

Commonwealth of Dominica

Coral Reef
Report Card
2016



Eastern Caribbean Coral Reef Report Cards



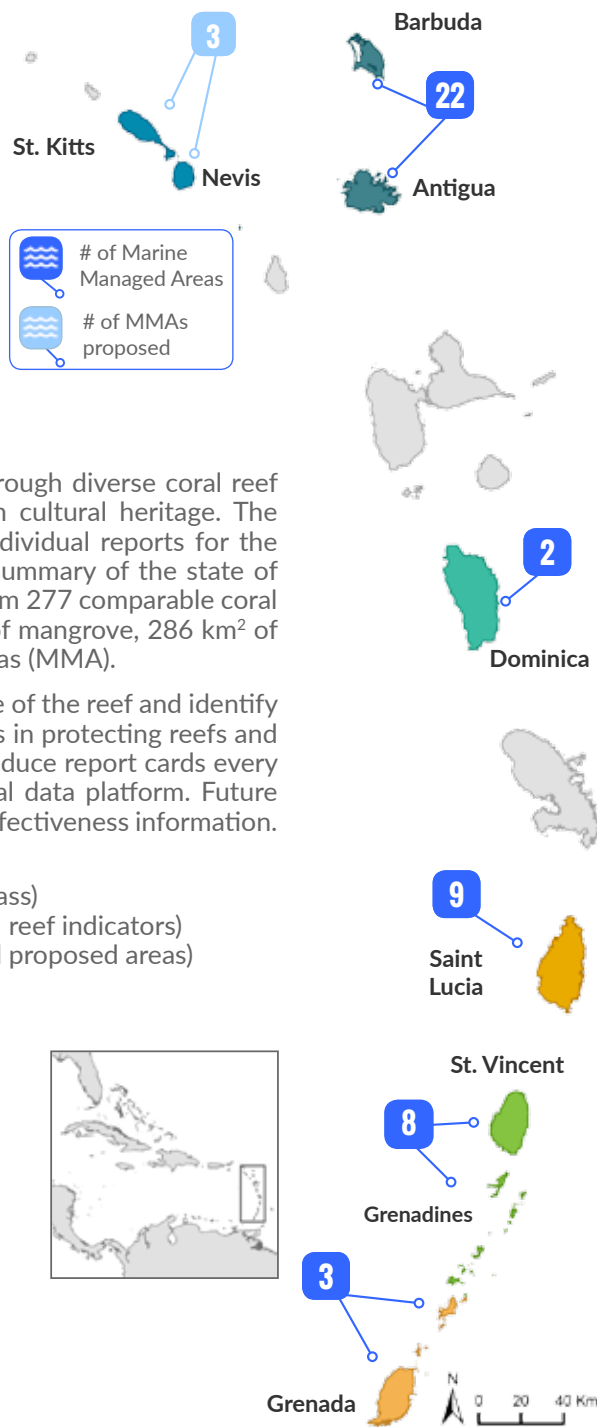
6 PARTICIPATING COUNTRIES
224,813 SQUARE KM OF OCEAN



44 AREAS DESIGNATED SINCE 1973
526 SQUARE KM OF OCEAN



50 AREAS PROPOSED
990 SQUARE KM OF OCEAN



ECMMAN countries and number of MMAs with designated borders

The 2016 Coral Reef Report Cards

The Eastern Caribbean Seascape is an arc of islands linked through diverse coral reef ecosystems, oceanic currents, migratory pathways and a rich cultural heritage. The Eastern Caribbean Coral Reef Report Cards are a series of individual reports for the 6 participating countries and provide an easy-to-understand summary of the state of the region's marine resources. The Report Cards collate data from 277 comparable coral reef surveys and map in detail 383 km² of coral reefs, 19 km² of mangrove, 286 km² of seagrass, 44 designated and 50 proposed Marine Managed Areas (MMA).

The Report Cards provide an initial baseline on the current state of the reef and identify gaps. Reporting this type of information will help track progress in protecting reefs and inform future monitoring and management. The vision is to produce report cards every 2 years and share data through the CaribNode regional spatial data platform. Future report cards will include key socioeconomic and management effectiveness information.

