayford, K. T. (2000). Past and present utilisation of marine mammals in Grenada, West Indies. *Journal of Cetacean Research and Management*, 2(3), 223-226.
219. <http://www.fao.org/fishery/facp/GRD/en#pageSection2>
220. Coastal Zone Management in Grenada, Carriacou and Petite Martinique . A brief from the Integrated Climate Change Adaptation Strategies (ICCAS) Programme. July 2018. <https://www.giz.de/en/downloads/ICCAS-FS-en-2018-%20costal%20zone%20management.pdf>; National Portal of the Government of Grenada. [https://www.gov.gd/mocr/sustainable-development-council-puts-spotlight-biodiversity; Grenada country review. Commonwealth Marine Economies Programme. 2018. \[https://www.gov.gd/sites/mocr/files/Commonwealth_Marine_Economies_Programme_-_Grenada_Country_review.pdf\]\(https://www.gov.gd/sites/mocr/files/Commonwealth_Marine_Economies_Programme_-_Grenada_Country_review.pdf\); Grenada National Biodiversity Strategy and Action Plan 2016-2020- 30 June 2016. <https://www.cbd.int/doc/world/gd/gd-nbsap-v2-en.pdf>; Project Brief. Coastal EbA Project in Grenada Pilot, 2014-16 \[https://www.gov.gd/sites/mocr/files/docs/Projects/GoG-UN%20Environment%20Coastal%20EbA%20Project_Project%20Brief%20and%20Coral%20Reef%20Restoration%20Programme.pdf\]\(https://www.gov.gd/sites/mocr/files/docs/Projects/GoG-UN%20Environment%20Coastal%20EbA%20Project_Project%20Brief%20and%20Coral%20Reef%20Restoration%20Programme.pdf\)](https://www.gov.gd/mocr/sustainable-development-council-puts-spotlight-biodiversity;Grenada%20country%20review.Commonwealth%20Marine%20Economies%20Programme.2018.https://www.gov.gd/sites/mocr/files/Commonwealth_Marine_Economies_Programme_-_Grenada_Country_review.pdf;Grenada%20National%20Biodiversity%20Strategy%20and%20Action%20Plan%202016-2020-30%20June%202016.https://www.cbd.int/doc/world/gd/gd-nbsap-v2-en.pdf;Project%20Brief%20Coastal%20EbA%20Project%20Pilot,2014-16https://www.gov.gd/sites/mocr/files/docs/Projects/GoG-UN%20Environment%20Coastal%20EbA%20Project_Project%20Brief%20and%20Coral%20Reef%20Restoration%20Programme.pdf)
221. Singh, A. (2010). The National Environmental Summary (NES) for Grenada. UNEP. https://www.researchgate.net/profile/Asha_Singh7/publication/312278293_National_Environmental_Summary_-_Grenada/links/58780db08ae329d6228352e/National-Environmental-Summary-Grenada.pdf
222. Reducing the input of plastic litter into the ocean around Grenada Applicability and effects of selected instruments. (2015). https://www.giz.de/en/downloads/giz2015_marine-litter-instruments_grenada.pdf
223. Ibid.
224. <http://www.racrempeitc.org/information-centre>
225. First impressions -<http://www.catamaranchartering.com/photo-gallery.html>
226. Corsair <https://www.toursgrenada.com/>
227. <https://www.scubadiving.com/article/news/non-profit-caribwhale-inc-founded-dominica>
228. <https://www.iucn.org/theme/protected-areas/our-work/world-database-protected-areas>
229. Climate-Resilient Eastern Caribbean Marine Managed Areas Network (ECMMAN) Project. Project Accomplishments 2013-2017. [https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/Caribbean/science/management/Documents/ECMMAN%20Project%20Accomplishments%20\(2013-2017\).pdf](https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/Caribbean/science/management/Documents/ECMMAN%20Project%20Accomplishments%20(2013-2017).pdf)
230. <https://www.facebook.com/GMPANetwork/>
231. Romero, A., and Hayford, K. T. (2000). Past and present utilisation of marine mammals in Grenada, West Indies. *Journal of Cetacean Research and Management*, 2(3), 223-226.
232. Romero, A., Hayford, K. T., Romero, A., and Romero, J. (2002). The marine mammals of Grenada, WI, and their conservation status. *Mammalia*, 66(4), 479-494.
233. <https://www.nature.org/en-us/about-us/where-we-work/caribbean/eastern-caribbean/>
234. <https://caribbeanbiodiversityfund.org/news/56-grenada-launches-its-newest-marine-protected-area-grand-anse>
235. Ministry of Climate Resilience, the Environment, Forestry, Fisheries and Disaster Management. <https://www.gov.gd/mocr/biodiversity>
236. Integrated climate change adaptation strategies in Grenada. Programme description. German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)- International Climate Initiative (IKI) <https://www.giz.de/en/worldwide/27030.html>
237. Guyana Act No. 22 of 2016. The Official Gazette. Laws of Guyana.
238. FAO. (2000). Guyana. <http://www.fao.org/oldsite/FCP/en/GUY/body.htm#:~:text=Industrial%20trawl%20fishery,rawl%20fleet%20is%20foreign%20owned.>
239. FAO. (2019). Country Brief: Guyana. <http://www.fao.org/fishery/facp/GUY/en>
240. MacDonald, J., Harper, S., Booth, S., and Zeller, D. (2015). Guyana Fisheries Catches: 1950-2010. Fisheries Centre: University of British Columbia; Working Paper #2015-21.
241. Guyana. National report of Guyana's fishing industry to the Caribbean Fisheries Forum. http://www.crfm.net/~uwohxjxf/images/Agenda_Item_7_Ref_Doc_ii_-_Guyana_National_Report.pdf
242. Marine Stewardship Council Fisheries Assessment. (2019). Guyana seabob fishery. (file:///C:/Users/Courtney%20Vail/Downloads/1807%20Guyana%20Seabob%20PCDR.pdf)
243. Lakhan, V. C. (1994). Planning and development experiences in the coastal zone of Guyana. *Ocean & Coastal Management*, 22(3), 169-186.
244. CPACC. (2002). Guyana's coastal vulnerability and risk assessment. Caribbean Planning for Adaptation to Global Climate Change Project. Component 6: Barbados, Grenada and Guyana. file:///C:/Users/Courtney%20Vail/Downloads/Guyana's%20Coastal%20Vulnerability%20and%20Risk%20Assessment.pdf
245. Guyana Marine Conservation Society. (2019). Comments on Esso exploration and production Guyana Ltd. Environmental impact assessment for the Payara Development Project. 7 pp.
246. UNEP. (2013). Mamacocosea Project. Marine mammal conservation corridor for northern South America follow-up workshop proceedings. March 18-20, 2013. Paramaribo, Suriname.
247. Guyana's revised intended national determined contribution (submitted to the UNFCCC). (2015). <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Guyana%20First/Guyana%27s%20revised%20NDC%20-%20Final.pdf>
248. Fishing Decree (Decree No. 154 of 1959) provides full protection to manatees in Honduras, prohibiting the capture of manatees or trading in their products.
249. CariMAM legislation survey. Honduras response.
250. Article 49 of Fisheries Law, Decree No. 154, has protected manatees since 1959; Decreto Ley No. 134-90, establishes that each municipality provides protection to marine mammals and marine protected areas
251. González-Socoloske, D., Taylor, C. R., and Rendon Thompson, O.R. (2011). Distribution and conservation status of the Antillean manatee (*Trichechus manatus manatus*) in Honduras. *Latin American Journal of Aquatic Mammals*, 9(2), 123-131. <http://dx.doi.org/10.5597/lajam00176>
252. <https://www.thegef.org/news/belize-guatemala-honduras-mexico-ccad-and-gef-join-forces-conservation-mesoamerican-reef>
253. <https://nypost.com/2020/09/22/massive-trash-tsunami-invades-honduras-beaches/>
254. Resolution No. DGMM/123/201
255. UNEP.(2019). State of the Cartagena convention Area Report. An Assessment of Marine Pollution from Land-Based Sources and Activities in the Wider Caribbean Region. Fourth Meeting of the Contracting Parties (COP) to the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS) in the Wider Caribbean Region. Roatan, Honduras, 4 June 2019. UNEP(DEPI)/CAR IG.41/INF.3.
256. Plastic management in the Gulf of Honduras. Fundación Mundo Azul (FUNMAZ). <https://www.outdoorconservation.eu/project-detail.cfm?projectid=1630>
257. <https://www.iderechoambientalhonduras.org/en/node/232>
258. UNEP: Regional Management Plan for the West Indian Manatee (*Trichechus manatus*) compiled by Ester Quintana-Rizzo and John Reynolds III. CEP Technical Report No. 48. UNEP Caribbean Environment Programme, Kingston, Jamaica. 2010
259. Honduras National Report to CMS convention 2019. https://www.cms.int/sites/default/files/document/2019_CMS_National_Report_Honduras.pdf
260. Ibid.
261. Ibid.
262. Data updated by Cetabase, July 2020 (outdated info found here: <https://www.cetabase.org/captive/cetacean/roatan-institute-marine-sciences>)

263. González-Socoloske, D., Taylor, C.R., and Rendon Thompson, O.R. (2011) Distribution and conservation status of the Antillean manatee (*Trichechus manatus manatus*) in Honduras. *Latin American Journal of Aquatic Mammals*, 9(2), 123-131.
264. <https://www.adaptation-undp.org/explore/honduras>
265. UNEP. (2019). State of the Cartagena convention Area Report. An Assessment of Marine Pollution from Land-Based Sources and Activities in the Wider Caribbean Region. Fourth Meeting of the Contracting Parties (COP) to the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS) in the Wider Caribbean Region. Roatan, Honduras, 4 June 2019. UNEP(DEPI)/CAR IG.41/INF.3
266. ARAP. (2014). Guía para la identificación de mamíferos y reptiles marinos de Panamá. Dirección General de Investigación y Desarrollo. Documento Técnico. Panamá. Primera Edición. 74 pp.
267. Law 13, 2 May 2005 Ley 13- 2 May 2005 – Establishes the marine corridor of Panama for the protection and conservation of marine mammals in waters of national jurisdiction and EEZ and a marine mammal coordinating committee
268. Executive Decree 6-A, 16 January 2020
269. <https://www.pa.undp.org/content/panama/es/home/projects/conservacion-y-uso-sostenible-de-la-biodiversidad-en-las-zonas-d.html>
270. <https://www.miambiente.gob.pa/consulta-publica-borrador-del-plan-de-accion-nacional-de-basura-marina/>
271. UNEP. (2019). State of the Cartagena convention Area Report. An Assessment of Marine Pollution from Land-Based Sources and Activities in the Wider Caribbean Region. Fourth Meeting of the Contracting Parties (COP) to the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS) in the Wider Caribbean Region. Roatan, Honduras, 4 June 2019. UNEP(DEPI)/CAR IG.41/INF.3
272. IWC Online WW Handbook. [accessed June 2020] Panama-Bocas del Toro case study . Can Tourists and community members turn the tide for dolphins?
273. Resolution DM 0530/2017, Ministerio de Ambiente. República de Panamá. 16 pp.
274. May-Collado, L. J., Amador-Caballero, M., Rodrigues-Fonseca, J., Casas, J. J., Gamboa-Poveda, M. P., Perez, B., Rasmussen, K., Trejos-Lasso, L., Garita-Alpizar, F. and Gerrodette, T. (2018). Ecology and Conservation of Cetaceans of Costa Rica and Panama. In Rossi-Santos, M.C. and Finkl, C. (eds). *Advances in Marine Vertebrate Research in Latin America: Technological Innovation and Conservation*. Coastal research Library 22. pp. 293-319.
275. Kassamali-Fox, A., Christiansen, F., May-Collado, L. J., Ramos, E. A., and Kaplin, B. A. (2020). Tour boats affect the activity patterns of bottlenose dolphins (*Tursiops truncatus*) in Bocas del Toro, Panama. *PeerJ* 8:e8804 <https://doi.org/10.7717/peerj.8804>
276. May-Collado, L. J., Amador-Caballero, M., Rodrigues-Fonseca, J., Casas, J. J., Gamboa-Poveda, M. P., Perez, B., Rasmussen, K., Trejos-Lasso, L., Garita-Alpizar, F. and Gerrodette, T. (2018). Ecology and Conservation of Cetaceans of Costa Rica and Panama. In Rossi-Santos, M.C. and Finkl, C. [eds]. *Advances in Marine Vertebrate Research in Latin America: Technological Innovation and Conservation*. Coastal research Library 22. pp.293-319.
277. <http://www.panacetacea.org>
278. Interview Panama SPAW Focal Point
279. ARAP. (2014). Guía para la identificación de mamíferos y reptiles marinos de Panamá. Dirección General de Investigación y Desarrollo. Documento Técnico. Panamá. Primera Edición. 74 pp.
280. <https://lists.uvic.ca/pipermail/marmam/2007-March/000948.html> and <https://www.latimes.com/archives/la-xpm-2007-jun-24-fg-flipper24-story.html>
281. May-Collado, L. J., Amador-Caballero, M., Casas, J. J., Gamboa-Poveda, M. P., Garita-Alpizar, F., Gerrodette, T., González-Barrientos, R., Hernández-Mora, G., Palacios, D. M., Palacios-Alfaro, J. D., Pérez, B., Rasmussen, K., Trejos-Lasso, L., Rodríguez-Fonseca, J. (2018). Ecology and Conservation of Cetaceans of Costa Rica and Panama. In Rossi-Santos, M.C. and Finkl, C. (eds). *Advances in Marine Vertebrate Research in Latin America: Technological Innovation and Conservation*. Coastal research Library 22. pp. 293-319. https://doi.org/10.1007/978-3-319-56985-7_12
282. Guzman, H. M., Gomez, C. G., Guevara, C. A., and Kleivane, L. (2013). Potential vessel collisions with Southern Hemisphere humpback whales wintering off Pacific Panama. *Marine Mammal Science*, 29(4), 629-642.
283. <https://www.adaptation-undp.org/explore/panama>
284. The Soil and Water Conservation Act, The Fisheries Protection Act, The National Trust Act, The National Conservation Authority Act and the Litter Act provide the enabling legal environment for biodiversity conservation.
285. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
286. Ibid.
287. UNEP. (2019). State of the Cartagena convention Area Report. An Assessment of Marine Pollution from Land-Based Sources and Activities in the Wider Caribbean Region. Fourth Meeting of the Contracting Parties (COP) to the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS) in the Wider Caribbean Region. Roatan, Honduras, 4 June 2019. UNEP(DEPI)/CAR IG.41/INF.3
288. O'Connor, S., Campbell, R., Cortez, H., and Knowles, T. (2009). Whale watching worldwide: Tourism numbers, expenditures and expanding economic benefits. International Fund for Animal Welfare, Yarmouth, MA. Prepared by Economists at Large.
289. <http://www.caribwhale.org/>
290. <https://stluciarstar.com/tag/caribbean-challenge-initiative/>
291. <https://www.iucn.org/news/protected-areas/202004/saint-lucia-equipped-a-management-effectiveness-assessment-tool>
292. Government of Saint Lucia. (2018). Saint Lucia's National Adaptation Plan (NAP): 2018–2028. Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations and Sustainable Development.
293. Saint Vincent and the Grenadines Statutory Rules and Orders, No. 42. 2003. Aboriginal subsistence whaling regulations.
294. Fielding, R. (2018). *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Harvard University Press, Boston.
295. <https://www.iwsvg.com/2018/04/16/whalers-kill-3-more-orcas-in-st-vincent-video/>
296. <https://searchlight.vc/searchlight/news/2019/04/12/svg-should-rethink-whaling-on-the-leeward-coast-mitchell/>
297. Fielding, R. (2018). *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Harvard University Press, Cambridge: MA. 341 pp.
298. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
299. St. Vincent and the Grenadines. (2015). Intended nationally determined contribution. Communicated to the UNFCCC on November 18, 2015.
300. Fielding, R. (2018). *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Harvard University Press, Boston.
301. McCormack, M. A., Fielding, R., Kiszka, J. J., Paz, V., Jackson, B. P., Bergfelt, D. R., and Dutton, J. (2020). Mercury and selenium concentrations, and selenium:mercury molar ratios in small cetaceans taken off St. Vincent, West Indies. *Environmental Research*, 181 (108908). <https://www.sciencedirect.com/science/article/pii/S0013935119307054>
302. Ibid.
303. <http://www.racrempeitc.org/sites/default/files/Attachments/Draft%20SVG%20Oil%20Spill%20Contingency%20Plan%20-%20Feb%202009.pdf>
304. Fantaseas Tours suspended its tours after the April 2017 incident where orcas were killed by fishermen in front of tourists. <https://www.fantaseatours.com/>
305. <https://iwc.int/bequia>
306. <https://www.nationalgeographic.com/news/2017/04/orcas-killed-tourists-st-vincent-whaling/>

