St. Kitts & Nevis

Coral Reef Report Card 2016

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DEPARTMENT OF MARINE RESOURCES

Supported by:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
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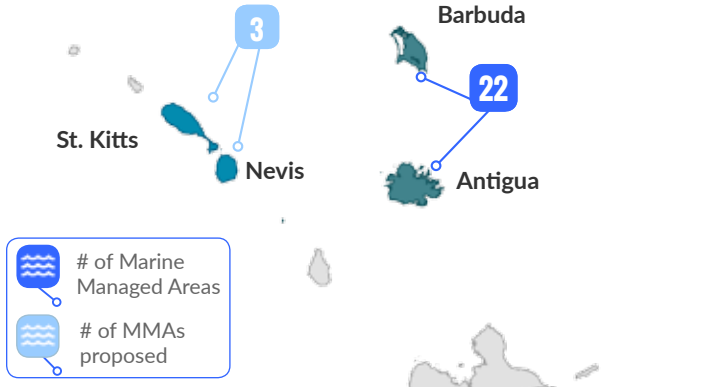
Eastern Caribbean Coral Reef Report Cards

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 km^2 of coral reefs, 19 km^2 of mangrove, 286 km^2 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)

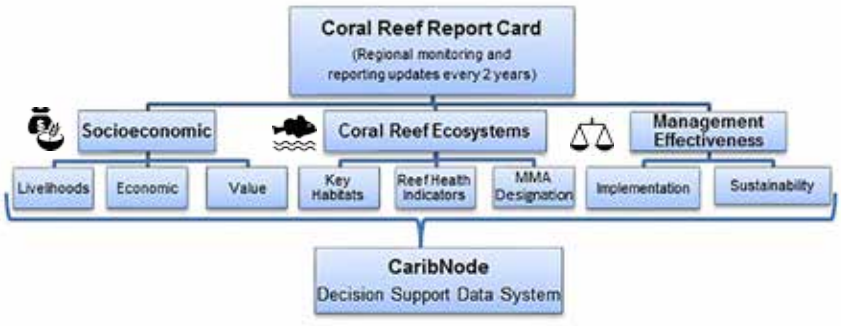
The Framework

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.