Each Report Card includes information on:

- Key Habitats (location and extent of coral, mangrove, seagrass)
- Reef Health Index (a measure of the health of four key coral reef indicators)
- Marine Managed Areas (size and location of designated and proposed areas)

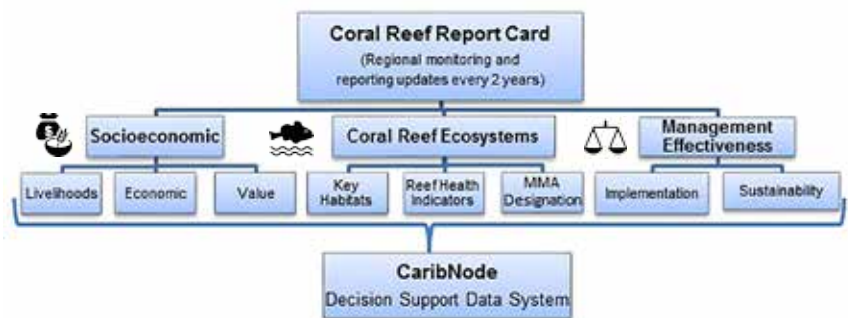
The Framework

To protect the region's marine biodiversity, it is essential to understand key issues and share critical data. The Climate-Resilient Eastern Caribbean Marine Managed Areas Network (ECMMAN) project developed the following framework to advance national and regional data collection and strengthen marine managed areas in the region.

1) **ECMMAN Monitoring Network:** The Network collects, analyzes and shares data through standardized methods. Three main themes include ecological, socio-economic, and marine management effectiveness. Indicator data (diagram right) are shared through the CaribNode.

2) **CaribNode:** This online information system combines regional and national data to create resource management tools. The Coral Reef Assessment Tool provides standardized indicators to monitor the marine environment, evaluate management, and track the wellbeing of coastal communities (www.caribnode.org).

3) **Coral Reef Report Cards:** Includes the Reef Health Index, an assessment tool to measure coral reef health. The Report Card integrates monitoring data and engages stakeholders to help protect marine ecosystems.



Dominica Coral Reef Report Card



Dominica

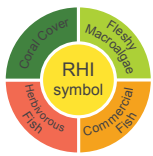
Dominica has the largest land area (750 km²) of the 6 ECOMAN countries and 197 km of coast. It is located midway along the Eastern Caribbean island chain between Guadeloupe to the north and Martinique to the south. Dominica is a tall mountainous volcanic island covered by tropical rainforests, geothermal hotspots, waterfalls, rivers, and sandy beaches. The island has a high biodiversity of flora and fauna with extensive natural forests. The Morne Trois Pitons National Park was the first UNESCO World Heritage Site designated in the Eastern Caribbean. Dominica has the smallest shelf area of the 6 countries supporting stretches of seagrass meadows, a variety of coral reefs and limited wetlands. Nearshore waters have been impacted by chronic disturbances like sediment (coastal development, agriculture, quarries), pollution (pesticides, untreated sewage, trash) and fishing (traps, spear, nets) and acute impacts like storms and coral bleaching. Dominica's economy is dependent on tourism and agriculture. Local communities have a long cultural heritage linked to their coastal waters.



Dominica Timeline Protection for reefs (above line) / Key events impacting coral (below)

<ul style="list-style-type: none"> CARDI established - 1975 Morne Trois Pitons National Park established - 1975 Independence - 1978 	<ul style="list-style-type: none"> Cabrits National Park - 1986 Soufriere Scott's Head MR - 1986 Golden Environmental Awards - 1998 Mooring buoys at dive sites 	<ul style="list-style-type: none"> \$100 million infrastructure investment - 2004 	<ul style="list-style-type: none"> GOCD / UNEP Organic Island established - 2010 Lionfish control efforts ECMMAN - 2013
1970 - 1980	1990	2000	2010
<ul style="list-style-type: none"> Diadema urchin die-off - 1980s Mass coral die-off due to disease 	<ul style="list-style-type: none"> Hurricane Georges - 1998 Hurricane Lenny - 1999 (west coast) Hurricane Omar - 1998 (Scott's Head) 	<ul style="list-style-type: none"> Tropical Storm Jeanne - 2004 Hurricane Dean - 2007 Mass coral bleaching - 2005 	<ul style="list-style-type: none"> Tropical Storm Erika - 2015 Mass coral bleaching - 2010 Invasive lionfish - 2011