307. St. Vincent and the Grenadines. (2015). Intended nationally determined contribution. Communicated to the UNFCCC on November 18, 2015.
308. The Nature Conservancy. (2016). St. Vincent and the Grenadines: Coral Reef Report Card. https://www.nature.org/media/coral-reef-report-cards/SVG_Report_Card_2016_WebLowRes.pdf
309. Ibid.
310. Sustainable Grenadines. <http://www.susgren.org/>
311. <http://crew-center.com/st-vincent-cruise-ship-schedule-2020>
312. <https://www.cruiseindustrynews.com/cruise-news/21152-cruise-drives-visitor-arrival-increase-in-st-vincent.html>
313. <http://crew-center.com/st-vincent-cruise-ship-schedule-2020>
314. <https://www.cruiseindustrynews.com/cruise-news/21152-cruise-drives-visitor-arrival-increase-in-st-vincent.html>
315. St. Vincent and the Grenadines. (2015). Intended nationally determined contribution. Communicated to the UNFCCC on November 18, 2015. https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Saint%20Vincent%20and%20Grenadines/1/SVG_IND_C_Final.pdf
316. <https://searchlight.vc/searchlight/front-page/2019/08/16/permeability-not-yet-found-reykjavik-geothermal-local-head/>
317. <https://agriculture.gov.tt/wp-content/uploads/2020/04/ICZM-March-2020.pdf>
318. Robards, M. D. and Reeves, R. R. (2011). The global extent and character of marine mammal consumption by humans: 1970-2009. *Biological Conservation*, 144, 2770-2786.
319. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
320. ICZM-NEWSLETTER-December-2019-FINAL.pdf
321. <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Trinidad%20and%20Tobago%20First/Trinidad%20and%20Tobago%20Final%20INDC.pdf>
322. <https://climateknowledgeportal.worldbank.org/country/trinidad-and-tobago>
323. UNEP. (2008). Draft Compilation of Capacities for Marine Mammals. Fourth Meeting of the Scientific and Technical Advisory Committee (STAC) to the Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region. Gosier, Guadeloupe, France, 2 - 5 July 2008. UNEP(DEPI)/CAR WG.31/INF.14.
324. Frankie Tours & Rentals; Island ManTours
325. <http://www.biodiversity.gov.tt/home/legislative-framework/policies/national-protected-areas-policy-2011.html>
326. Food and Agriculture Organisation of the United Nations (FAO). (2018). National Protected Area Systems Plan for Trinidad and Tobago. Government of the Republic of Trinidad and Tobago, Port of Spain, Trinidad. Draft document submitted to the Government of the Republic of Trinidad and Tobago for approval
327. Phillips, A. C. N. and Suepaul, R. (2017). *Nasitrema* species - A Frequent Culprit in Melon-Headed Whale (*Peponocephala electra*) Strandings in Trinidad. *Aquatic Mammals*. doi: 10.1578/AM.43.5.2017.547
328. Marine Mammals Strandings in Guyana and Trinidad. Data from Annette Arjoon-Martins – the Guyana Marine Conservation Society.
329. MamaCocoSea Project. (2013). Marine Mammal Conservation Corridor for Northern South America Follow-Up Workshop Proceedings. 18-20 March 2013, Paramaribo, Suriname. 63pp.
330. MamaCocoSea Project. (2015). A review of seismic mitigation measures used along the coast of northern south America, from north brasil up to Colombia, Reference document for the MamaCocoSea Steering Committee. 76pp. http://www.car-spaw-rac.org/IMG/pdf/seismic_mitigation_measures_review_mamacocosea.pdf
331. <https://www.adaptation-undp.org/explore/caribbean/trinidad-and-tobago>
332. Government of the Republic of Trinidad and Tobago. (2011). National Climate Change Policy. July 2011. 28 pp.
333. 16 U.S.C. §§ 1361 et seq., available at <https://www.govinfo.gov/content/pkg/USCODE-2018-title16/pdf/USCODE-2018-title16-chap31.pdf>
334. 16 U.S.C. §§ 1531 et seq., available at <https://www.govinfo.gov/content/pkg/USCODE-2018-title16/pdf/USCODE-2018-title16-chap35.pdf>
335. https://www.aphis.usda.gov/animal_welfare/downloads/AC_BlueBook_AWA_508_comp_version.pdf
336. <https://www.govinfo.gov/content/pkg/USCODE-2015-title7/html/USCODE-2015-title7-chap54.htm>
337. <https://www.fisheries.noaa.gov/topic/endangered-species-conservation>
338. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries>
339. <https://www.fisheries.noaa.gov/foreign/marine-mammal-protection/noaa-fisheries-establishes-international-marine-mammal-bycatch-criteria-us-imports#:~:text=The%20MMPA%20Import%20Provisions%20rule,same%20standards%20as%20U.S.%20commercial>
340. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act#title-iii---international-dolphin-conservation-program>
341. <https://www.wlox.com/2019/06/03/why-mississippi-sound-salinity-levels-are-low-how-opening-morganza-spillway-can-lower-freshwater-intrusion/>
342. Bossart, G. D., Schaefer, A. M., McCulloch, S., Goldstein, J., Fair, P. A., and Reif, J. S. (2015). Mucocutaneous lesions in free-ranging Atlantic bottlenose dolphins *Tursiops truncatus* from the southeastern USA. *Diseases of Aquatic Organisms*, 115, 175-184. doi:10.3354/dao02895
343. Taylor, J. S., and Adams, J. (2020). Skin lesion prevalence of estuarine common bottlenose dolphins (*Tursiops truncatus*) in North Carolina, with comparisons to other east coast study sites. *Marine Mammal Science*, <https://doi.org/10.1111/mms.12731>
344. <https://washingtonspectator.org/beach-erosion-valentino/>
345. Litz, J. A., Baran, M. A., Bowen-Stevens, S. R., Carmichael, R. H., Colegrove, K. M., Garrison, L. P., Fire, S. E., Fougères, E. M., Hardy, R., Holmes, S., et al. (2014). Review of historical unusual mortality events (UMEs) in the Gulf of Mexico (1990-2009): providing context for multi-year northern Gulf of Mexico cetacean UME declared in 2010. *Diseases of Aquatic Organisms*, 112, 161-175. https://www.int-res.com/articles/dao_oa/d112p161.pdf
346. Fire, S. E., Browning, J. A., Durden, W. N., and Stolen, M. K. (2020). Comparison of during-bloom and inter-bloom brevetoxin and saxitoxin concentrations in Indian River Lagoon bottlenose dolphins, 2002-2011. *Aquatic Toxicology*, 218, 105371. <https://doi.org/10.1016/j.aquatox.2019.105371>
347. <https://www.king5.com/article/tech/science/environment/new-rules-aim-at-protecting-orcas-from-getting-harassed-by-humans/281-4f634d26-3774-4d1d-93fd-2d789d0d8c1d>
348. <https://www.fisheries.noaa.gov/topic/marine-life-viewing-guidelines#guidelines-&-distances>
349. <https://sanctuaries.noaa.gov/dolphinmart/>
350. <https://stellwagen.noaa.gov/sister/welcome.html>
351. <https://sanctuaries.noaa.gov/>
352. <https://hawaiihumpbackwhale.noaa.gov/>
353. https://nmshawaiihumpbackwhale.blob.core.windows.net/hawaiihumpbackwhale-prod/media/archive/documents/pdfs_mpr/HHWNMS_FMP.pdf
354. <https://www.fws.gov/caribbean/Refuges/#:~:text=The%20Caribbean%20Islands%20National%20Wildlife,Laguna%20Cartagena%2C%20Navassa%20and%20Vieques> and <https://www.nps.gov/subjects/oceans/caribbean.htm>
355. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments> and <https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>
356. <https://www.fisheries.noaa.gov/permit/scientific-research-and-enhancement-permits-marine-mammals>

357. <https://apps.nmfs.noaa.gov/>
358. <https://www.fisheries.noaa.gov/contact-directory/marine-mammal-stranding-network-coordinators>
359. <https://www.fisheries.noaa.gov/report>
360. <https://www.fisheries.noaa.gov/national/marine-life-distress/level-data-collection-marine-mammal-stranding-events>
361. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/national-inventory-marine-mammals>
362. <https://www.cetabase.org/captive/cetacean/>
363. <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act>
364. <https://cetsound.noaa.gov/road-map>
365. <https://www.capecodtimes.com/news/20200626/years-first-right-whale-death-in-us-reported>
366. <https://www.news-journalonline.com/opinion/20200725/slow-down-for-manatees--our-view>
367. Van der Hoop, J. M., Vanderlaan, A. S. M., Cole, T. V. N., Henry, A. G., Hall, L., Mase-Guthrie, B., Wimmer, T., and Moore, M. J. (2015). Vessel strikes to large whales before and after the 2008 ship strike rule. *Conservation Letters*, 8(1), 24–32.
368. <https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales>
369. <https://www.fisheries.noaa.gov/west-coast/marine-mammals-west-coast-ship-strikes>
370. <https://www.fisheries.noaa.gov/topic/climate#responding-to-change>
371. Ley Orgánica del Ambiente; Ley Orgánica de los Espacios Acuáticos e Insulares; Ley Orgánica de Ciencia, Tecnología e Innovación; Ley Penal del Ambiente; Ley de Gestión de la Diversidad Biológica; Ley de Protección a la Fauna Silvestre y su Reglamento (G.O. No.29.289, 11/08/1970); Decrees 1485 and 1486 on species 'closed' for exploitation and endangered, respectively.
372. In addition, extensive legal regulations have been enacted, having as main promoter, the 2019–2025 Economic Development Plan, which establishes the mandatory implementation of the National Strategy for the Conservation of Biological Diversity and its National Action Plan. Among strategic lines of action is the conservation of threatened species and the preservation of strategic natural areas for the conservation of species. The following regulations have been decreed:
 - Decree with rank, value and power of Law for Coastal Zones. Official Gazette of the Bolivarian Republic of Venezuela No. 37349 / 12-19-2001.
 - Decree No. 227- 23 April 1992, issuing the Conservation Technical Standards to Control the Exercise of Fishing Activity, Official Gazette of the Bolivarian Republic of Venezuela No. 4,418 Extraordinary - 27 April 1992.
 - Decree No. 883- Norms for Classification and Quality Control of Water Bodies and Liquid Discharges or Effluents. Official Gazette No. 5,021 Extraordinary -18 October 1995.
 - Water Law – 2 January 2007- Official Gazette No. 38,595.
 - Water and Air Quality Law – 28 December 2015, Extraordinary Official Gazette No. 6,207.
 - Decree No. 2635: Regulations for the Control of the Recovery of Hazardous Materials and the Management of Hazardous Waste, Extraordinary Official Gazette No. 5245 - 3 August 1998.
 - Law on Hazardous Substances, Materials and Waste. Official Gazette No. 5,554 Extraordinary dated 13 November 2001.
 - Law on Comprehensive Garbage Management, Official Gazette No. 6017 Extraordinary dated 30 December 2010.
 - Draft Decree of the Plan for the Planning and Integrated Management of Coastal Zones of the Bolivarian Republic of Venezuela, which includes national policies for the conservation and sustainable development of coastal areas (in the process of approval).
373. Ferrer, A., Herrera, O., Trujillo, F., Mosquera-Guerra, F., De La Cruz Melo, G., Lew, D., Boher, S., Seijas, A. E., Hernández, O. y Usma, S. (Eds.). 2017. *Plan de acción para la conservación de los mamíferos acuáticos de Venezuela: delfines de agua dulce, nutrias y manatíes 2017- 2027*. Caracas, Venezuela. 92 pp.
374. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., van der Wal, J. T. (2017). Priorities in management implementation for marine mammal conservation in the Saba sector of the Yarari sanctuary. Wageningen, Wageningen Marine Research (University & Research centre), Wageningen Marine Research report C097/17. 103 pp.
375. Bjorkland, R. H. (2011). An assessment of sea turtle, marine mammal and seabird bycatch in the Wider Caribbean Region. PhD Dissertation, Department of Environment, Duke University. 230 pp.
376. Venezuela MMAP questionnaire response-Yurasi Briceño.
377. Bjorkland, R., Dunn, D., Crowder, L.B., Kot, C., McDonald, S., and Boustany, A. (2008). A summary review of sea turtle bycatch in the wider Caribbean. In: Annual Symposium on Sea turtle Biology and Conservation. 19–26 January 2008.
378. Lyssikatos, M. (2019). Information on observed takes of coastal bottlenose dolphins in gillnets by the Northeast and Southeast fishery observer programmes (1995–Aug 2019). NOAA, National Marine Fisheries Service, Northeast Fisheries Science Center.
379. Altherr, S. and Hodges, N. (2018). Small Cetaceans, Big Problems. A global review of the impacts of hunting on small whales, dolphins and porpoises. Published by ProWildlife, Animal Welfare Institute, and Whale and Dolphin Conservation. Available at: <https://awionline.org/press-releases/report-100000-dolphins-small-whales-and-porpoises-slaughtered-globally-each-year>
380. Ferrer, A., Herrera, O., Trujillo, F., Mosquera-Guerra, F., De La Cruz Melo, G., Lew, D., Boher, S., Seijas, A. E., Hernández, O. y Usma, S. (Eds.). 2017. *Plan de acción para la conservación de los mamíferos acuáticos de Venezuela: delfines de agua dulce, nutrias y manatíes 2017- 2027*. Caracas, Venezuela. 92 pp.
381. Barrios-Garrido, H., De Turris-Morales, K., and Espinoza-Rodríguez, N.E. (2021). Guiana Dolphin (*Sotalia guianensis*) in the Maracaibo Lake System, Venezuela: Conservation, Threats, and Population Overview. *Frontiers in Marine Science*, 7, 594021. doi: 10.3389/fmars.2020.594021
382. Briceno, Y., Sanchez, L., Trujillo, F., von Fersen, L., and Ramirez, S. (2021). Aquatic wildmeat consumption of Guiana Dolphins (*Sotalia guianensis*) in Lake Maracaibo System, Venezuela. *Frontiers in Marine Science*, 8, 625801. <https://doi.org/10.3389/fmars.2021.625801>
383. Venezuela expert questionnaire response-Yurasi Briceño.
384. Ibid.
385. Venezuela country profile, 2015 - <http://www.racrempeitc.org/>
386. ITOPE - Promoting Effective Spill Response- Venezuela Profile, 2018 -<https://www.itopf.org/>
387. Ibid.
388. Venezuela Country Report 2017-2018 SPAW Protocol.
389. Espinoza-Rodríguez, N., De Turris-Morales, K., Shimada, T., and Barrios-Garrido, H. (2019). Guiana Dolphin (*Sotalia guianensis*) in the southern Gulf of Venezuela: seasonal distribution, group size, and habitat use. *Regional Studies in Marine Science*, 32, 100874. doi: 10.1016/j.rsma.2019.100874
390. Bolanos-Jimenez, J.; Balladares, C., Barrios-Garrido, H; Bermudez-Villapo, L.; De Turris, K.; Espinoza, N.; Gonzalez-Fernandez, M. and Sanchez-Criollo, L. (2015). Varamientos de cetáceos en Venezuela-1988-2014. Abstract. II Congreso Colombiano y III Latinoamericano de Mastozoología. *Mammalogy Notes*, 2(2), 238.
391. Venezuela expert questionnaire response-Yurasi Briceño.
392. Ferrer, A., Herrera, O., Trujillo, F., Mosquera-Guerra, F., De La Cruz Melo, G., Lew, D., Boher, S., Seijas, A. E., Hernández, O. y Usma, S. (Eds.). (2017). *Plan de acción para la conservación de los mamíferos acuáticos de Venezuela: delfines de agua dulce, nutrias y manatíes 2017- 2027*. Caracas, Venezuela. 92 pp.
393. MamaCocoSea Project. (2015). A review of seismic mitigation measures used along the coast of Northern South America, from north Brasil up to Colombia, Reference document for the MamaCocoSea Steering Committee. 76pp.
394. Venezuela questionnaire response.
395. República Bolivariana de Venezuela. Segunda Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre Cambio Climático. (2017). 180pp. (Second National Communication to the United Nations Framework Convention on Climate Change).
396. See Annex I for a compilation representing all current marine mammal species as identified by the Society for Marine Mammalogy's Committee on Taxonomy. All cetacean and manatee species are listed on Annex II of the Protocol Concerning Specially Protected Areas and Wildlife (SPAW Protocol) of the Cartagena Convention. These species were listed in 1991 and have remained on the Annex since the Protocol