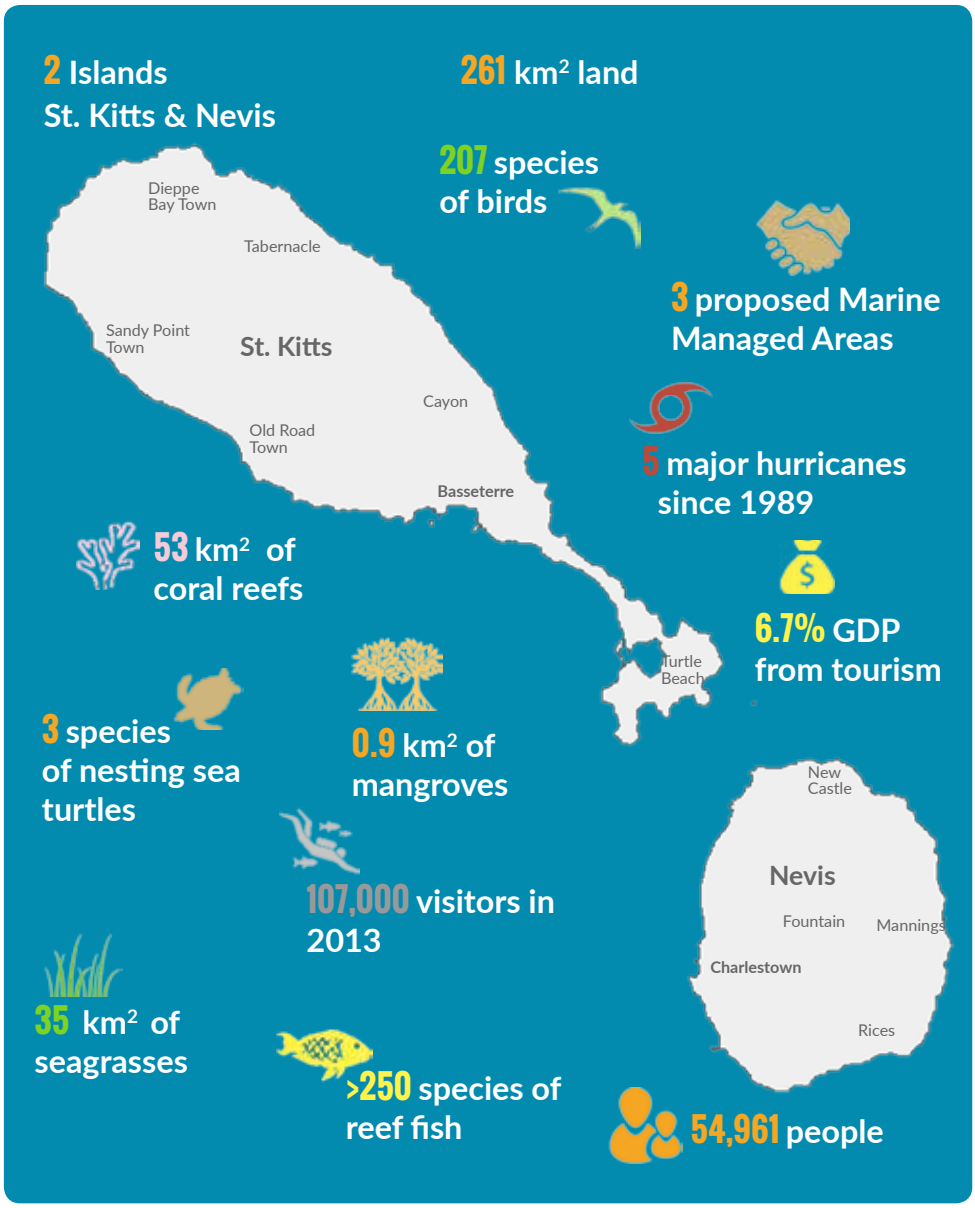


Kramer PR, Roth LM, Constantine S, Knowles J, Cross L, Bruckner A. 2016. St. Kitts and Nevis' Coral Reef Report Card 2016. The Nature Conservancy. (www.CaribNode.org).

St. Kitts and Nevis Coral Reef Report Card

St. Kitts and Nevis

The two island nation of St Kitts and Nevis is located at the northern point of the Eastern Caribbean islands. St. Kitts has 167 km of coastline, while Nevis has 94 km. The ocean shelf is small (~742 km^2), but the Exclusive Economic Zone (EEZ) is large (10,206 km^2). The narrow shelf supports coral reefs, seagrasses, and a few mangrove stands. Tourism is the main economic driver and long stretches of the coast have been developed for hotels, yachts, cruise ships, shops and water activities. Local communities have a long cultural heritage linked to their coastal waters. Like many EC islands, nearshore waters are affected by coastal development, sediments, pollution, unsustainable fishing, storms and coral bleaching. St. Kitts and Nevis is protecting marine resources by increasing governmental protection through laws and regulations, monitoring and community outreach.



St. Kitts and Nevis Timeline

Protection for reefs (above line) *Key events impacting coral (below)*

1970 - 1980

- Independence - 1983
- Fisheries Act - 1984
- Litter Abatement Act - 1989

- Hurricane Hugo - 1989
- *Diadema* urchin die-off - 1980s
- Mass coral die-off due to disease

1990

- UNFCCO - 1993
- UNCCD - 1997
- MPA proposed - 1998
- Aquaculture (SNAPPER) - 1999

- Hurricane Lenny & Georges
- Hurricane Luis
- Negative Coastal Development
- Port Zante

2000

- Development Control & Planning - 2000
- Revised Fisheries Regulations - 2002
- Nevis Turtle Group (NTG) - 2003
- St. Kitts Turtle Monitoring Network 2003
- NPDP - 2006
- TNC Marine Spatial Planning - 2009
- Wind Farm - 2009
- Fish Aggregating (FAD) - 2009