Tracking Coral Reef Health



The Reef Health Index (RHI) integrates four indicators to measure coral reef health (coral cover, fleshy macroalgae, herbivorous fish and commercial fish). The RHI “pie” symbol on the map is displayed at the site, subregional and national levels. * (For more information visit www.caribnode.org)



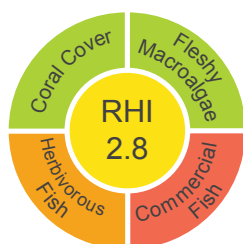
Dominica

The Reef Health Index for Dominica is based on data shared by Sascha Steiner of Institute for Tropical Marine Ecology (ITME) for 16 sites surveyed in 2005 and additional research reports.¹ These surveys were conducted during the severe 2005 coral bleaching event. Additional impacts from the 2010 bleaching event and years of continued local impacts have occurred. Thus, the RHI shown here may not be representative of the current condition today, but it provides an island wide baseline. Dominica is divided into 2 subregions since west coast reefs are different from the east. Subregions for the 6 ECOMAN countries are numbered 1 to 41 from Grenada north to St. Kitts and Nevis.

ID	Sub region	Subregion Description ¹	# Sites	Score
29	West Coast	Protected narrow shelf has steep slopes near rivers and coastal calderas. North west: Isolated patch reefs near Morne Espagnol, Toucari Bay. Boulder fields near Cabrits and Hermitage River. Central west: Greater coral diversity, complex reef structure, deep fringing reefs. Largest reefs between Batali and Mero, south Prince Ruperts Bay and Grande Savane. South west: Main reefs at a) Fond Colet/Roseau patch reef, some of oldest large corals, b) Soufriere north fringing reef, and c) Cachacrou, north Scott's Head Peninsula.	15	
30	East Coast	Windward side, higher wave energy. East and South east coast: Coral reefs are found in a few small protected bays. Unique NE coast: wider, semi-protected areas extends ~3 km offshore between Wesley and Marigot. The largest reefs, between Anse Soldat and Calibishie, have coral framework of dead elkhorn skeletons with some live elkhorn and small corals like <i>Diploria</i> and <i>Porites</i> . The back reef area behind the reef crest provides important habitat for seagrass communities to grow.	1	

Indicator	Description of Dominica's Reef Health ¹	Threatened	Healthy
Corals	<p><i>Corals build the reef's 3D structure, provide habitat and protect coastlines</i></p> <ul style="list-style-type: none"> • Coral cover was high (10-53%) prior to 2005 bleaching event • Cover declined >28% in 1 year, >75% of corals were bleached • Significant loss of large mountainous star corals in deep reefs • Reefs at risk to local chronic impacts and bleaching events 	Sascha Steiner	Sascha Steiner
Fleishy macroalgae	<p><i>Fleshy macroalgae, when too abundant, outcompete corals</i></p> <ul style="list-style-type: none"> • Fleishy macroalgae was very low prior to 2005 coral bleaching • Turf and fleshy macroalgae overgrew corals that died in 2005 • Crustose coralline algae were low on most reefs • High sedimentation reduces coral recruitment substrate 	Andy Bruckner	Ken Marks
Herbivorous Fish	<p><i>Herbivorous fish clean algae off reefs, large parrotfish remove more algae</i></p> <ul style="list-style-type: none"> • Herbivorous fish were abundant, numerous surgeonfish • Fish were small in size (11-21cm) which means less grazing • More large parrotfish found in Soufriere-Scott's Head MR • Parrotfish are harvested, but could recover if protected 	Clare Morrall	Ken Marks
Commercial Fish	<p><i>Groupers & snappers are key predators that keep food chain in balance</i></p> <ul style="list-style-type: none"> • Majority of groupers & snappers were small in size • More fish on reefs with complex structure and deeper water • Larger-sized fish found in protected areas • Predatory fish are overharvested, may recover if protected 	Emma Doyle	Ken Marks
Diadema antillarum	<p><i>Diadema urchins clean algae off reefs and open space for coral recruits</i></p> <ul style="list-style-type: none"> • <i>Diadema</i> found on all sites but Calibishie • Urchins increased >60% over a 5 year period (2001-2005) • Reefs with more urchins had less seaweed and more coral cover • <i>Diadema</i> urchins are important since few large herbivorous fish 	Clare Morrall	Patricia Kramer
Coral Recruits	<p><i>Coral recruits are "baby" corals. Recruits prefer macroalgae free areas</i></p> <ul style="list-style-type: none"> • Recruits were abundant prior to 2005 coral bleaching • Number of recruits decreased by >65% after event • Large star corals had new tissue regrowing over dead skeleton • More coral recruits found on reefs with abundant urchins 	Clare Morrall	Andy Bruckner