came into force in 2000.

397. Wayward arctic hooded seals have live-stranded in the Caribbean <http://manatipr.org/wp-content/uploads/2010/01/Mig2002Science.pdf>

398. UNEP CEP. (2013). A Stranding Guide to the Marine Mammals of the Wider Caribbean Region. An Introductory Field Guide to Stranding Responders. CEP Technical Report: 74. 79 pp.

399. The SPAW-listed neotropical otter (*Lontra longicaudis annectens*) and Giant otter (*Pteronura brasiliensis*) which feed on fish and crustaceans, found in Central and South American SPAW countries (including Belize, Panama, Guyana, French Guiana, and Trinidad and Tobago) can live on the shorelines of marine and riverine/ estuarine environments and should be considered for listing as a marine (aquatic) mammal under the SPAW MMAP. Similarly, river dolphin species (e.g. *Sotalia spp.* and *Inia geoffrensis*) should receive consideration and inclusion within the MMAP as listed species which may occupy marine and estuarine habitats and that require management by SPAW Parties.

400. IUCN. (2020). IUCN Red List of Threatened Species. <http://www.iucnredlist.org>.

401. UNEP-Spanish partnership project, "Broad-scale marine spatial planning of marine mammal corridors and Protected Areas in the Wider Caribbean and Eastern Pacific" <https://LifeWeb.cbd.int/project?id=ACC962F1-847E-4154-31C5-90DCF53CB81F#obj>

402. UNEP CEP. (2011). Report of the Regional Workshop on Integration, Mapping, GIS Analysis of Marine Mammal Migration Routes, Critical Habitats and Human Threats in the Wider Caribbean Region. Miami, May 9-11.

403. Bolanos, J. J., Mignucci-Giannoni, A. A., Blumenthal, J., Bogomolni, A., Casas, J. J., Henriquez, A., Iniguez, M., Khan, J., Landrau-Giovannetti, N., Rinaldi, C., Rinaldi, R., Rodriguez-Ferrer, G., Suty, L., and Ward, N. (2014). Distribution, feeding habits and morphology of killer whales *Orcinus orca* in the Caribbean Sea, *Mammal Review*, 44(3-4), 177-189. doi:10.1111/mam.12021

404. <https://car-spaw-rac.org/?Cartographie-interactive>

405. <https://www.nationalredlist.org/search2/species-search>

406. http://www.guyane.developpement-durable.gouv.fr/IMG/pdf/fascicule_liste-rouge-faune-vertebre-de-guyane.pdf

407. https://ofb.gouv.fr/sites/default/files/Documents/Listes_rouges/liste-rouge-faune-de-martinique.pdf

408. <https://ambiente.gob.do/biodiversidad/fauna/>

409. <https://www.nationalredlist.org/search2/species-search/>

410. No longer found in French Caribbean (only present in French Guiana).

411. <http://www.fao.org/3/a-i3932e.pdf>

412. Reeves, R., Berggren, P., Crespo, E. A., Gales, N., Northridge, S. P., Notarbartolo di Sciara, G., Perrin, W., Read, A. J., Rogan, E., Smith, B. D., and Van Waerebeek, K. (2005). Global priorities for reduction of cetacean bycatch. World Wildlife Fund (WWF) Report.

413. Lent, R., and Squires, D. (2017). Reducing marine mammal bycatch in global fisheries: An economics approach. *Deep-Sea Research* 11, 140, 268-277.

414. FAO. (2019). A third assessment of global marine fisheries discards. FAO Fisheries and Aquaculture Technical Paper 633. <http://www.fao.org/3/CA2905EN/ca2905en.pdf>

415. Read, A. J., Drinker, P., and Northridge, S. (2006). *Conservation Biology*, 20(1), 163-169.

416. Bolanos, J. J., and Rojas-Bracho, L. (2005). A review of fisheries bycatch of marine mammals in the Wider Caribbean Region. Report prepared for the Regional Workshop of Experts on the Development of Marine Mammal Action Plan for the Wider Caribbean Region. UNEP(DEC)/CAR WG.27/Inf.5

417. See, for example CRFM. (2019). Report of CRFM Continental Shelf Fisheries Working Group (CRFM-CSWG) on Atlantic Seabob, *Xiphopenaeus kroyeri*, fisheries of Guyana and Suriname. CRFM Fishery Report-2019/1

418. CRFM. (2013). CRFM Strategic Plan (2013-2021). CRFM Administrative Report. 43pp.

419. CLME Project. (2013). 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). 99 pp.

420. Bjorkland, R. H. (2011). An assessment of sea turtle, marine mammal and seabird bycatch in the Wider Caribbean Region. PhD Dissertation, Department of Environment, Duke University. 230 pp.

421. Morissette, L., Kaschner, K., Gerber, L. R. (2010). 'Whales eat fish'? Demystifying the myth in the Caribbean marine ecosystem. *Fish and Fisheries*, 11, 388-404.

422. Ibid.

423. Rinaldi, C., and Rinaldi, R. (2010). A deadly mother-calf bond in Caribbean sperm whales. International Whaling Commission 2014, SC/65b/HIMO2.

424. Rinaldi, C., and Rinaldi, R. (2016). Report of disentanglement of a sperm whale (*Physeter macrocephalus*) March 17, 2016 downwind coast of Guadeloupe, French Caribbean. Association Evasion Tropicale, 4 pp.

425. IWC. (2019). Report of the IWC workshop on marine debris: The way forward, 3-5 December, 2019, La Garriga, Catalonia, Spain. SC/68B/REP/03. <https://iwc.int/marine-debris>

426. Personal conversation with Eric Angel Ramos. October 12, 2020.

427. <https://www.facebook.com/fadtrackers/> Reports and data can be sent to fadtrackers@gmail.com

428. Information provided by Gerald Mannaerts, October 22, 2020.

429. Bjorkland, R. H. (2011). An assessment of sea turtle, marine mammal and seabird bycatch in the Wider Caribbean Region. PhD Dissertation, Department of Environment, Duke University.

430. Ibid.

431. Gero, S., and Whitehead, H. (2016). Critical Decline of the Eastern Caribbean Sperm Whale Population. PLoS ONE 11(10), e0162019. <https://doi.org/10.1371/journal.pone.0162019>

432. Debro, A.O., Witte, R.H., and Scheidat, M. (2011). The marine mammals of the Dutch Caribbean: a comparison between EEZ sectors, contrasts and concerns IWC/SC/63/E9. Paper presented to the Scientific Committee Meeting of the International Whaling Commission.

433. International Whaling Commission. (2010). France Progress Report to the International Whaling Commission.

434. Reports of entanglement of humpback whales in 2009, 2107; sperm whale in 2018, and manatees in 2018.

435. Rinaldi, C., and Rinaldi, R. (2014). A deadly mother-calf bond in Caribbean sperm whales. Report for the International Whaling Commission. SC/65b/HIMO2. 5 pp.

436. Rinaldi, C., and Rinaldi, R. (2016). Report of disentanglement of a sperm whale (*Physeter macrocephalus*) March 17, 2016—downwind coast of Guadeloupe, French Caribbean. Report by Association Evasion Tropicale, 4 pp.

437. Personal email exchange with Caroline Rinaldi, Association Evasion Tropicale, October 31, 2019.

438. Williams, R., Gero, S., Bejder, L., Calambokidis, J., Kraus, S. D., Lusseau, D., Read, A., and Robbins, J. (2011). Underestimating the damage: interpreting cetacean carcass recoveries in the context of the Deepwater Horizon/BP incident. *Conservation Letters*, 4, 228-233.

439. Robbins, J., and Mattila, D. (2004). Estimating humpback whale (*Megaptera novaeangliae*) entanglement rates on the basis of scar evidence. Report to the Northeast Fisheries Science Center, Order Number 43EANF030121. 22pp.

440. Shane Gero, personal communication, September 30, 2020.

441. Luksenburg, J.A. (2014). Prevalence of External Injuries in Small Cetaceans in Aruban Waters, Southern Caribbean. PLoS ONE 9(2): e88988. doi:10.1371/journal.pone.0088988

442. UNEP. (2010). Regional Management Plan for the West Indian Manatee (*Trichechus manatus*). CEP Technical Report No. 48. UNEP Caribbean Environment Programme, Kingston, Jamaica.

443. Moore, J. E., Cox, T. M., Lewison, R. L., Read, A. J., Bjorkland, R., McDonald, S. L., Crowder, L. B., Aruna, E., Ayissi, I., Espeut, P., Joynson-Hicks, C., Pilcher, N., Poonian, C. N. S., Solarin, B., and Kiszka, J. (2009). An interview-based approach to assess marine mammal and sea turtle captures in artisanal fisheries. *Biological Conservation*, 143, 795-805.