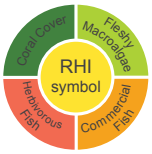
- Negative Coastal Development
- Mass coral bleaching - 2005
- Hurricane Omar - 2008
- Nevis Quarry near coast - 2008

2010

- Lionfish derby and control efforts
- 1st benthic habitat mapping survey - 2010
- 1st island wide coral reef survey - 2011
- FAD Fishing workshop - 2013
- ECMMAN -2013

- Mass coral bleaching - 2010
- Coastal development continues
- Lionfish invasion

Tracking Coral Reef Health

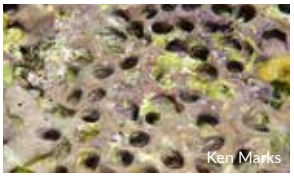


The Reef Health Index (RHI) integrates four indicators to measure coral reef health (coral cover, fleshy macroalgae, herbivorous fish and commercial fish). The RHI "pie" symbol on the map is displayed at the site, subregional and national levels.* (For more information visit www.caribnode.org)

St. Kitts and Nevis

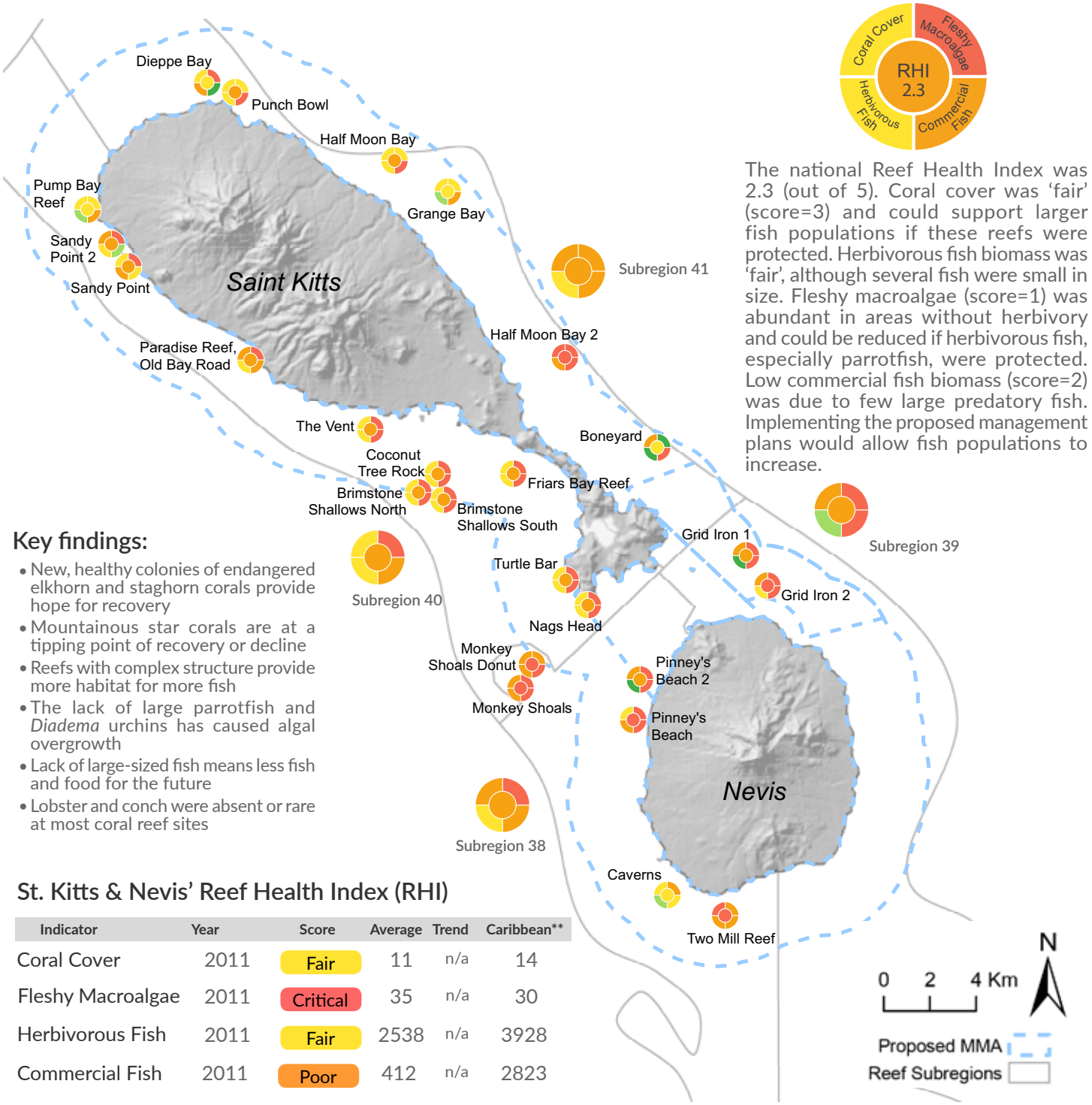
The Reef Health Index for St. Kitts and Nevis is based on data shared by The Living Oceans Foundation (LOF). In 2011, LOF, TNC and local and international researchers, conducted the first comprehensive National coral reef survey at 25 representative sites.[1] St. Kitts & Nevis is divided into subregions based on biogeographical features (e.g., reef type) to facilitate the reporting of Reef Health Index data. Subregions for the 6 ECMMAN countries are numbered 1 to 41 from Grenada north to St. Kitts and Nevis. The combination of data into the RHI pie symbol allows the visualization and mapping of reef health data.