Reef Health Index



Dominica
2005

The **Reef Health Index (RHI)** score from 2005 was considered 'fair' (RHI=2.8 out of 5). Coral cover was high (score=4) and fleshy macroalgae was low (score=4); suggesting these reefs could support larger fish populations. Scores for the biomass of fish were poor because of the low abundance of large parrotfish and large predatory fish. The score for 2015 is projected to be lower due to the potential loss of coral from subsequent coral bleaching events and continued local impacts.

Key findings¹:

- Dominica has many coral reef types, each providing important habitat
- At least 10-15% of live coral cover has been lost on many reefs since 2005¹
- Abundant *Diadema* urchins have reduced macroalgae
- Lack of large-sized female fish means fewer eggs to replenish populations
- Marine managed areas may be helping some fish to recover in those areas
- Reefs considered in better condition (★) in 2013 included Grande Savanne, Salisbury, Mero S, Mero W, Batali, Cachacrou, Plat Coubari and Hodges Reefs¹

Dominica's Reef Health Index (RHI)

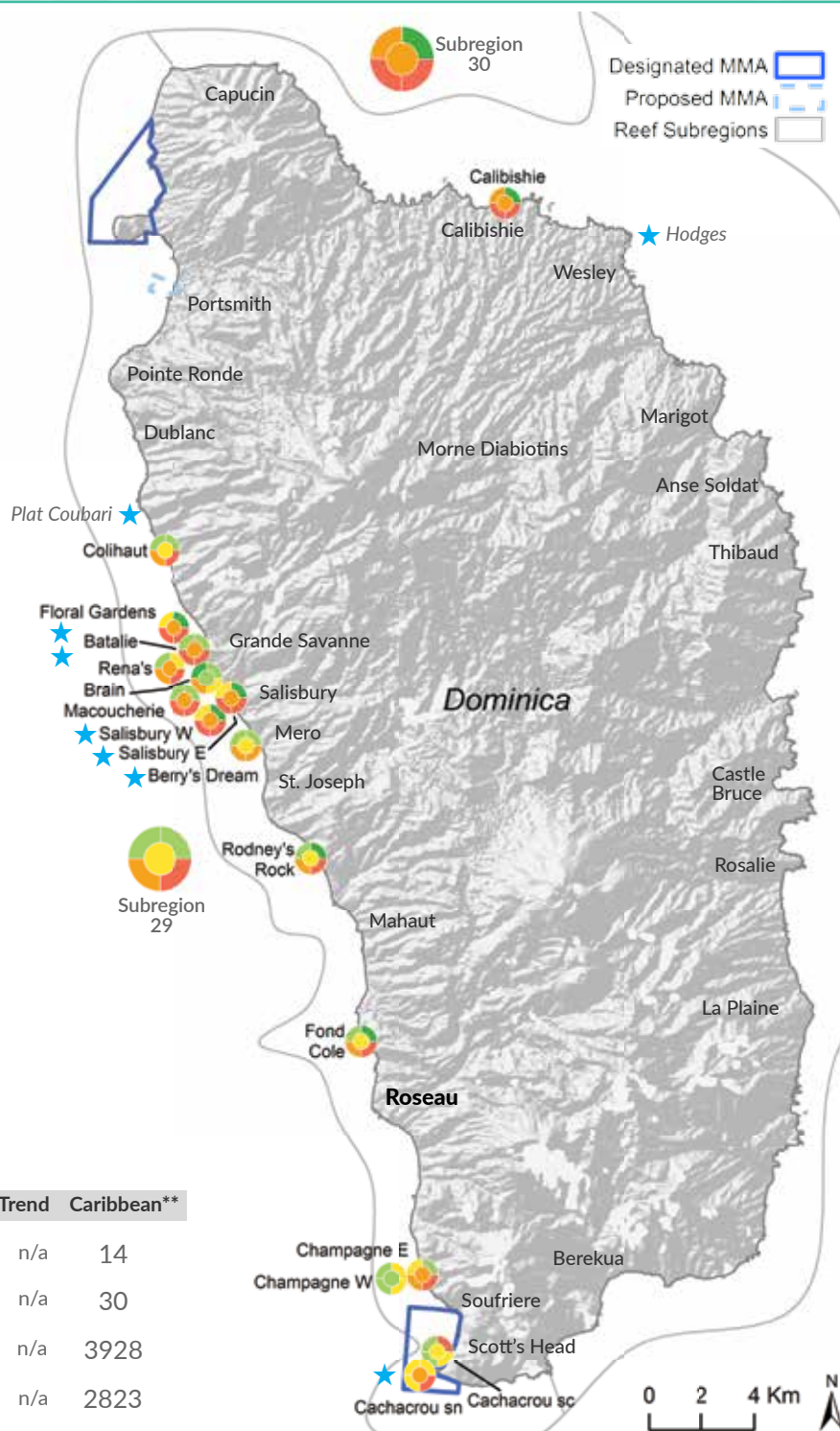
Indicator	Year	Score	Average	Trend	Caribbean**
Coral Cover	2005	Good	25	n/a	14
Fleshy Macroalgae	2005	Good	4	n/a	30
Herbivorous Fish	2005	Poor	1200	n/a	3928
Commercial Fish	2005	Critical	395	n/a	2823