444. Bjorkland, R. H. (2011). An assessment of sea turtle, marine mammal and seabird bycatch in the Wider Caribbean Region. PhD Dissertation, Department of Environment, Duke University. 230 pp.
445. FAO. (2019). A third assessment of global marine fisheries discards. FAO Fisheries and Aquaculture Technical Paper 633. <http://www.fao.org/3/CA2905EN/ca2905en.pdf>
446. Reeves, R. R., McClellan, K., and Werner, T. (2013). Marine mammal bycatch in gillnet and other entangling net fisheries, 1990 to 2011. *Endangered Species Research*, 20, 71-97.
447. Van Waerebeek, K. (1990). Preliminary notes on the existence of dolphin by-catch off French Guiana. *Aquatic Mammals*, 16.2, 71-72.
448. Vidal, O., Van Waerebeek, K., and Findley, L. T. (1994). Cetaceans and gillnet fisheries in Mexico, Central America and the Wider Caribbean: A preliminary review. Report to the International Whaling Commission, Special Issue, 13 pp.
449. Chevalier, J. (2001). Etude des Captures Accidentelles de Tortues Marines Liées a la Pêche au Filet Derivant Dans L'ouest Guyanais. In: Office National de la Chasse et de la Faune Sauvage, Direction des Etudes et de la Recherche- Fauna d'Outre Mer. 39 pp.
450. Bjorkland, R., Dunn, D., Crowder, L.B., Kot, C., McDonald, S., and Boustany, A. (2008). A summary review of sea turtle bycatch in the wider Caribbean. In: Annual Symposium on Sea turtle Biology and Conservation. 19-26 January 2008.
451. Ibid.
452. Trujillo, F., Gartner, A., Caicedo, D., and Diazgranados, M. C. (Eds.) (2013). *Diagnóstico del estado de conocimiento y conservación de los mamíferos acuáticos en Colombia*. Ministerio de Ambiente y Desarrollo Sostenible, Fundación Omacha, Conservación Internacional y WWF. Bogotá, 312 pp.
453. Venezuela MMAP questionnaire response.
454. González-Socoloske, D., Taylor, C.R., and Rendon Thompson, O.R. (2011) Distribution and conservation status of the Antillean manatee (*Trichechus manatus manatus*) in Honduras. *Latin American Journal of Aquatic Mammals* 9(2): 123-131.<http://dx.doi.org/10.5597/lajam00176>
455. Zollett, E. A. (2009). Bycatch of protected species and other species of concern in U.S. east coast commercial fisheries. *Endangered Species Research*, 9, 49-59.
456. Reeves, R., McClellan, K., and Werner, T. B. (2013). Marine mammal bycatch in gillnet and other entangling net fisheries, 1990-2011. *Endangered Species Research*, 20, 71-97.
457. Kiszka, J. (2014). Bycatch assessment of the West Indian manatee (*Trichechus manatus*) and other megafauna in artisanal fisheries of the Caribbean. Final report to SPAW-RAC. Florida Atlantic University.
458. Ibid.
459. Ibid.
460. Brum, S., Rosas-Ribeiro, P., de Souza Amaral, R., Alexandre de Souza, D., Castello, L., and Ferreira da Silva, V. M. (2021). Conservation of Amazonian aquatic mammals. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 31, 1068-1086. Doi:10.1002/aqc.3590
461. FAO. (2019). A third assessment of global marine fisheries discards. FAO Fisheries and Aquaculture Technical Paper 633. <http://www.fao.org/3/CA2905EN/ca2905en.pdf>
462. Duarte, L. O., Manjarres, L., and Escobar, F. (2009). Bottom trawl bycatch assessment of the shrimp fishery in the Caribbean Sea off Colombia. *Proceedings of the 62nd Gulf and Caribbean Fisheries Institute*, Cumana, Venezuela.
463. Diamond, S. L. (2004). Bycatch quotas in the Gulf of Mexico shrimp trawl fishery: Can they work? *Reviews in Fish Biology and Fisheries*, 14, 207-237.
464. FAO. (2019). A third assessment of global marine fisheries discards. FAO Fisheries and Aquaculture Technical Paper 633. <http://www.fao.org/3/CA2905EN/ca2905en.pdf>
465. Ibid.
466. Bjorkland, R., Dunn, D., Crowder, L.B., Kot, C., McDonald, S., and Boustany, A. (2008). A summary review of sea turtle bycatch in the wider Caribbean. In: Annual Symposium on Sea turtle Biology and Conservation. 19-26 January 2008.
467. Lyssikatos, M. (2019). Information on observed takes of coastal bottlenose dolphins in gillnets by the Northeast and Southeast fishery observer programmes (1995-Aug 2019). NOAA, National Marine Fisheries Service, Northeast Fisheries Science Center.
468. <http://www.fao.org/in-action/rebyc-2/overview/en/>
469. <http://www.fao.org/3/ba0022t/ba0022t00.pdf>
470. FAO. (2021). *Fishing operations. Guidelines to prevent and reduce bycatch of marine mammals in capture fisheries*. FAO Technical Guidelines for Responsible Fisheries No.1, Suppl. 4. Rome. <https://doi.org/10.4060/cb2887en>
471. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-take-reduction-plans-and-teams>
472. IWC. (2018). Report of the 4th IWC workshop on large whale entanglement issues. IWC/67/WKMWI/Rep/01
473. Hamer, D., and Minton, G. (2020). Guidelines for the safe and humane handling and release of bycaught small cetaceans from fishing gear. UNEP/CMS Secretariat. Bonn, Germany 50 pages. CMS Technical Series No. 43.
474. Country responses to MMAP questionnaire.
475. Caballero, S., Trujillo, F., Del Risco, A., Herrera, O., and Ferrer, A. (2017). Genetic identity of *Sotalia* dolphins from Orinoco River. *Marine Mammal Science*, 33(4), 1214-1223. doi:10.1111/mms.12422
476. Gomez-Salazar, C., Portocarrero-Aya, M., Trujillo, F., Caballero, S., Bolanos-Jimenez, J., Utreras, V., McGuire, T., Ferrer-Perez, A., Pool, M., and Aliaga-Rossel, E. (2010). Update on the freshwater distribution of *Sotalia* in Colombia, Ecuador, Peru, Venezuela and Suriname. *Latin American Journal of Aquatic Mammals*, 8(1-2), 171-178.
477. Baker, C. S. and Clapham, P. J. (2004). Modelling the past and future of whales and whaling. *TRENDS in Ecology and Evolution*, 19(7), 365-371.
478. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
479. Ibid.
480. Bolanos-Jimenez, J., Mignucci-Giannoni, A. A., Blumenthal, J., Bogomolni, A., Casas, J. J., Henriquez, A., Iniquez, M., Khan, J., Landrau-Giovannetti, N., Rinaldi, C., Rinaldi, R., Rodriguez-Ferrer, G., Suty, L., Ward, N., Luksenburg, J. A. (2014). Distribution, feeding habits and morphology of killer whales *Orcinus orca* in the Caribbean Sea. *Mammal Review*, 44(3-4), 177-189.
481. https://iwc.int/html_76 The International Convention for the Regulation of Whaling established the International Whaling Commission (IWC). The International Convention for the Regulation of Whaling art. III(1), Dec. 2, 1946, 62 Stat. 1716, 161 U.N.T.S. 72 (entered into force Nov. 10, 1948) (ICRW). The schedule, which includes the rules for whaling, is an integral part of the ICRW. Id. art. II(1). The schedule was last amended at the Sixty-seventh Annual Meeting of the IWC in September 2018. Current St Vincent provisions are at Schedule Paragraph 13 (b) (4). For the most recent description of the hunt. See <https://iwc.int/bequia>
482. <https://www.smithsonianmag.com/smart-news/after-orcas-are-killed-front-tourists-caribbean-nation-wrangles-over-whaling-180962838/>
483. Fielding, R. (2018). *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Harvard University Press, Cambridge: MA. 341 pp.
484. Species targeted include spinner dolphin, pilot whale, Atlantic spotted, killer whale, Fraser's dolphin (*Lagenodelphis hosei*), False killer whale, Risso's dolphin (*Grampus griseus*), melon-headed whale (*Peponocephala electra*), Clymene dolphin, striped dolphin, dwarf sperm whale (*Kogia simus*), and rough-toothed dolphin (*Steno bredanensis*).
485. Fielding, R. (2018). *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Harvard University Press, Boston.
486. <https://www.iwnsvg.com/2018/04/16/whalers-kill-3-more-orcas-in-st-vincent-video/>
487. <https://searchlight.vc/searchlight/news/2019/04/12/svg-should-rethink-whaling-on-the-leeward-coast-mitchell/>
488. Bolanos-Jimenez, J., Mignucci-Giannoni, A. A., Blumenthal, J., Bogomolni, A., Casas, J. J., Henriquez, A., Iniquez, M., Khan, J., Landrau-Giovannetti, N., Rinaldi, C., Rinaldi, R., Rodriguez-Ferrer, G.,

- Sutty, L., Ward, N., Luksenburg, J. A. (2014). Distribution, feeding habits and morphology of killer whales *Orcinus orca* in the Caribbean Sea. *Mammal Review*, 44(3-4), 177-189.
489. Fielding, R. (2018). *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Harvard University Press, Cambridge: MA. 341 pp.
490. Fielding, R., and Kiszka, J. (2021). Artisanal and aboriginal subsistence whaling in Saint Vincent and the Grenadines (Eastern Caribbean): History, catch characteristics, and needs for research and management. *Frontiers in Marine Science*, 8, 668597. <https://doi.org/10.3389/fmars.2021.668597>
491. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019. 9 pp.
492. Ibid.
493. Ibid.
494. Robards, M. D. and Reeves, R. R. (2011). The global extent and character of marine mammal consumption by humans: 1970-2009. *Biological Conservation*, 144, 2770-2786.
495. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
496. Personal conversations with Haiti Ocean Project (HOP); referencing data maintained by HOP. Available upon request. www.haitioceanproject.net
497. Personal communication. Haiti Ocean Project, Jamie Aquino. August 10, 2020.
498. Animal Welfare Institute. (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019. 9 pp.
499. Altherr, S. and Hodges, N. (2018). Small Cetaceans, Big Problems. A global review of the impacts of hunting on small whales, dolphins and porpoises. Published by ProWildlife, Animal Welfare Institute, and Whale and Dolphin Conservation. Available at: <https://awionline.org/press-releases/report-100000-dolphins-small-whales-and-porpoises-slaughtered-globally-each-year>
500. Herrera-Trujillo, O. (2017). Creation of an action plan for the conservation of freshwater mammals in Venezuela. *Oryx*, 51(1), 16.
501. Briceno, Y., Sanchez, L., Trujillo, F., von Fersen, L., and Ramirez, S. (2021). Aquatic wildmeat consumption of Guiana Dolphins (*Sotalia guianensis*) in Lake Maracaibo System, Venezuela. *Frontiers in Marine Science*, 8, 625801. <https://doi.org/10.3389/fmars.2021.625801>
502. Robards, M. D. and Reeves, R. R. (2011). The global extent and character of marine mammal consumption by humans: 1970-2009. *Biological Conservation*, 144, 2770-2786.
503. International Whaling Commission (IWC). (2018). Scientific Committee Report. SC/67B/REP/01. Bled, Slovenia, April.
504. International Whaling Commission (IWC). (2020). Conservation Management Plan for Amazon, Orinoco and Tocantins-Araguaia river dolphins (*Inia geoffrensis*, *Inia boliviensis*, *Inia araguaiaensis* and *Sotalia fluviatilis*). Governments of Brazil, Colombia, Peru and Ecuador. SC/68b/CMP/21
505. International Whaling Commission (IWC). (2018). Scientific Committee Report. SC/67B/REP/01. Bled, Slovenia, April.
506. Self-Sullivan, C. and Mignucci-Giannoni, A. A. (2012). West Indian Manatees (*Trichechus manatus*) in the Wider Caribbean Region. Pages 36-46 in Hines, E. M., Reynolds III, J. E., Aragones, L. V., Mignucci-Giannoni, A. A. and Marmontel, M. (Eds.) *Sirenian Conservation: Issues and Strategies in Developing Countries*. University Press of Florida, Gainesville, FL.
507. UNEP. (2010). Regional Management Plan for the West Indian Manatee (*Trichechus manatus*). CEP Technical Report No. 48. UNEP Caribbean Environment Programme, Kingston, Jamaica.
508. Kiszka, J. (2014). Bycatch assessment of the West Indian manatee (*Trichechus manatus*) and other megafauna in artisanal fisheries of the Caribbean. Final report to SPAW-RAC. Florida Atlantic University.
509. Ferrer, A., Herrera, O., Trujillo, F., Mosquera-Guerra, F., De La Cruz Melo, G., Lew, D., Boher, S., Seijas, A. E., Hernández, O. y Usma, S. (Eds.). (2017). *Plan de acción para la conservación de los mamíferos acuáticos de Venezuela: delfines de agua dulce, nutrias y manatíes 2017- 2027*. Caracas, Venezuela. 92 pp.
510. UNEP. (1995). Regional Management Plan for the West Indian Manatee (*Trichechus manatus*). CEP Technical Report No. 35. UNEP Caribbean Environment Programme, Kingston, Jamaica.
511. Kiszka, J. (2014). Bycatch assessment of the West Indian manatee (*Trichechus manatus*) and other megafauna in artisanal fisheries of the Caribbean. Final report to SPAW-RAC. Florida Atlantic University.
512. González-Socoloske, D., Taylor, C. R., and Rendon Thompson, O. R. (2011). Distribution and conservation status of the Antillean manatee (*Trichechus manatus manatus*) in Honduras. *Latin American Journal of Aquatic Mammals*, 9(2), 123-131. <http://dx.doi.org/10.5597/lajam00176>
513. Personal Communication with Jamie Aquino, Director of the Haiti Ocean Project. May 18, 2020.
514. Miller, A. R. and Dolsak, N. (2007). Issue linkages in international environmental policy: The International Whaling Commission and Japanese Development Aid. *Global Environmental Politics*, 7(1), 69-96.
515. Kershaw, J. L., and Hall, A. J. (2020). Mercury in cetaceans: Exposure, bioaccumulation and toxicity. *Science of The Total Environment*, 694(1), 133683. <https://www.sciencedirect.com/science/article/abs/pii/S0048969719336095>
516. Booth, S. and Zeller, D. (2005). Mercury, food webs, and marine mammals: Implications of diet and climate change for human health. *Environmental Health Perspectives*, 113(5), 521-526.
517. Animal Welfare Institute (AWI). (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
518. Animal Welfare Institute (AWI). (2019). Briefing Paper: Summary of Prohibited Acts Under The SPAW Protocol Related to Small Cetaceans. Presented to the SPAW Conference of the Parties, Roatan, Honduras, December 2019.
519. UNEP. (2019). Decisions of the 10th Conference of the Parties. Item 9. UNEP(DEPI)/CAR IG.40/3, June 3, 2019, Roatan, Honduras.
520. Article 14. SPAW Protocol. Exemption for Traditional Activities.
521. UNEP/CEP. (2020). State of nearshore marine habitats in the Wider Caribbean. Report prepared by Caribbean Natural Resources Institute (CANARI). Draft final report.
522. CLME Project. (2013). 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). 99 pp.
523. UNEP- Spain Partnership 'Broad-Scale Marine Spatial Planning and Transboundary Marine Mammal Management' – LifeWeb Project [2010-2014]. See interactive maps at <http://www.ancien-site.car-spaw-rac.org/?Mapping-application,357>
524. UNEP/CEP. (2020). State of nearshore marine habitats in the Wider Caribbean. Report prepared by Caribbean Natural Resources Institute (CANARI). Draft final report.
525. <https://www.caribjournal.com/2017/11/15/curacao-opens-new-mega-cruise-pier/>
526. <https://stthomassource.com/content/2014/09/26/hearing-brings-crowd-opposition-dolphinarium/>
527. <https://www.travelpulse.com/news/cruise/disney-dedicates-new-website-to-bahamian-lighthouse-point-project.html>
528. https://www.bahamaslocal.com/newsitem/87635/Abaco_chief_councilor_calls_for_EIA_release.html
529. UNEP. (2018). Sargassum white paper-Sargassum outbreak in the Caribbean: Challenges, opportunities, and regional situation. UNEP(DEPI)/CAR WG.40/INF8. Eighth meeting of the Scientific and Technical Advisory Committee (STAC) to the SPAW Protocol. Panama City, Panama.
530. Ibid.
531. <https://massivesci.com/notes/seagrass-sargassum-caribbean-harming-marine-life/>