ID	Sub-region	Subregion Description	# Sites	Ranking
38	Nevis West	**Monkey Shoal** - offshore reef, large mountainous star corals, small corals, sea fans. **Donut** - unique small patch reef inside large circular sand patch with sponges, small corals, abundant fish. **NW Coast** - low relief fore reefs, small corals, few fish.	6	
39	Nevis East	**Grid Iron** - wide, shallow fringing reef of dead elkhorn coral framework with several new healthy elkhorn corals, crustose coralline algae. It extends from Narrows to southernmost tip and protects shoreline from waves and storms. **Nevis SE tip** - low relief hardgrounds, no surveys.	2	
40	St. Kitts West	**Sandy Point** - narrow, steep shelf, large mountainous star corals, higher coral cover, diversity, numerous invertebrates and fish. **Coastline** - nearshore reefs with boulder rocks fallen from land colonized by many small corals and numerous fish in crevices.	11	
41	St. Kitts East	**Grid Iron North** (similar to 39) - extensive framework of remnant elkhorn coral, new healthy elkhorn and small coral species, protects shoreline from waves and storms. **NE corner** - Dieppe Bay provides unique habitat for many new healthy elkhorn and staghorn corals.	6	

Indicator	Description of St. Kitts and Nevis' Reef Health	Threatened	Healthy
Corals	*Corals build the reef's 3D structure, provide habitat, and protect coastlines* • Coral cover was lower here than other Caribbean reefs • Most small corals were healthy (low mortality, little disease) • Large mountainous star corals are at high risk to coral bleaching/disease • Several new healthy elkhorn corals, an endangered species, were found	 Andy Bruckner	 Andy Bruckner
Fleshy macroalgae	*Fleshy macroalgae, when too abundant, outcompete corals* • Most reefs were covered with more macroalgae than live coral • Macroalgae overgrew corals and prevented coral recruits from growing • Cyanobacteria and algae were high on reefs near populated areas • Crustose coralline algae were low on many reefs except elkhorn reefs	 Andy Bruckner	 Ken Marks
Herbivorous Fish	*Herbivorous fish clean algae off reefs, large parrotfish remove more algae* • Parrotfish were small in size (6-10 cm), only 10 parrotfish were >40 cm • Few large parrotfish, less grazing allows algae to overgrow corals • Parrotfish are harvested and caught in abandoned traps • Many juveniles suggests populations could increase if protected	 Andy Bruckner	 Andy Bruckner
Commercial Fish	*Groupers & snappers are key predators that keep food chain in balance* • Fish were small in size meaning fewer mature females to produce eggs • Predatory fish included coneys, grasbys, red hinds, and yellowtails • Groupers were rare at several reefs, only 1 grouper >40 cm • Complex reef structure had more fish (subregions 40, 41)	 Emma Doyle	 Ken Marks
Diadema	*Diadema urchins clean algae off reefs and open space for coral recruits* • Only 4 of 25 sites had *Diadema* urchins • Urchins were less abundant compared to other E. Caribbean reefs • Reefs with more urchins had less algae and more coral cover • More urchins seen in 2015 suggests recovery on some boulder reefs	 Clare Morrall	 Patricia Kramer
Coral Recruits	*Coral recruits are "baby" corals. Recruits prefer macroalgal free areas* • Recruits were fairly abundant, but mostly of smaller sized species • Several elkhorn coral recruits seen suggests hope for recovery • Large star corals had new tissue regrowing over dead skeleton • Lack of urchins and fish has reduced space for coral recruits	 Clare Morrall	 Andy Bruckner