Reef Health Index Scores

The Reef Health Index "scores" are calculated by converting the average data value of each indicator into a condition ranking from 'critical' to 'very good' based on reference values (right). The four scores are averaged to obtain the overall RHI score. The pie displays the overall RHI (middle) and each individual indicator to show how each indicator affects the score.

Reef Health Index Reference Values*					
The Reef Health Index (RHI)	Critical 1-1.8	Poor 1.9-2.6	Fair 2.7-3.4	Good 3.5-4.2	Very Good 4.3-5
Coral Cover (%)	<5	5.0-9.9	10.0-19.9	20.0-39.9	≥40
Fleshy Macroalgal Cover (%)	>25.0	12.1-25	5.1-12.0	1.0-5.0	0-0.9
Herbivorous Fish (g/100m ²)	<960	960-1919	1920-2879	2880-3479	≥3480
Commercial Fish (g/100m ²)	<420	420-839	840-1259	1260-1679	≥1680

¹Steiner SCC (2015) Coral Reefs of Dominica (Lesser Antilles). Ann. Naturhist. Mus. Wien, B, 177:47-119. ITME Research Reports 33 and Institute Tropical Marine Ecology (www.itme.org). *Reef Health Index developed by Healthy Reefs Initiative (www.healthyreefs.org). **Caribbean average based on AGRRA regional database 2011-2014 (www.agrra.org). A trend is calculated after an indicator has been assessed for at least two years, otherwise it is listed as not available (n/a). For data, maps, and references see www.caribnode.org.



Protecting Key Habitats

Key Habitats of Dominica

Three main habitats, coral reefs, mangroves and seagrass beds, support fisheries, stabilize coastlines and host tourism activities.

- Only 5% of seagrass, the most extensive habitat, is protected, with 0.7% new proposed. Approximately 0.8% km² of coral reefs is within existing MMAs. The designation of currently proposed MMAs would increase the amount of reef protected. Only 19% of mangroves are protected. No additional mangrove area is currently proposed for management.
- Healthy, intact corals, mangroves and seagrasses provide higher quality habitat, food, shelter, nursery areas, and corridors for resident and transient species.
- Habitats are threatened by direct removal and damage, overfishing, human use, coastal development, poor water quality, and global climate change.
- There is a lack of geospatial benthic habitat data, but detailed descriptions of coral reefs are available.¹



Dominica's Habitat Types¹

Threatened

Healthy

Coral reefs cover 0.8 km² of the narrow, steep western shelf and broader shallow east coast. The Northeast has the largest reef, Calibishie, but west coast reefs, especially between Batali and Mero, have higher coral cover, diversity and structural framework. Most reefs are isolated not continuous, with 46 coral species. Reefs include shallow patch reefs of pencil (*Madracis auretenra*) or finger coral (*Porites porites*), fields of volcanic boulder rocks colonized by small corals, deep (5-40 m) fringing reefs of mountainous star coral, pencil or finger coral and remnant elkhorn (*Acropora palmata*).