532. See for example Finneran *et al.* for a review of noise impacts on cetaceans. Finneran, J. (2015). Noise-induced hearing loss in marine mammals: A review of temporary threshold shift studies from 1996 to 2015. *The Journal of the Acoustical Society of America*, 138, 1702. <https://asa.scitation.org/doi/10.1121/1.4927418>
533. de Bettencourt, J., and Imminga-Berends, H. (2015). Overseas Countries and Territories: Environmental Profiles. Final Report: Section A-Caribbean Region; EuropeAid/127054/C/SER/multi, Request no. 2013/325768. 54 pp.
534. <https://health.wustl.edu/post/uf-researchers-study-how-algae-blooms-hurt-florida-s-economy#stream/0>
535. Van Dola, F. M., Doucette, G. J., Gulland, F. M. D., Rowles, T. L., and Bossart, G. D. (2003). Impacts of algal toxins on marine mammals. In *Toxicology of Marine Mammals*, Chapter 10. Eds. Joseph G. Vos, Gregory Bossart, Michel Fournier, and Thomas O' Shea. pp.247.
536. Williams, E. H., and Bunkley-Williams, L. (2000). Marine major ecological disturbances of the Caribbean. *Infectious Disease Review*, 2(3), 110-127.
537. Ibid.
538. <https://www.nytimes.com/2013/04/07/science/earth/algae-bloom-in-florida-kills-record-number-of-manatees.html> and <https://www.theguardian.com/us-news/2018/aug/20/manatee-deaths-toxic-red-tide-algae-bloom-florida>
539. <https://www.fisheries.noaa.gov/southeast/marine-life-distress/2018-2020-bottlenose-dolphin-unusual-mortality-event-southwest>
540. <https://news.mongabay.com/2014/01/a-series-of-oil-spills-sully-caribbean-paradise-coating-mangroves-and-wildlife-photos/>
541. Acevedo, R., Oviedo, L., Silva, N., and Bermúdez-Villapol, L. (2008). A note on the spatial and temporal distribution of humpback whales (*Megaptera novaeangliae*) off Venezuela, Southeastern Caribbean. *Journal of Cetacean Research and Management*, 10(1), 73-79.
542. Bolaños-Jiménez, J., Acevedo, R., Bermúdez-Villapol, L., Boher-Bentti, S., Oviedo, L., y Villarroel-Marín, A. (2015). Ballena jorobada, *Megaptera novaeangliae*. En: J.P. Rodríguez, A. García-Rawlin y F. Rojas-Suárez (eds.) Libro Rojo de la Fauna Venezolana. Cuarta edición. Provita y Fundación Empresas Polar, Caracas, Venezuela. Downloaded from: animalesamenazados.provita.org.ve/content/ballenajorobada
543. <https://www.aljazeera.com/news/2020/10/22/damaged-venezuelan-oil-tanker-poses-minimal-spill-risk-officials>
544. <https://incidentnews.noaa.gov/incident/9502>
545. Singh, A., Asmath, H., Leung Chee, C., and Darsan, J. (2015). Potential oil spill risk from shipping and the implications for management in the Caribbean Sea. *Marine Pollution Bulletin*, 93 (1-2), 217-227. <https://doi.org/10.1016/j.marpolbul.2015.01.013>
546. Wallace, B. P., Brosnan, T., McLamb, D., Rowles, T., Rder, E., Schroeder, B., Schwacke, L., Stacy, B., Sullivan, L., Takeshita, R., and Wehner, D. (2017). Effects of the Deepwater Horizon oil spill on protected marine species. *Endangered Species Research*, 33, 1-7.
547. <https://oceanservice.noaa.gov/news/apr17/dwh-protected-species.html>
548. NOAA Affected Gulf Resources. NOAA Gulf Spill Restoration. <https://www.gulfspillrestoration.noaa.gov/affected-gulf-resources>. Accessed May 20, 2020.
549. US EPA. (201). Radioactive waste material from oil and gas drilling. In: US EPA. Available: <https://www.epa.gov/radtown/radioactive-waste-material-oil-and-gas-drilling>. Accessed April 7, 2020.
550. Personal conversation with Annette Arjoons. March 17, 2020. Oil and gas permits pending for Liza II without any environmental review.
551. Alleyne, K., Layne, L., and Soroush, M. (2018). Liza Field Development - The Guyanese Perspective. Society of Petroleum Engineers. doi:10.2118/191239-MS
552. <https://www.offshore-energy.biz/bpc-finds-oil-in-bahamas-well-but-no-commercial-volumes/>
553. MamaCocoSea Project. 2015. A review of seismic mitigation measures used along the coast of northern South America, from north brasil up to Colombia, Reference document for the MamaCocoSea Steering Committee. 76pp.
554. Ibid.
555. Singh, A., and Mee, L. D. (2008). Examination of policies and MEAs commitment by SIDS for sustainable management of the Caribbean Sea. *Marine Policy*, 32(3), 274-282.
556. UNEP. (1994). Regional Overview of Land Based Sources of Pollution in the Wider Caribbean Region. UNEP Caribbean Environment Programme Publication, Kingston, Jamaica, p. 59 (CEP Technical Report No. 33).
557. Botello A. V., Villanueva, S. F., and Diaz G. G. (1997). Petroleum Pollution in the Gulf of Mexico and Caribbean Sea. In: Ware G.W. (eds) *Reviews of Environmental Contamination and Toxicology. Reviews of Environmental Contamination and Toxicology*, vol 153. Springer, New York, NY.
558. Clarkson, T. W. (2008). The Toxicology of Mercury. *Critical Reviews in Clinical Laboratory Sciences*, 34(4), 369-403.
559. McNutt, M. (2013). Mercury and health. *Science*, 341(6153), 1430.
560. Tan, S. W., Meiller, J. C., and Mahaffey, K. R. (2009). The endocrine effects of mercury in humans and wildlife. *Critical Reviews in Toxicology*, 39(3), 228-269.
561. Fielding, R., Kiszka, J. J., Macdonald, C., McCormack, M. A., Dutton, J., Ollivierre, A. D., Arnett, J., Elkins, M., Darby, N. A., Garcia, H., Skinner, S., Tucker, H., and Reid, V. (2020). Demographic and geographic patterns of cetacean-based food product consumption and potential mercury exposure within a Caribbean whaling community. Research Square, doi: 10.21203/rs.3.rs-33554/v1. <https://assets.researchsquare.com/files/rs-33554/v1/c3a3604f-c07f-470e-9aa7-c9ee3d249fea.pdf>
562. McCormack, M. A., Fielding, R., Kiszka, J. J., Paz, V., Jackson, B. P., Bergfelt, D. R., and Dutton, J. (2020). Mercury and selenium concentrations, and selenium:mercury molar ratios in small cetaceans taken off St. Vincent, West Indies. *Environmental Research*, 181, 108908. <https://doi.org/10.1016/j.envres.2019.108908>
563. Mendez-Fernandez, P., Kiszka, J. J., Heithaus, M. R., Beal, A., Vandersarren, G., Caurant, F., Spitz, J., Taniguchi, S., and Montone, R. C. (2018). From banana fields to the deep blue: Assessment of chlordecone contamination of oceanic cetaceans in the eastern Caribbean. *Marine Pollution Bulletin*, 137, 56-60.
564. Booth, S. and Zeller, D. (2005). Mercury, food webs, and marine mammals: Implications of diet and climate change for human health. *Environmental Health Perspectives*, 113(5), 521-526.
565. CLME+. (2013). The Strategic action programme for the sustainable management of the shared living marine resources of the Caribbean and the North Brazil Shelf Large Marine Ecosystems (CLME+ SAP). 99pp.
566. <http://www.lasrutadeloro.com/colombia-mineria-ilegal-amenaza-a-diez-especies-de-animales/>
567. Mosquera-Guerra, F., Trujillo, F., Parks, D., Oliveira da Costa, M., Van Damme, P., Echeverría, A., Franco, N., Carvajal-Castro, J., Mantilla-Meluk, H., Marmontel, M and D. Armenteras. (2019). Mercury in populations of river dolphins of the Amazon and Orinoco basins. *EcoHealth*, 16, 743-758
568. Ibid.
569. McCormack, M. A., Fielding, R., Kiszka, J. J., Paz, V., Jackson, B. P., Bergfelt, D. R., and Dutton, J. (2020). Mercury and selenium concentrations, and selenium:mercury molar ratios in small cetaceans taken off St. Vincent, West Indies. *Environmental Research*, 181, 108908. <https://doi.org/10.1016/j.envres.2019.108908>
570. Fielding, R., and Evans, D. W. (2014). Mercury in Caribbean dolphins (*Stenella longirostris* and *Stenella frontalis*) caught for human consumption off St. Vincent, West Indies. *Marine Pollution Bulletin*, 89, 30-34.
571. Fielding, R., Kiszka, J. J., Macdonald, C., McCormack, M. A., Dutton, J., Ollivierre, A., Arnett, J. A., Elkins, M., Darby, N. A., Garcia, H., Skinner, S., Tucker, H., and Reid, V. (2021). Demographic and geographic patterns of cetacean-based food product consumption and potential mercury exposure within a Caribbean whaling community. *Human and Ecological Risk Assessment*, 21(6), 1671-1695. <https://doi.org/10.1080/10807039.2020.1870865>
572. Personal conversation with Dr. Linroy Christian, Director, Department of Analytic Services, Ministry of Agriculture, January 27, 2020.
573. <https://www.fluencecorp.com/the-caribbeans-wastewater-problem/>
574. Diez, S.M., Patil, P.G., Morton, J., Rodriguez, D.J., Vanzella, A., Robin,

D.V., Maes, T., and Corbin, C. (2019). Marine Pollution in the Caribbean: Not a Minute to Waste. Washington, D.C.: World Bank Group

575. UNEP CEP. (2014). Regional action plan on marine litter management (RAPMaLi) for the Wider Caribbean Region 2014.

576. Ibid.

577. Acosta-Coley, I., Duran-Izquierdo, M., Rodriguez-Cavallo, E., Mercado-Camargo, J., Mendez-Cuadro, D., And Olivero-Verbel, J. (2019). Quantification of microplastics along the Caribbean Coastline of Colombia: Pollution profile and biological effects on *Caenorhabditis elegans*. *Marine Pollution Bulletin*, 146, 574–583.

578. IWC. (2019). Report of the IWC Workshop on Marine Debris: the way forward, 3–5 December 2019, La Garriga, Catalonia, Spain. SC/68B/REP/03. https://archive.iwc.int/pages/view.php?search=%21collection29916+&k=&modal=&display=list&order_by=title&offset=0&per_page=240&archive=&sort=DESC&restypes=&recentdaylimit=&foredit=&ref=17025

579. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management and implementation for marine mammal conservation in the Saba sector of the Yarari Sanctuary. Wageningen, Wageningen Marine Research (University and Research Center), Wageningen Marine Research Report C097/17. 103 pp.

580. For example, Are baleen whales exposed to the threat of microplastics? A case study of the Mediterranean fin whale (*Balaenoptera physalus*). *Marine Pollution Bulletin*, <https://bigwobber.nl/wp-content/uploads/osd/20171221/1306.pdf>

581. Ivar do Sul, J. A., and Costa, M. F. (2007). Marine debris review for Latin America and the Wider Caribbean Region: From the 1970s until now, and where do we go from here? *Marine Pollution Bulletin*, 54, 1087–1104.

582. Matthews, T. R. (2009). Assessing opinions on abandoned, lost, or discarded fishing gear in the Caribbean. A final report submitted to Gulf and Caribbean Fisheries Institute and the U.S. Department of State. 17 pp.

583. <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2018/07/additional-fad-management-measures-needed-in-international-fisheries>

584. Ivar do Sul, J. A., and Costa, M. F. (2007). Marine debris review for Latin America and the Wider Caribbean Region: From the 1970s until now, and where do we go from here? *Marine Pollution Bulletin*, 54, 1087–1104.

585. Madeira Di Benedetto, A. P., and Arruda Ramos, R. M. (2014). Marine debris ingestion by coastal dolphins: What drives differences between sympatric species? *Marine Pollution Bulletin*, 83, 298–301.

586. Ivar do Sul, J. A., and Costa, M. F. (2007). Marine debris review for Latin America and the Wider Caribbean Region: From the 1970s until now, and where do we go from here? *Marine Pollution Bulletin*, 54, 1087–1104.

587. Heneman, B. (1988). Persistent marine debris in the North Sea, Northwest Atlantic Ocean, Wider Caribbean Area, and the West coast of Baja California. A report to the Marine Mammal Commission. Center for Environmental Education.

588. Hoyt, E. (1999). *The Potential of Whale Watching in the Caribbean: 1999+*. Whale and Dolphin Conservation Society, Bath, UK. Presented as IWC/51/WW2 by the United Kingdom Government to the International Whaling Commission, May 1999, Grenada, pp. 1–81.

589. Carlson, C. (2008). A review of whalewatching guidelines and regulations around the world. International Whaling Commission. 149 pp. <https://www.handbook.iwc.int/en/downloadable-resources/guidelines-and-regulations#entry:5924:url>

590. UNEP. (2011). Report of the regional workshop on marine mammal watching in the Wider Caribbean Region. Panama City, Panama. October 2011.

591. O'Connor, S., Campbell, R., Cortez, H., and Knowles, T. (2009). Whale watching worldwide: Tourism numbers, expenditures and expanding economic benefits. International Fund for Animal Welfare, Yarmouth, MA. Prepared by Economists at Large.

592. Ibid.

593. IWC. (2018). Colombia Whale and dolphin watching country profile. IWC Online Whale Watching Handbook. <https://www.handbook.iwc.int/en/>

[iwc.int/en/](https://www.handbook.iwc.int/en/)

594. Hoyt, E., and Hvenegard, G. T. (2002). A review of whale-watching and whaling with applications for the Caribbean. *Coastal Management*, 30, 381–399.

595. Gerst, S., Ingulrud, L., Johnson, S., and Steffen, C. (2020). Whales and vessels: Economic valuation of whale watching and marine spatial planning surrounding Dominica. Report prepared for the Dominica Sperm Whale Project. 89 pp. <http://trapdoor.bren.ucsb.edu/research/documents/WorthWhaleFinalReport.pdf>

596. Mayol, P., de Mongolfier, B., Ratel, M., Bordes, R., Costales, L., Iatropoulos, D., Ortolé, C., and Belhadjer, A. (2015). Caractérisation des activités d'observation commerciale des cétacés à l'échelle du sanctuaire Agoa. Étude commandée par le sanctuaire Agoa Co-financée par l'Agence des aires marines protégées et la DEAL Martinique Maitrise d'œuvre réalisée par Souffleurs d'Écume en partenariat avec Aquasearch. Décembre 2015. 110 pp.

597. <https://oceanwealth.org/ecosystem-services/recreation-tourism/> and <https://pressroom.oecs.org/oceans-the-last-frontier-for-oecs-states>

598. Luksenburg, J. A., and Parsons, E. C. M. (2013). Attitudes towards marine mammal conservation issues before the introduction of whale-watching: a case study in Aruba (southern Caribbean). *Aquatic Conservation: Marine and Freshwater Ecosystems*, DOI: 10.1002/aqc.2348

599. Personal communication. Caroline Rinaldi, Association Evasion Tropicale, October 13, 2019.

600. O'Connor, S., Campbell, R., Cortez, H., and Knowles, T. (2009). Whale watching worldwide: Tourism numbers, expenditures and expanding economic benefits. International Fund for Animal Welfare, Yarmouth, MA. Prepared by Economists at Large.

601. IWC. (2018). Dominican Republic Whale and dolphins watching country profile. IWC Online Whale Watching Handbook. <https://www.handbook.iwc.int/en/>

602. Reglamento Técnico Ambiental para la observación de Ballenas de los Bancos de la Plata y La Navidad y en la Bahía de Samaná. Ministerio de Medio Ambiente y Recursos Naturales. Santo Domingo, República Dominicana. Mayo, 2018

603. Hoyt, E. (2001). Whale Watching 2001: Worldwide tourism numbers, expenditures, and expanding socioeconomic benefits. International Fund for Animal Welfare, Yarmouth Port, MA, USA. 158 pp.

604. IFAW. (1999). *Report of the Workshop on the Socioeconomic Aspects of Whale Watching*. Kaikoura, New Zealand. 88 pp.

605. O'Connor, S., Campbell, R., Cortez, H., and Knowles, T. (2009). Whale watching worldwide: Tourism numbers, expenditures and expanding economic benefits. International Fund for Animal Welfare, Yarmouth, MA. Prepared by Economists at Large.

606. Parsons, E. C. M. (2012). The negative impacts of whale watching. *Journal of Marine Biology*, 2012, 1–9.

607. New, L., Lusseau, D., and Harcourt, R. (2020). Dolphins and boats: When is a disturbance, disturbing? *Frontiers in Marine Science*, 7 (353), 1–13. doi:10.3389/fmars.2020.00353

608. Perez-ortega, B., Daw, R., Paradee, B., Gimbrere, E., and May-Collado, L. J. (2021). Dolphin-watching boats affect whistle frequency modulation in bottlenose dolphins. *Frontiers in Marine Science*, 8, 618420. Doi:10.3389/fmars.2021.618420.

609. Parsons, E. C. M. (2012). The negative impacts of whale watching. *Journal of Marine Biology*, 2012, 1–9.

610. <https://tinyurl.com/y9e9z7f8>

611. Reeves, R. R., Smith, B. D., Crespo, E. A. and Notarbartolo di Sciara, G. (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 139 pp.