Reef Health Index

The national Reef Health Index was 2.3 (out of 5). Coral cover was 'fair' (score=3) and could support larger fish populations if these reefs were protected. Herbivorous fish biomass was 'fair', although several fish were small in size. Fleshy macroalgae (score=1) was abundant in areas without herbivory and could be reduced if herbivorous fish, especially parrotfish, were protected. Low commercial fish biomass (score=2) was due to few large predatory fish. Implementing the proposed management plans would allow fish populations to increase.



Key findings:

- New, healthy colonies of endangered elkhorn and staghorn corals provide hope for recovery
- Mountainous star corals are at a tipping point of recovery or decline
- Reefs with complex structure provide more habitat for more fish
- The lack of large parrotfish and *Diadema* urchins has caused algal overgrowth
- Lack of large-sized fish means less fish and food for the future
- Lobster and conch were absent or rare at most coral reef sites

St. Kitts & Nevis' Reef Health Index (RHI)

Indicator	Year	Score	Average	Trend	Caribbean**
Coral Cover	2011	Fair	11	n/a	14
Fleshy Macroalgae	2011	Critical	35	n/a	30
Herbivorous Fish	2011	Fair	2538	n/a	3928
Commercial Fish	2011	Poor	412	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 (table 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

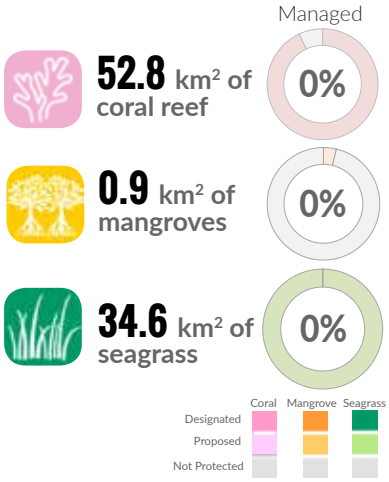
[1]Bruckner, A. and Williams, A. (2012) Assessment of the Community Structure, Status, Health and Resilience of Coral Reefs off St. Kitts and Nevis. June 2011. Khaled bin Sultan Living Oceans Foundation, Landover MD, pp.64 (www.livingoceansfoundation.org). *Reef Health Index developed by Healthy Reefs 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 maps & references see www.caribnode.org.

Protecting Key Habitats

Key Habitats of St. Kitts and Nevis

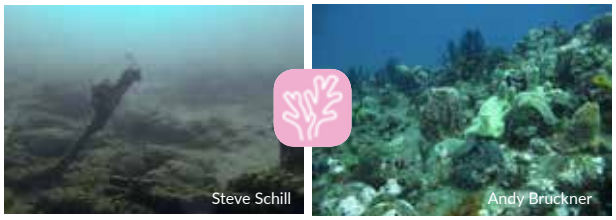
Three main habitats, coral reefs, mangroves and seagrass beds, support productive fisheries, stabilize coastlines and host tourism activities.

- The Nature Conservancy and Government of St. Kitts and Nevis conducted benthic habitat surveys in 2010. Benthic habitat maps provide information on natural resources and support marine spatial planning.
- Contiguous areas with corals, mangroves and seagrasses are important nursery areas and corridors for resident and transient species.
- Habitats are threatened by direct removal and damage, unsustainable fishing practices, coastal development, poor water quality, and global climate change.
- New proposed managed areas will protect 93% of coral reefs, 4% of mangroves and 100% of seagrass.