Mangroves are not common in Dominica and limited to only two mangrove species - black (*Avicennia germinans*) and white (*Laguncularia racemosa*) mangroves. White mangroves are found near Cabrits on the northwest coast and black mangroves are found at Bout Sable near La Plaine on the east coast. Although uncommon, protecting these mangroves will provide habitat and nursery areas, protect shorelines and improve water quality.



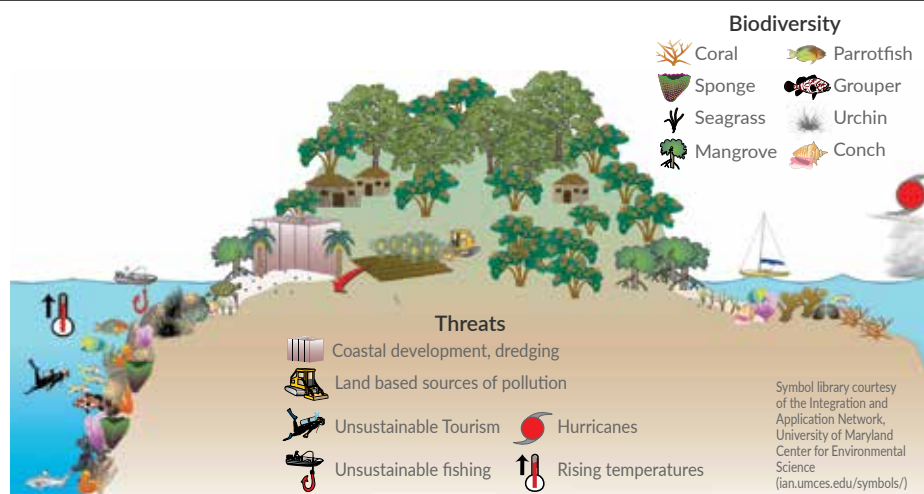
Seagrass is the most extensive habitat. Species include *Syringodium filiforme* (manatee grass), *Thalassia testudinum* (turtle grass), *Halodule wrightii* and *Halophila decipien*. More seagrass occurs along the west coast, even into deep waters. The largest meadows, between Canefield to Point Ronde, have more manatee grass. The NE and East coasts have turtle and manatee seagrass in calm waters behind reefs and in bays (Marigot, Calibishie, Anse Soldat, Hodges Bay). The invasive seagrass *Halophila stipulacea*, first observed in 2007, has replaced several native seagrasses on the west coast and colonized new areas, but not found in NE areas. Native seagrasses are impacted by sediment runoff and storms.



Climate Change Impacts

Local and regional resource managers need to incorporate planning for climate change in their efforts to protect coral reefs.

- Rising ocean temperatures increase coral bleaching, disease and mortality
- Oceans will become more acidic as more atmospheric carbon dioxide is dissolved reducing calcification in corals and other calcifying animals
- The intensity and frequency of hurricanes will increase as oceans continue to warm and will damage corals, coastlines and infrastructure
- Rising sea levels will flood coastal areas and may reduce light in seagrass beds and coral reefs



Marine Managed Areas



2 Areas Designated Since 1973

11 Square KM of Ocean



1 Areas Proposed

0.4 Square KM of Ocean

Ocean Protected

Shelf Protected

<1%

2%

Marine Managed Areas
Designated
Proposed
Not Protected



Cabrits Marine Reserve (MR) - part of the larger terrestrial National Park, protects biodiversity in the watershed stretching from upland ridge to adjacent coastal marine habitats. White mangroves only found here. Important interface between land and sea provides key nursery areas for numerous fish, nesting habitat for birds, and nesting beaches for sea turtles.

Recent management activities to protect and celebrate the marine environment include:

- Fishermen training course
- Installation of dive moorings
- Deployment of fish aggregation devices
- Splash and Clean up event in Toucari
- Savanne Paille Primary school and local resident outreach
- 'This is Who We Are' campaign to celebrate the ocean

Grand Savanne Area - Largest contiguous, diverse and healthy coral reefs and seagrass beds. Managing these adjacent habitats can improve fisheries and protect biodiversity.