612. New, L., Lusseau, D., and Harcourt, R. (2020). Dolphins and boats: When is a disturbance, disturbing? *Frontiers in Marine Science*, 7 (353), 1–13. doi:10.3389/fmars.2020.00353

613. Sprogis, K. R., Bejder, L., Hanf, D., and Christiansen, F. (2020). Behavioural responses of migrating humpback whales to swim-with-whale activities in the Ningaloo Marine Park, Western Australia. *Journal of Experimental Marine Biology and Ecology*, 522, 151254. <https://doi.org/10.1016/j.jembe.2020.151254>

org/10.1016/j.jembe.2019.151254

614. Lundquist, D., Sironi, M., Wursig, B., Rowntree, V., Martino, J., and Lundquist, L. (2013). Behavioral response of southern right whales to simulated swim-with-tourism at Peninsula Valdes, Argentina. *Marine Mammal Science*, 29(2), E24-E45. <https://doi.org/10.1111/j.1748-7692.2012.00583.x>

615. Constantine, R. (2006). Increased avoidance of swimmers by wild bottlenose dolphins (*Tursiops truncatus*) due to long-term exposure to swim-with-dolphin tourism. *Marine Mammal Science*, 17(4), 689-702. <https://doi.org/10.1111/j.1748-7692.2001.tb01293.x>

616. <https://tinyurl.com/yxj565u7>

617. Vail, C. (2016). An overview of increasing incidents of bottlenose dolphin harassment in the Gulf of Mexico and possible solutions. *Frontiers in Marine Science*, 3(110). doi: 10.3389/fmars.2016.00110 <https://tinyurl.com/jwdxzdq>

618. Powell, J., Machernis, A. F., Engleby, L. K., Farmer, N. A., and Spradlin, T. (2018). Sixteen years later: an updated evaluation of the impacts of chronic human interactions with bottlenose dolphins (*Tursiops truncatus truncatus*) at Panama City, Florida, USA. *Journal of Cetacean Research and Management*, 19, 79-93.

619. IWC. (2018). Dominican Republic Whale and dolphins watching country profile. IWC Online Whale Watching Handbook. <https://www.handbook.iwc.int/en/>

620. In one study surveying compliance with vessel speed restrictions, a 5% compliance rate only improved after citations, outreach programmes, and enforcement of fines was implemented. See Silber, G. K., Adams, J. D., Fonnesbeck, C. J. (2014). Compliance with vessel speed restrictions to protect North Atlantic right whales. *Peer J*. 2:e399. <https://doi.org/10.7717/peerj.399>

621. Avila, I. C., Correa, L. M., and Parsons, E.C.M. (2015). Whale-watching activity in Bahía Málaga, on the Pacific coast of Colombia, and its effect on humpback whale (*Megaptera novaeangliae*) behavior. *Tourism in Marine Environments*, 11(1), 19-32.

622. Whitt, A. D. and Read, A. J. (2006). Assessing compliance to guidelines by dolphin-watching operators in Clearwater, Florida, USA. *Tourism in Marine Environments*, 3 (2), 117-130.

623. <https://s3-eu-west-1.amazonaws.com/wwwhandbook/files/Panama-2011-UNEP-workshop-report.pdf>

624. These guidelines can be found in Annex III.

625. <http://www.caribwhale.org/>

626. Personal communication. Caroline Rinaldi, Association Evasion Tropicale, October 13, 2019.

627. <https://www.handbook.iwc.int/en/responsible-management/guidelines-and-regulations>

628. There are currently 35 marine protected areas listed under the SPAW Protocol.

629. The evolution of the Caribbean Marine Protected Area Management Network and Forum (CaMPAM): 20 years of the regional, multidimensional programme for strengthening MPA practitioners. *Gulf and Caribbean Research*, 29:GCF1-9 <https://aquila.usm.edu/cgi/viewcontent.cgi?article=1525&context=gcr>

630. <https://sites.google.com/cep.unep.org/campamgeospatialdatabase/home>

631. The CARIMAM Project is co-financed by the Interreg Caraibes programme under the European regional development fund.

632. <https://www.marinemammalhabitat.org/building-transatlantic-partnerships-among-mpas-whales-dolphins/>

633. The Sister Sanctuaries Program for Marine Mammals in the Wider Caribbean – A US/NOAA, Dominican Republic, France and the Netherlands initiative. STAC 2016. UNEP(DEPI)/CAR WG.38/INF.16

634. https://nmsstellwagen.blob.core.windows.net/stellwagen-prod/media/archive/sister/pdfs/ss_fs_e.pdf

635. <http://www.bahamaswhales.org/home.aspx>

636. For example, Stichting Nationale Parken Bonaire (STINAPA Bonaire) is a non-governmental organization commissioned by island government to manage two protected areas on Bonaire.

637. <https://ommag971.jimdo.free.com/>

638. <http://www.evasiontropicale.org/>

639. <http://observation.org/>; for example <https://bonaire.observation.org/foto/index>

640. For example, see Stinapa's research and monitoring programmes <https://stinapabonaire.org/resources/research-reports/>

641. Lucke, K., Scheidat, M., Geelhoed, S., Debrot, D., Ward, N., Hatch, L., Wiley, D., McDonald, C., Reynolds, J., Hoetjes, P., Bolanos, J., Souan, H., Vandersarren, G., and Gandhilon, N. (2014). Marine mammals in the Wider Caribbean – Current research and priorities for future studies. Report No. C007/14, IMARES Wageningen UR, 39 pp.

642. Vilaça, S.T., Lima, C. S., Mazzoni, C. J., Santos, F. R., and de Thoisy, B. (2019). Manatee genomics supports a special conservation area along the Guianas coastline under the influence of the Amazon River plume. *Estuarine, Coastal and Shelf Science*, 226.

643. Caballero, S., Islas-Villanueva, V., Tezanos-Pinto, G., Duchene, S., Delgado-Estrella, A., Sanchez-Okucki, R. and Mignucci-Giannoni, A. A. (2011). Phylogeography, genetic diversity and population structure of common bottlenose dolphins in the Wider Caribbean inferred from analyses of mitochondrial DNA control region sequences and microsatellite loci: conservation and management implications. *Animal Conservation*, 15(1), 95-112.

644. <https://thespermwhaleproject.org>

645. Gero, S. and Whitehead, H. (2016). Critical decline of the Eastern Caribbean sperm whale population. *PLoS ONE*, 11(10), e0162019.

646. http://www.bahamaswhales.org/about_us.aspx

647. Bolanos, J., Balladares, C., Barrios-Garrido, H., Bermudez-Villapol, L., De Turris, K., Espinoza, N., Gonzalez-Fernandez, M., and Sanchez-Criollo, L. (2014). Preliminary review of cetacean strandings and mortality in Venezuela, 1988-2014. Paper presented to the Scientific Committee of the International Whaling Commission, SC/65b/SM27

648. Cobarrubia-Russo, S., Barber-Myer, S., Barreto, G. R., and Molero-Lizarraga, A. (2021). Historic population estimates for bottlenose dolphins (*Tursiops truncatus*) in Aragua, Venezuela, indicate monitoring need. *Aquatic Mammals Journal*, 47(1), 10-20. Doi:10.1578/AM.47.1.2021.10

649. <https://www.diarilibre.com/actualidad/medioambiente/orcas-en-el-caribe-AM20862121>

650. Alvarez-Alemán, A.; Angulo Valdes, J. and Powell, J. (2013). ABSTRACT Manatee research and conservation in Cuba. Congreso de Biología y Conservación, Habana, Cuba

651. Whitt, A. D., Jefferson, T. A., Blanco, M., Fertl, D., and Rees, D. (2011) A review of marine mammal records of Cuba. *Latin American Journal of Aquatic Mammals* 9(2), 65-122. <http://dx.doi.org/10.5597/lajam00175>

652. <http://www.trinationalinitiative.org/marine-mammals.html>

653. <https://finsconservation.org>

654. <http://www.ecomarbelize.org/sightings.html>

655. <https://www.ecosur.mx/>

656. Presentation by Nataly Castelblanco, PROMMAC, CariMAM Workshop November 3-4, La Romana, Dominican Republic

657. <https://www.fundemardr.org/mamiferos-marinos>

658. IWC. (2018). Dominican Republic Whale and dolphin watching country profile. *Online Whale Watching Handbook*. <https://www.handbook.iwc.int/en/>

659. Online report at http://oceansciencelogistic.org/?page_id=286

660. Rodriguez-Ferrer, G., Reyes, R., Hammerman, N. M., and Garcia-Hernandez, J. E. (2018). Cetacean sightings in Puerto Rican waters: including the first underwater photographic documentation of a minke whale (*Balaenoptera acutorostrata*). *Latin American Journal of Aquatic Mammals*, 13(1-2), 26-36.

661. Mignucci-Giannoni, A. A., Swartz, S. L., Martinez, A., Burks, C. M., and Watkins, W. A. (2003). First records of the pantropical spotted dolphin (*Stenella attenuata*) for the Puerto Rican Bank, with a review of the species of the Caribbean. *Caribbean Journal of Science*, 39(3), 381-392.

662. Rodriguez, G., Curz-Motta, J. J., Schizas, N. V., and Appeldorn, R. S. (2020). Modelling distribution of the common bottlenose dolphin, *Tursiops truncatus* off the southwest coast of Puerto Rico. *Journal of Marine Systems*, 210, 103371.

663. <https://ommag971.jimdofree.com/>
664. <http://www.evasiontropicale.org/>
665. Rinaldi, C., Rinaldi, R., Laine, J., and Barbraud, C. (2020). Population dynamics of Sperm Whales (*Physeter macrocephalus*) in Guadeloupe, French Caribbean: a mark recapture study from 2001 to 2013. In press.
666. See, for example, Stevick, P. T., Berrow, S. D., Bérubé, M., Bouveret, L., Broms, F., Jann, B., et al. (2016). There and back again: Multiple and return exchange of humpback whales between breeding habitats separated by an ocean basin. *Journal of Marine Biological Association, U.K.* 96, 885–890. doi: 10.1017/s0025315416000321 and Stevick, P. T., Bouveret, L., Gandilhon, N., Rinaldi, C., Rinaldi, R., Broms, F., et al. (2018). Migratory destinations and timing of humpback whales in the southeastern Caribbean differ from those off the Dominican Republic. *Journal of Cetacean Research and Management*. 18, 127–133.
667. Smith, T. D., Allen, J., Clapham, J., Hammond, P. S., Katona, S., Larsen, F., Lien, J., Mattila, D., and Palsboll, P. J. (1999). *Marine Mammal Science*, 15(1), 1–32.
668. Fulling, G. and Clapham, P. (2004). Cruise report: NOAA ship Gordon Gunter cruise GU-04-01(26) MONAH project humpback whale survey, Silver Bank.
669. Bettridge, S., Baker, S., Barlow, J., Clapham, J., Ford, M., Gouveia, D., Mattila, D., Pace, R. M., Rosel, P. E., Silber, G., Wade, P. R. (2015). Status review of the humpback whale (*Megaptera Novaeangliae*) under the Endangered Species Act. NOAA Technical Memorandum NMFS.
670. Heenehan, H., Stanistreet, J. E., Corkerson, P. J., Bouveret, L., Chalifour, J., Davis, G. E., Henriquez, A., Kiszka, J. J., Reed, C., Shamir-Reynoso, O., Védie, F., De Wolf, W., Hoetjes, P., and Van Parijs, S. M. (2019). Caribbean Sea Soundscapes: Monitoring humpback whales, biological sounds, geological events, and anthropogenic impacts of vessel noise. *Frontiers in Marine Science*, <https://doi.org/10.3389/fmars.2019.00347>
671. <https://www.citizenscience.gov/catalog/408/#>
672. <http://www.ancien-site.car-spaw-rac.org/?-SPAW-RAC-Mapping-Application->
673. Caribbean Marine Mammal's Passive Acoustic Observatory. Technical Note. 2019–2020.
674. CariMam project activity report. 2019.
675. <http://www.panacetacea.org/>
676. <http://congresocetaceosca.com/actividades.html>
677. <https://www.savethemanatee.org/manatees/manatee-population/>
678. UNEP. (2010). Regional Management Plan for the West Indian Manatee (*Trichechus manatus*). CEP Technical Report No. 48. UNEP Caribbean Environment Programme, Kingston, Jamaica.
679. Distribution and abundance of marine megafauna In French Guiana REMMOA Campaign - Guiana Final report – May 2009 (reviewed May 2010). Agence des Aires Marines Protégées and Université de la Rochelle. Fédération de Recherche en Environnement et Développement Durable Centre de Recherche sur les Mammifères Marins. 43pp.
680. Ward, N., Moscrop, A., and Carlson, C. (2001). Elements for the development of a marine mammal action plan for the Wider Caribbean: A review of marine mammal distribution. United Nations Environment Program (UNEP), Havana, Cuba. Retrieved from <http://www.cep.unep.org/pubs/meetingreports/SPAW%20COP/English%20Docs/IG20-inf3en.doc>
681. Ibid.
682. Ramos, E. A., Castelblanco-Martinez, N., Jenko, K., Torres, C. A. N., Gomez, N. A. (2016). A review of aquatic mammals in Belize. *Aquatic Mammals*, 42(4), 476–493. Available from: https://www.researchgate.net/publication/311207043_A_Review_of_the_Aquatic_Mammals_of_Belize
683. <http://animalia.bio/neotropical-river-otter>
684. Partners have included NOAA, SPAW-RAC, ECCN, SOCN, Evasion Tropicale, French Ministry of the Environment (DREN), and others. Participants to these workshops included protected management organizations, government departments, and intergovernmental and non-governmental organizations.
685. Ward, N. (2007). Protocols and techniques for responding to strandings. Eastern Caribbean Cetacean Network, workshop report.
686. Ward, N., and Rinaldi, C. (2010). Final Report for the regional workshop for marine mammal stranding response in the French Caribbean. Bouillante, Basse Terre, Guadeloupe.
687. Ward, N. (2010). Final report of three regional workshops for marine mammal stranding response in the Dutch, French and Spanish-speaking Caribbean countries and territories. Eastern Caribbean Cetacean Network (ECCN).
688. <https://iwc.int/news-extending-the-global-whale-entanglement-response>
689. <https://iwc.int/iwc-entanglement-training-in-eastern-caribbean>
690. MamaCocoSea Project. (2013). Marine Mammal Conservation Corridor for Northern South America Follow-Up Workshop Proceedings. 18–20 March 2013, Paramaribo, Suriname. 63pp
691. Ward, N. (2007). Protocols and techniques for responding to strandings. Eastern Caribbean Cetacean Network, workshop report.
692. <http://manatipr.org/>
693. The network is run by Antonio Mignucci in partnership with the Puerto Rico Manatee Conservation Center
694. Personal conversation with Antonio Mignucci. August 30, 2020.
695. These organizations include the Bahamas Marine Mammal Research Organization and Guyana Marine Conservation Society.
696. For example, a local manatee expert in collaboration with a US-based aquarium and Belize Wildlife Conservation Society responded to a dead baleen whale off the coast of Belize City. Antonio Mignucci of the Caribbean Stranding Network assisted remotely over Whatsapp. <https://www.breakingbelizenews.com/2020/05/13/dead-whale-found-near-belize-city-coast/>
697. The Belize Marine Mammal Stranding Network was formed in 1999 in collaboration with the Coastal Zone Management Authority and Institute.
698. For example, in the Dominican Republic, the National Aquarium coordinates the stranding network; in the United States, regional stranding networks are complemented by staff from marine mammal parks and aquaria. See <https://www.seewinter.com/animals/rescue-missions/> and <https://www.dpmmr.org/rescue-strandings>
699. Gomez-Hernandez, G., Seingier, G., Elorriago-Verplancken, F., and Heckel, G. (2020). Status and scope of marine mammal stranding research in Mexico. *Journal of Coastal Conservation*, 24, 3. <https://doi.org/10.1007/s11852-019-00725-8>
700. Personal conversation with Antonio Mignucci, Puerto Rico Manatee Conservation Center; and Jamie Aquino, Haiti Ocean Project. May 14, 2020.
701. <http://www.bahamaswhales.org/strandings.aspx>
702. Stranded species included two West Indian Manatees. One stranded alive (2009) and later died, and the other (2017) was rescued, rehabbed and released.
703. Strandings data provided by Diane Claridge and Charlotte Dunn of Bahamas Marine Mammal Research Organization (BMMRO).
704. Department of Commerce and Secretary of the Navy. (2001). Joint Interim Report: Bahamas Marine Mammal Stranding Event of 15–16 March 2000. December. Accessible at <https://www.thecre.com/selfReports/wp-content/uploads/2012/12/Evans-D.I..pdf>
705. <https://www.ima.gov.tt/report-a-marine-incident/>
706. Phillips, A.C.N. and Suepaul, R. (2017). Nasitrema species - A Frequent Culprit in Melon-Headed Whale (*Peponocephala electra*) Strandings in Trinidad. *Aquatic Mammals*. doi: 10.1578/AM.43.5.2017.547
707. Filadelfo, R., Mintz, J., Michlovich, E., D'Amico, A., Tyack, P., and Ketten, D. R. (2009). Correlating military sonar use with beaked whale mass strandings: What do the historical data show? *Aquatic Mammals*, 35(4), 435–444.
708. Ibid.
709. Personal communication, Paul Hoetjes. May 18, 2020.
710. Williams, R., Gero, S., Beijder, L., Calambokidis, J., Kraus, S. D., Lusseau, D., Read, A. J., and Robbins, J. (2011). *Conservation Letters*, 4, 228–233. doi: 10.1111/j.1755-263X.2011.00168.x

711. Note: The authors were unable to verify how many individual pinnipeds are being held in the WCR.
712. Santos, M. C. O., C. Olavarría, C., Borobia, M., Caballero, S., Secchi, E. R., Siciliano, S., and Palacios, D. A. (2010). A Tale of Two Dolphins: Introduction to the Special Volume on the Biology and Conservation of Neotropical Dolphins of the Genus *Sotalia*. *Latin American Journal of Aquatic Mammals*, 8(1-2), 9-23.
713. <http://acuariorodadero.com/>
714. One facility in Cuba claims to have Six interaction pools (for up to 21 dolphins), an entertainment area of 900 m² and 260 seats for dolphin shows. <http://www.cayosantamaria.info/dolphinarium.html>
715. Resolution No. 20/2018, prohibits the capture, importation, exportation and commerce of dolphin species in all national territory for five years. Captive mammal programmes are regulated by the Regulation on the Holding, Management and Exhibition of Marine Mammal Species in the Dominican Republic (Resolution No. 01/2008).
716. <https://www.dolphindiscovery.com/>
717. <https://dolphinworld.org/activity/tortola-royal-dolphin-swim/>
718. <https://www.latimes.com/archives/la-xpm-2007-jun-24-fg-flipper24-story.html>;
719. <https://www.facebook.com/dolphindiscoverystlucia>
720. <https://us.whales.org/2014/10/14/antigua-and-barbuda-considering-legislation-to-ban-whale-and-dolphin-captivity/>
721. St. Aubin, D. J., Forney, K. A., Chivers, S. J., Scott, M. D., Danil, K., and Romano, T. (2011). Hematological, serum, and plasma chemical constituents in pantropical spotted dolphins (*Stenella attenuata*) following the chase, encirclement, and tagging. *Marine Mammal Science*, 29, 14-35.
722. Rose, N. A., and Parsons, E. C. M., (2019). The case against marine mammals in captivity, 5th edition. Washington, DC: Animal Welfare Institute and World Animal Protection, 160 pp.
723. Personal communication with Jaime Bolanos-Jimenez, September 6, 2020. Director of SEA -VIDA
724. Parsons, C., Bonnelly de Calventi, I., Vail, C. S. (2008). Case study illustrating the socio-economics and sustainable utilization of marine mammal resources. Friends of the Dolphin Project (Proyecto Amigos de los Delfines). Paper prepared for SPAW STAC.
725. Espinosa, J., and Orta, J. (2007). Biota Marina. Pages 72-141 in González, H.A. (Ed) *Biodiversidad de Cuba*, Ciudad de Guatemala.
726. Rose, N. A., and Parsons, E. C. M., (2019). The case against marine mammals in captivity, 5th edition. Washington, DC: Animal Welfare Institute and World Animal Protection, 160 pp.
727. Parsons, E.C.M., Rose, N. A., and Telecky, T. M. (2010). The trade in live Indo-Pacific bottlenose dolphins from Solomon Islands—A CITES decision implementation case study. *Marine Policy*, 34(3), 384-388.
728. Small, R. J. and DeMaster, D. P. (1995a). Survival of five species of captive marine mammals. *Marine Mammal Science* 11, 209-226 and Small, R. J. and DeMaster, D. P. (1995b). Acclimation to captivity: A quantitative estimate based on survival of bottlenose dolphins and California sea lions. *Marine Mammal Science* 11, 510-519.
729. Clubb, R. and Mason, G. (2003). Captivity effects on wide-ranging carnivores. *Nature* 425, 473.
730. Woodley, T. H., Hannah, J. L., and Lavigne, D. M. (1997). A comparison of survival rates for captive and free-ranging bottlenose dolphins (*Tursiops truncatus*), killer whales (*Orcinus orca*) and beluga whales (*Delphinapterus leucas*). IMMA Technical Report No. 97-02.
731. Maas, B. (2000). Prepared and Shipped: A Multidisciplinary Review of the Effects of Capture, Handling, Housing and Transport on Morbidity and Mortality. A Report for the RSPCA, Horsham, UK. 55pp.
732. Reeves, R. R., Smith, B. D., Crespo, E. A. and Notarbartolo di Sciara, G. (compilers). (2003). *Dolphins, Whales and Porpoises: 2002-2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 139 pp.
733. Ibid.
734. D'Amico, A., Gisiner, R. C., Ketten, D. R., Hammock, J. A., Johnson, C., Tyack, P. L., and Mead, J. (2009). Beaked whale strandings and naval exercises. *Aquatic Mammals*, 35(4), 452-472.
735. Senigaglia, V., Christiansen, F., Bejder, L., Gendron, D., Lundquist, D., Noren, D. P., Schaffar, A., Smith, J. C., Williams, R., Martinez, E., Stockin, K., Lusseau, D. (2016). Meta-analyses of whale-watching impact studies: comparisons of cetacean responses to disturbance. *Marine Ecology Progress Series*, 542, 251-263.
736. MamaCocoSea Project. 2013. Marine Mammal Conservation Corridor for Northern South America Follow-Up Workshop Proceedings. 18-20 March 2013, Paramaribo, Suriname. 63pp.
737. https://www.researchgate.net/publication/332511177_GUIDELINES_-_MARINE_BIOTA_MONITORING_IN_SEISMIC_SURVEYS
738. MamaCocoSea Project. (2015). A review of seismic mitigation measures used along the coast of northern south America, from north brasil up to Colombia, Reference document for the MamaCocoSea Steering Committee. 76pp.
739. <https://ecologie.gouv.fr/sites/default/files/Guide%20preconisations%20pour%20limiter%20l'impact%20des%20bruits%20sous-marins%20sur%20la%20faune%20marine.pdf>
740. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management and implementation for marine mammal conservation in the Saba sector of the Yarari Sanctuary. Wageningen, Wageningen Marine Research (University and Research Center), Wageningen Marine Research Report C097/17. 103 pp.
741. U.S. Navy Office of Information. https://www.navy.mil/submit/display.asp?story_id=111047
742. Moretti, D. (2017). Marine Mammal Monitoring on Navy Ranges (M3R) Passive Acoustic Monitoring on the Atlantic Undersea Test and Evaluation Center (AUTC) and Undersea Shallow Water Training Range (USWTR). 15 pp.
743. Simonis, A. E., Brownell, R. L., Thayre, B. J., Trickey, J. S., Oleson, E. M., Huntington, R., Baumann-Pickering, S. (2020). Co-occurrence of beaked whale strandings and naval sonar in the Mariana Islands, Western Pacific. *Proceedings Royal Society B*, 287, 20200070. <http://dx.doi.org/10.1098/rspb.2020.0070>
744. Balcolmb, K. C. I., and Claridge, D. E. (2001). A mass stranding of cetaceans caused by naval sonar in the Bahamas. *Bahamas Journal of Science*, 2, 2-12.
745. May-Collado, L. J. et al. (2018). Ecology and Conservation of Cetaceans of Costa Rica and Panama. In Rossi-Santos, M.C. and Finkl, C.(eds). *Advances in Marine Vertebrate Research in Latin America: Technological Innovation and Conservation*. Coastal research Library 22. pp.293-319.
746. Kassamali-Fox, A., Christiansen, F., May-Collado L. J., Ramos, E. A., Kaplin, B. A. (2020). Tour boats affect the activity patterns of bottlenose dolphins (*Tursiops truncatus*) in Bocas del Toro, Panama. *Biodiversity and Conservation*, 32266117. https://peerj.com/articles/8804/?fbclid=IwAR0VuO_9FY2t3PbpAAOOUZnTr8J_xA92wPk2ZXdDhgLGmfxUHamhtNuhZPo
747. Silber, G. K., Vanderlaan, A. S. M., Arceredito, A. T., Johnson, L., Taggart, C. T., Brown, M. W., Bettridge, S., and Sagarmiraga, R. (2012). *Marine Policy*, 36, 1221-1233.
748. Heenehan, H., Stanistreet, J. E., Corkeron, P. J., Bouvert, L., Chalifour, J., Davis, G. E., Henriquez, A., Kiszka, J. J., Kline, L., Reed, C., Shamir-Reynoso, O., Védie, F., De Wolf, W., Hoetjes, P., and Van Parijs, S. M. (2019). Caribbean sea soundscapes: Monitoring humpback whales, biological sounds, geological events, and anthropogenic impacts of vessel noise. *Frontiers in Marine Science*, <https://doi.org/10.3389/fmars.2019.00347>
749. UNEP-SPAW and member countries. The report of the meeting is available at http://www.car-spaw-rac.org/IMG/pdf/Ship_Strikes_Report_FINAL-July25.pdf
750. see <https://iwc.int/ship-strikes>
751. Personal conversation, Caroline Rinaldi, November 19, 2020.
752. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management and implementation for marine mammal conservation in the Saba sector of the Yarari Sanctuary. Wageningen, Wageningen Marine Research (University and Research Center), Wageningen Marine Research Report C097/17. 103 pp.
753. <http://repcet.com/en/home/>