Marine Managed Areas

Designated

1. Cabrits National Park	1986	7.0
2. Soufriere-Scott's Head MR	1998	4.9

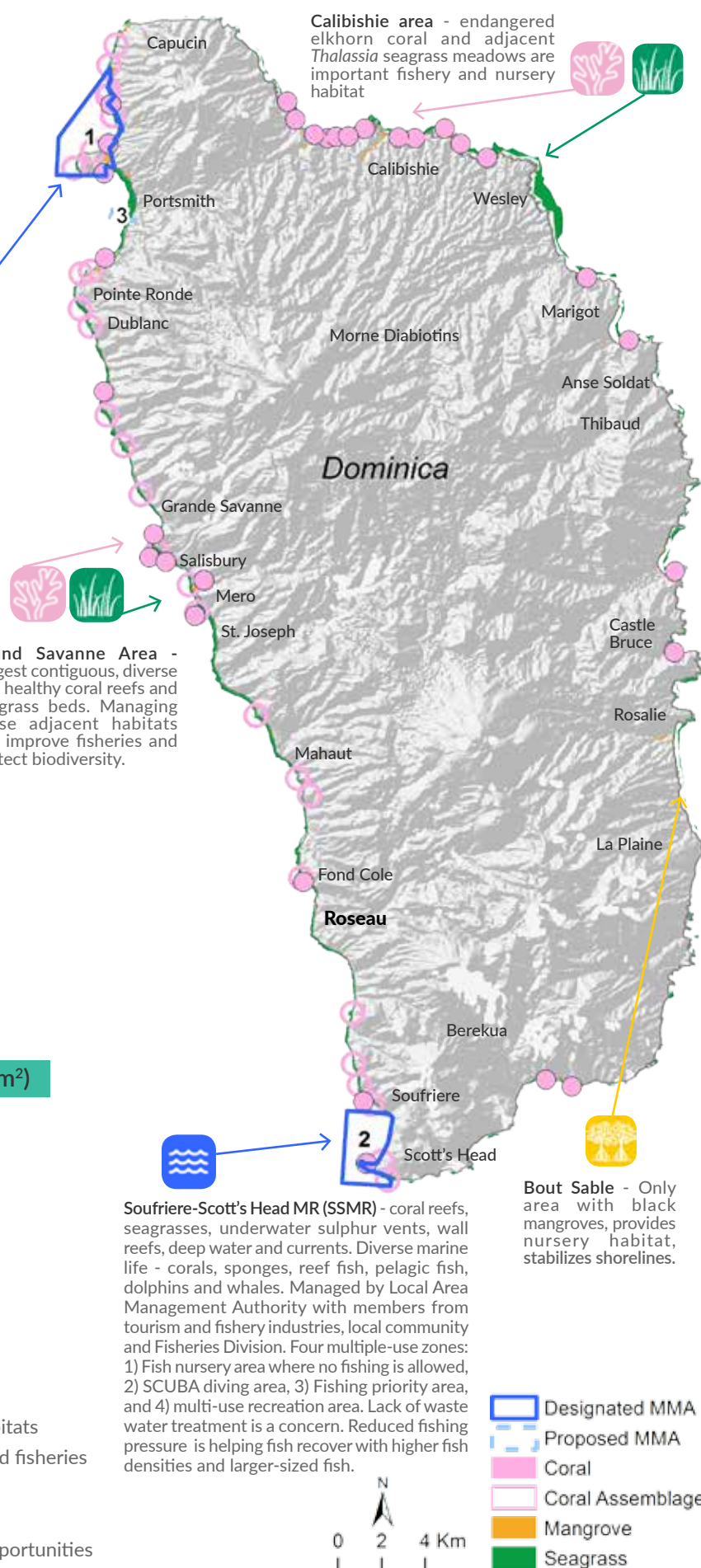
Proposed

3. Indian River		0.5
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Marine Managed Areas

Dominica's MMAs are important as they:

- Protect marine biodiversity by conserving critical habitats
- Provide refugia and replenishment zones for exploited fisheries
- Reduce negative impacts associated with human use
- Foster a higher level of sustainable use
- Increase community involvement and educational opportunities



Eastern Caribbean Regional Overview

Status of coral reefs in the Eastern Caribbean (EC)