754. Luksenburg, J.A. (2014). Prevalence of External Injuries in Small Cetaceans in Aruban Waters, Southern Caribbean. *PLoS ONE* 9(2): e88988. doi:10.1371/journal.pone.0088988
755. Bolanos, J. J., Balladares, C., Barrios-Garrido, H., Bermudez-Villapol, L., De Turris, K., Espinoza, N., Gonzalez-Fernandez, M., and Sanchez-Criollo, L. (2014). Preliminary review of cetacean strandings and mortality in Venezuela, 1988-2014. Paper presented to the Scientific Committee of the International Whaling Commission, SC/65b/SM27
756. Personal communication with Diane Claridge, Bahamas Marine Mammal Research Organization. November 10, 2020.
757. <https://www.wtsp.com/article/life/animals/florida-manatee-death-rates-are-at-the-states-highest-since-2013/67-9e9d601c-dafb-4c75-8c65-f39b03abdb37>
758. LaCommare, K. S., Self-Sullivan, C., and Brault, S. (2008). Distribution and habitat use of Antillean Manatees (*Trichechus manatus manatus*) in the drowned cayes area of Belize, Central America. *Aquatic mammals*, 34(1), 35-43.
759. Laist, D. W., Knowlton, A. R., and Pendleton, D. Effectiveness of mandatory vessel speed limits for protecting North Atlantic right whales. *Endangered Species Research*, 23, 133-147.
760. Nurse, L.A., McLean, R. F., Agard, J., Briguglio, L. P., Duvat-Magnan V., Pelesikoti, N., Tompkins, E., and Webb, A. (2014). Small islands. In: 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 [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1613-1654.
761. Ibid.
762. <https://iwc.int/climate-change>
763. IWC. (2014). Report of the IWC Climate Change Steering Group Meeting, University of Glasgow, August 19th, 2014. 18pp.
764. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management implementation for marine mammal conservation in the Saba sector of the Yarari sanctuary. Wageningen, Wageningen Marine Research (University & Research centre), Wageningen Marine Research report C097/17. 103 pp Priorities in management implementation for marine mammal conservation in the Saba sector of the Yarari sanctuary
765. IWC. (2010). Report of the workshop on cetaceans and climate change. *Journal of Cetacean Research and Management*, 11 (suppl 2), 451-480.
766. Debrot, A. O., Tamis, J. E., de Haan, D., Scheidat, M., and van der Wal, J. T. (2017). Priorities in management and implementation for marine mammal conservation in the Saba sector of the Yarari Sanctuary. Wageningen, Wageningen Marine Research (University and Research Center), Wageningen Marine Research Report C097/17. 103 pp.
767. Reyer, C. P. O., Adams, S., Albrecht, T., Baarsch, F., Boit, A., Trujillo, N. C., Carlsburg, M., Coumou, D., Eden, A., Fernandes, E., Langerwisch, F., et al. (2015). Climate change impacts in Latin America and the Caribbean and their implications for development. *Regional Environmental Change*, doi: 10.1007/s10113-015-0854-6 <https://research.fit.edu/media/site-specific/researchfit.edu/coast-climate-adaptation-library/latin-america-and-caribbean/regional---latin-am-amp-caribbean/Reyer-et-al.-CC-Impacts-in-Latin-America-and-the-Caribbean-for-2015.pdf>
768. IWC (2012). Report of the Workshop on Small Cetaceans and Climate Change, *Journal of Cetacean Research and Management*. 13 (suppl.), 319-336.
769. USGCRP. (2018). *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.
770. Ibid.
771. Roman, J., Estes, J. A., Morissette, L., Smith, C., Costa, D., McCarthy, J., Nation, J. B., Nicol, S., Pershing, A., and Smetacek, V. (2014). *Frontiers in Ecology and the Environment*, 12(7), 377-385. doi:10.1890/130220.
772. IWC. (2014) Report of the IWC Climate Change Steering Group Meeting, University of Glasgow, August 19th, 2014. 18pp.
773. E.g. UNEP(DEPI)/CAR WG.36/INF.6. Update on the implementation of activities in support of the action plan for the conservation of marine mammals (MMA), including the government of Spain-UNEP LifeWeb project "protecting habitats and migration corridors for marine mammals in the south and northeast pacific and the wider caribbean through marine protected area networks". STAC 6, Cartagena, Colombia. 8 December 2014
774. A draft agreement jointly prepared by CEP-SPAW AND IWC Secretariats was submitted to the IWC Bureau Meeting in 2019, as a first formal step. A negotiated agreement is pending.
775. See country assessments and CariMAM national survey reviews.
776. These articles call for the establishment, publication, and dissemination of general guidelines and criteria for the management and recovery of endangered and threatened species of regional concern in the form of regional management plans.
777. UNEP(DEPI)/CAR WG.36/INF.6. Update on the implementation of activities in support of the action plan for the conservation of marine mammals (MMA), including the government of Spain-UNEP LifeWeb project "protecting habitats and migration corridors for marine mammals in the south and northeast pacific and the wider Caribbean through marine protected area networks."
778. https://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5319&docType=pdf
779. <https://phys.org/news/2016-10-manatee-caribbean-repopulation-scheme-dies.html>
780. https://guadeloupe-parcnational.com/IMG/pdf/note_for_sirenews.pdf
781. Ibid
782. Report of the Joint IWC-SPAW Workshop to Address Collisions Between Marine Mammals and Ships with a Focus on the Wider Caribbean. Panama, 18-20 June 2014 <https://unitednations.sharepoint.com/:f/s/UNEP-CEP/EmYU-86U5g1ltXei7ky9XGYBv4Roq7w2lx0cdsOvcQSVQ?e=7YLOWo>
783. An overview Report on the State of Marine Habitats in the Wider Caribbean & Regional Strategy and Action Plan for the Valuation, Protection and/or Restoration of Key Marine Habitats in the Wider Caribbean 2021 – 2030. UNEP(DEPI)/CAR IG.40/INF.3
784. see details in UNEP(DEPI)/CAR WG.40/INF.5
785. see details in UNEP(DEPI)/CAR WG.40/INF.4
786. State of the Cartagena Convention Area Report (SOCAR). (2019). An Assessment of Marine Pollution from Land-Based Sources and Activities in the Wider Caribbean Region. LBS COP4, Roatan, Honduras, 4 June 2019. UNEP(DEPI)/CAR IG.41/INF.3
787. Paper on the State of the Marine Environment and Associated Economies (SOME) collaborative development & institutionalization of a regional integrated reporting mechanism. SPAW COP10, Roatan, Honduras, 3 June 2019. UNEP(DEPI)/CAR IG.40/INF.7 <https://www.unenvironment.org/cep/events/conference-parties-cartagena-convention-cops/spaw-cop10?%2Fnode%2F107=&doctypeid=268>
788. Regional Workshop on Marine Mammal Watching in the Wider Caribbean Region Panama City, Panama 19-22 October 2011. 56pp.
789. <https://www.facebook.com/barbadosmarinemammals/>
790. <https://www.wildquest.com/wp-content/uploads/CodeOfConduct.pdf>
791. Report of the visit to the Marine Mammal Sanctuary of the Dominican Republic. Samana, 12-14 March 2012. 10 pp.
792. UNEP. (2011). Overarching Principles and Best Practice Guidelines for Marine Mammal Watching in the Wider Caribbean (WCR). Regional Workshop on Marine Mammal Watching in the Wider Caribbean Region. Panama City, Panama.19-22 October 2011.
793. UNEP(DEPI)/CAR WG.38/INF.16 The Sister Sanctuaries Program for Marine Mammals in the Wider Caribbean – A US/NOAA, Dominican Republic, France and the Netherlands Initiative. Miami, Florida, 2-4 November 2016
794. MaMPAN <https://www.marinemammalhabitat.org/building-transatlantic-partnerships-among-mpas-whales-dolphins/>
795. <https://www.marinemammalhabitat.org/building-transatlantic-partnerships-among-mpas-whales-dolphins/>
796. UNEP(DEPI)/CAR WG.40/INF.6. Update on the implementation of

activities in support of the action plan for the conservation of marine mammals (MMAP), including the government of Spain-UNEP LifeWeb project “*protecting habitats and migration corridors for marine mammals in the south and northeast pacific and the wider caribbean through marine protected area networks*”. STAC 6, Cartagena, Colombia. 8 December 2014

797. <https://sites.google.com/cep.unep.org/campamgeospatialdatabase/home/update-info?authuser=0>

798. <https://marineprotectedareas.noaa.gov/connecting.html>

799. <http://campam.gcfi.org/>

800. <https://www.sprep.org/acp-meas>; Capacity building project relating to MEAs in Africa, Caribbean and Pacific Countries.

801. <http://www.ancien-site.car-spaw-rac.org/?-SPAW-RAC-Mapping-Application->

802. The 2ND International Conference on Marine Mammal Protected Areas. Martinique, 7-11 November 2011 Workshop 5 North East of South America. Regional cooperation for a MMs conservation strategy MAMA COCO SEA Project. http://www.ancien-site.car-spaw-rac.org/IMG/pdf/MAMA_COCO_SEA_WORKSHOP.pdf

803. UNEP. (2013). Mamacocosea Project. Marine mammal conservation corridor for northern South America follow-up workshop proceedings. March 18-20, 2013. Paramaribo, Suriname. http://www.ancien-site.car-spaw-rac.org/IMG/pdf/Mamacocosea_Workshop_proceedings.pdf

804. Halpern, B. S., Walbridge, S., Selkoe, K. A., Kappel, C. V., Micheli, F., D'Agrosa, C., Bruno, J. F., Casey, K. S., Ebert, C., Fox, H.E., Fujita, R., Heinemann, D., Lenihan, H. S., Madin, E. M. P., Perry, M. T., Selig, E. R., Spalding, M., Steneck, R., and Watson, R. (2008). A Global Map of Human Impact on Marine Ecosystems. *Science*, 319(5865), 948-952.

805. Namely an area extending from the Dominican Republic south to Grenada all along and including the Lesser Antilles, and a second one encompassing countries of Northern Latin America (Venezuela, Trinidad and Tobago, Guiana, Suriname, and French Guiana). Inter-regional Workshop on Broad-Scale Marine Spatial Planning and Transboundary Marine Mammal Management, held in Panama City, Panama, 21-24 May 2012. 77pp.

806. In the compatibility analysis, the balance between uses pressure and habitat resilience/tolerance is compared to decide whether the overlap is indeed a proof of use-habitat conflict. For this analysis, an expert group is required to discuss from a multi-disciplinary perspective the pressure-tolerance levels of the interaction and to develop a compatibility matrix. In spite of these limitations, the overlap analysis calls attention to those areas where a more intense interaction is happening and allows advancing targeted further action or decisions of potential measures to be taken in those areas.

807. Under its established norms, IMO recognizes the PSSA as “an area that needs special protection because of its significance for recognized ecological, socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities.”

808. Countries refer to them differently. They may be called Responsible Fishing Areas, Exclusive Zones for Artisanal Fishing, Regulated Fishing Areas, etc. The use of hook and line, regulations on gillnet use and the exclusion of trawling and industrial fishing are characteristics of these areas

809. TERMINAL MISSION REPORT SATELLITE TAGGING AND BIOPSY SAMPLING CAMPAIGN MEGASAT REPRODUCTION AREA – North West Indies (N.W.I). (2014). 26pp.

810. Final report of the three regional workshops for marine mammal stranding response in the Dutch, French and Spanish-speaking Caribbean countries and territories. 9 pp.

811. Ward, N., Bogomolni, A., and Potter, C. (2013). A Stranding Guide to Marine Mammals of the Wider Caribbean Region: An introductory field guide for stranding responders. Gecko Productions Inc. 2013. 78pp.

812. <https://www.yumpu.com/en/document/read/35537836/marine-mammals-strandings-car-spaw-rac>

813. Netherlands Antilles originally sought an exemption for its captive dolphin facility on Curaçao (Sea Aquarium and Dolphin Academy) at the first SPAW STAC in 2001 (for 8 dolphins). UNEP(DEC)/CAR IG.20/INF.7 The Netherlands Antilles extended this original exemption to include the additional acquisition of dolphins (up to 24 individuals) in 2007. UNEP(DEPI)/CAR WG.31/6

814. <https://www.cetabase.org/captive/cetacean/>

815. A review of seismic mitigation measures used along the coast of Northern South America, from North Brazil up to Colombia. 2015. Reference Document for the MaMa CoCo SEA Steering Committee. 75pp.

816. Naranjit, A. and Higgins, E. F. (2014) Requirements for the mitigation of acoustic disturbance from offshore seismic surveys to marine life in Trinidad and Tobago. Version: Draft 2, April 2014.

817. Report of the Joint IWC-SPAW Workshop to Address Collisions Between Marine Mammals and Ships with a Focus on the Wider Caribbean [Panama 2014]

818. A draft agreement jointly prepared by CEP-SPAW AND IWC Secretariats was submitted to the IWC Bureau [25 May 2020], as a first formal step.

819. <https://www.fws.gov/caribbean/PDF/ManateeManagementPlan.pdf>

820. http://www.car-spaw-rac.org/IMG/pdf/manateebycatch_finalversion.pdf

821. Report on the State of Marine Habitats in the Wider Caribbean & Regional Strategy and Action Plan for the Valuation, Protection and/or Restoration of Key Marine Habitats in the Wider Caribbean 2021 – 2030. UNEP(DEPI)/CAR IG.40/INF.3

822. MamaCocoSea Project. (2015). A review of seismic mitigation measures used along the coast of northern south America, from north brasil up to Colombia, Reference document for the MamaCocoSea Steering Committee. 76pp.

823. Report of the Joint IWC-SPAW Workshop to Address Collisions Between Marine Mammals and Ships with a Focus on the Wider Caribbean [Panama 2014]

824. Guidelines For Establishment And Operation Of Regional Activity Centres And Regional Activity Networks For The Cartagena Convention. UNEP(DEC)/CAR IG.24/CRP.9 Rev.1. 10 September 2008

825. FAO. 2018. Report of the Expert Workshop on Means and Methods for Reducing Marine Mammal Mortality in Fishing and Aquaculture Operations, Rome, 20-23 March 2018. FAO Fisheries and Aquaculture Report No.1231. Rome, Italy.

826. <https://iwc.int/expert-advisory-panel-on-bycatch> The panel's first in-person meeting was held in Kenya in May 2019.

827. Article 11.1(b) states: “Each Party shall ensure total protection and recovery to the species of fauna listed in

Annex II by prohibiting: i) the taking, possession or killing (including, to the extent possible, the incidental taking, possession or killing) or commercial trade in such species, their eggs, parts or products; ii) to the extent possible, the disturbance of such species, particularly during periods of breeding, incubation, estivation or migration, as well as other periods of biological stress.”

828. Article 14. Exemptions for Traditional Activities states: “Each Party shall, in formulating management and protective measures, take into account and provide exemptions, as necessary, to meet the traditional subsistence and cultural needs of its local populations. To the fullest extent possible, no exemption which is allowed for this reason shall: (a) endanger the maintenance of areas protected under the terms of this Protocol, including the ecological processes contributing to the maintenance of those protected areas; (b). cause either the extinction of, or a substantial risk to, or substantial reduction in the number of, individuals making up the populations of species of fauna and flora within the protected areas, or any ecologically inter-connected species or population, particularly migratory species and threatened, endangered or endemic species.”

829. <https://dpi.gov.gy/cdc-engages-stakeholders-on-oil-pollution-response-protocols/>

830. <https://www.marinemammalhabitat.org/>

831. <https://www.wildquest.com/wp-content/uploads/CodeOfConduct.pdf>

832. <https://sanctuaries.noaa.gov/dolphinmart/>

833. https://iwc.int/private/downloads/64tWY7N4G3GcdYuPm4Orwg/whale_watch_strategic_plan.pdf

834. <https://www.handbook.iwc.int/en/>

835. OBIS.org - a global open-access data and information clearing-

house on marine biodiversity for science, conservation and sustainable development

836. Brakes, P., Dall, S. R. X., Aplin, L. M., Bearhop, S., Carroll, E. L., Ciucci, P., Fishlock, V., Ford, J. K. B., Garland, E. C., Keith, S. A., et al. (2019). Animal cultures matter for conservation. *Science*, 363 (6431), 1032-1034. DOI: 10.1126/science.aaw3557

837. Whitehead, H. (2010). Conserving and managing animals that learn socially and share cultures. *Learning & Behavior*, 38(3), 329-336.

838. In particular, scientific investigations in the Eastern Caribbean has demonstrated the presence of at least two socially segregated, sympatric cultural clans of sperm whales in the Caribbean with dramatically smaller ranges than species found outside the WCR. Spatial and social boundaries requires that each distinct cultural clan be treated as a separate management unit warranting protection measures specific to the threats in their particular range. See Gero, S., Bottcher, A., Whitehead, H., and Madsen, P. T. (2016). Socially segregated, sympatric sperm whale clans in the Atlantic Ocean. *Royal Society Open Science*, 3, 160061 and Vachon, F., Hersh, T., Gero, S., Rendell, L., and Whitehead, H. (In preparation). Culturally mediated fine-scale habitat partitioning in sperm whales.

839. Gero, S., and Whitehead, H. (2016). Critical decline of the Eastern Caribbean Sperm whale population. *PLoS ONE*, 11(10), E0162019. Doi:10.1371/journal.pone.0162019

840. Ward, N., Bogomolni, A., and Potter, C. (2013). A stranding guide to the marine mammals of the Wider Caribbean Region: An introductory field guide for stranding responders. CEP Technical Report: 74. 79pp.

841. For example, see the United States' National Marine Mammal Inventory. Reporting by facilities to the National Marine Fisheries Service (NMFS) is required on a periodic basis. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/national-inventory-marine-mammals>

842. <https://iwc.int/iwc-workshop-locating-ship-strike-hotspots>

843. <https://iwc.int/ship-strikes>

844. For those SPAW Parties that are also members of the IWC, such data is reported under the National Progress Reports.

845. http://www.souffleursdecume.com/etudes_collisions.html

846. See, for example NMFS Right Whale Mandatory Ship Reporting System: <https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales>

847. Guzman, H. M., Gomez, C. G., Guevara, C. A., and Kleivane, L. (2013). Potential vessel collisions with Southern Hemisphere humpback whales wintering off Pacific Panama. *Marine Mammal Science*, 29(4), 629-642.

848. https://iwc.int/private/downloads/dr1UJzeCuNpAWs9Xf9caBw/IWC_Strategic_Plan_on_Ship_Strikes_Working_Group_FINAL.pdf

849. For example, see <https://iwc.int/private/downloads/wTxPpBwQq0nCREo19HUuGQ/Spanish%20whale%20strike%20folder.pdf>

850. <http://www.whalealert.org/>

851. Committee on Taxonomy. 2017. List of marine mammal species and subspecies. Society for Marine Mammalogy, www.marinemammalscience.org.

852. CITES Appendices current as of October 2020: <https://cites.org/sites/default/files/eng/app/2017/E-Appendices-2017-10-04.pdf>

853. IUCN Red List for species at 'GLOBAL' level current to October 2020: <http://www.iucnredlist.org/>