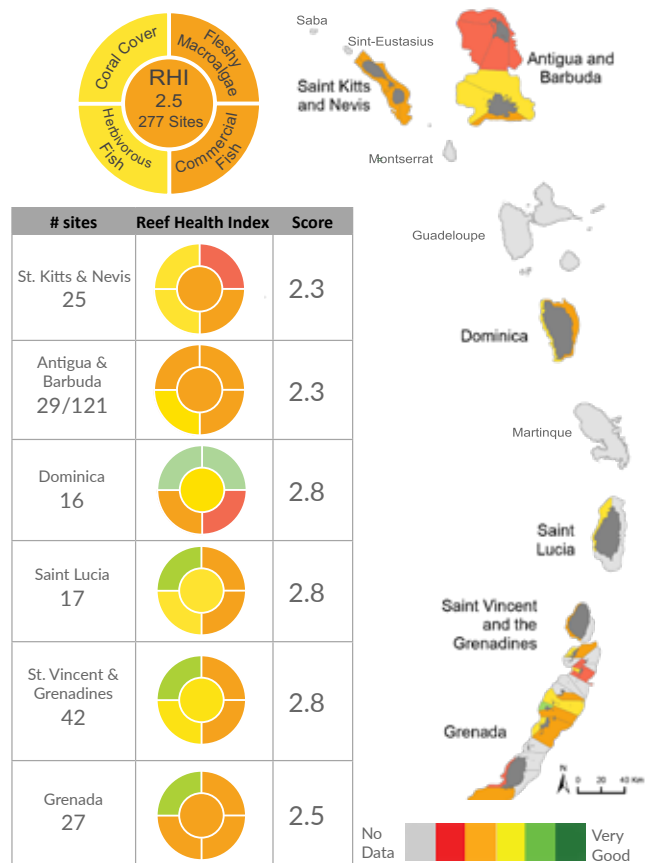
The Region's overall Reef Health Index (RHI) score was "fair" (2.5 of 5). Coral cover and herbivorous fish biomass were scored "fair", while fleshy macroalgae and commercial fish biomass were "poor". Reef condition varied at the local scale, but several regional patterns of reef condition were common:

- Endangered elkhorn/staghorn corals are recovering (NE island areas)
- Fleshy algae are often found on leeward reefs and near settlements
- Lack of large parrotfish has reduced grazing on several reefs
- *Diadema* urchins are abundant on several reef types in the EC
- Reefs with greater structure and relief have higher fish abundance
- Reefs under some level of protection have higher fish abundance, especially fully protected areas and longer established MMAs

Status of MMAs in the Eastern Caribbean

The long-term health and resilience of these ecosystems will depend on both effective local management and adopting collaborative and transboundary management strategies among the 6 nations.

- Currently 44 designated MMAs protect 526 km² of marine resources
- Many MMAs were designated >25 years ago (17 of 44)
- Most of the designated MMAs are small (27 of 44 are <10 km²)
- Few MMAs are fully protected "no take" zones, which had more fish
- Several key nursery areas with adjacent coral, mangrove & seagrass remain unprotected
- 50 new proposed MMAs will protect 990 km² of marine resources



Next Steps

The following Management Recommendations and Monitoring Priorities are suggested to help protect Dominica's coast:

I. Management Recommendations

- Continue management of MMAs to help reefs recover
- Protect parrotfish and other herbivores to reduce seaweed
- Create more fully protected replenishment areas to let fish grow larger and produce more fish for the future
- Protect reefs adjacent to seagrass beds and elkhorn corals
- Improve nearshore water quality to increase reef resilience
- Improve ridge to reef management to reduce impact of land based activities

II. Monitoring Priorities

- Coral Reef Monitoring
 - Conduct representative island-wide surveys in 2016
 - Survey strategic reefs - Cabrits NP (MMA), Calibishe (elkhorn reefs, seagrass), Grand Savannes/Salisbury (extensive reefs), Layou river (upland impacts), Fond Cole/Rosseau (upland impacts), Soufriere-Scott's Head (MMA, complex reefs)
 - Establish long-term monitoring sites
- Socioeconomic monitoring
- MMA effectiveness monitoring in Cabrits MR and SMMR
- Produce Report Cards in 2017 based on 2016 surveys
- Update CaribNode data platform with new data



Healthy coral reefs provide habitat, support ecotourism & protect our shorelines