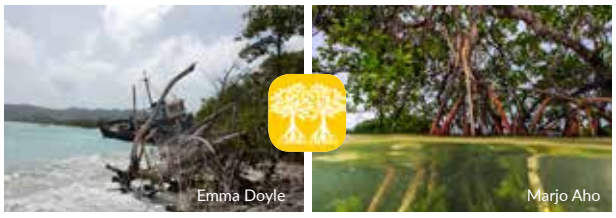


St. Kitts Habitat Type	Threatened	Healthy

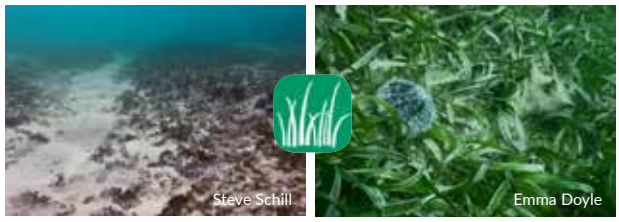
Coral reefs vary in structure with reef type, windward/leeward exposure, and water depth. Common reef types include: a fringing relict elkhorn coral reef along the entire east coast; leeward deep reefs with large mountainous star corals, nearshore volcanic boulders colonized by corals, a unique circular deep patch reef (The Donut), and gorgonian plains. The western narrow shelf has a steep slope with higher coral diversity and cover. The broad, shallow, eastern shelf has lower coral cover and diversity.



Mangroves: Very few mangrove stands occur, covering only 0.9 km², but their ecological and socioeconomic significance is high. Small mangrove stands are found at St. Kitt's SE Peninsula (red, black and white mangroves) and Sandy Point (white mangroves). Nevis has a few small stands in bays with only white mangrove/ buttonwood stands left (e.g., Bogs Area, Pinney Ponds).



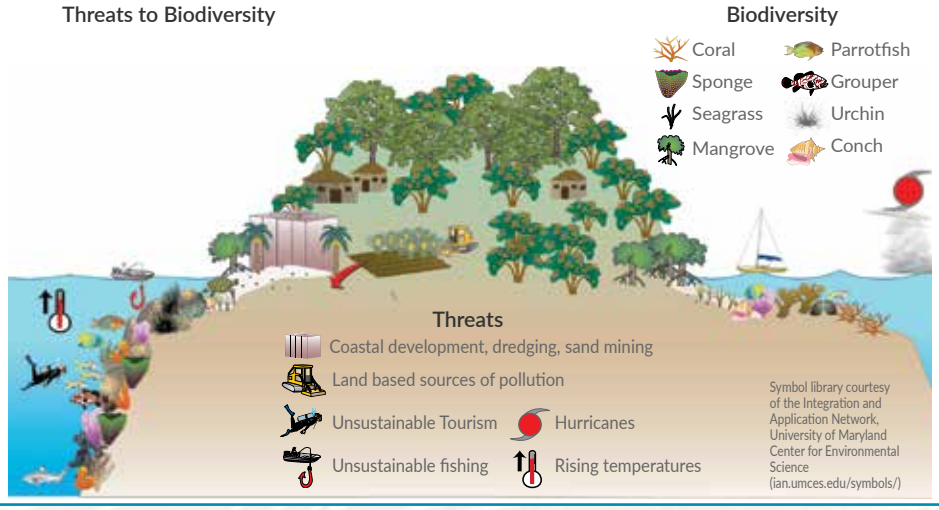
Seagrass beds are found in three main areas: The Narrows, St. Kitts SW corner and Nevis W/SW side. The Narrows, a 3 km shallow channel between the two islands, has a vast seagrass meadow dominated by dense turtle and manatee grass. The Narrows is unique in the Eastern Caribbean as it is the only sizeable seagrass meadow linking two large islands and adjacent reefs together. An invasive seagrass, *Halophila stipulacea*, has been found; impact on native habitat unknown.



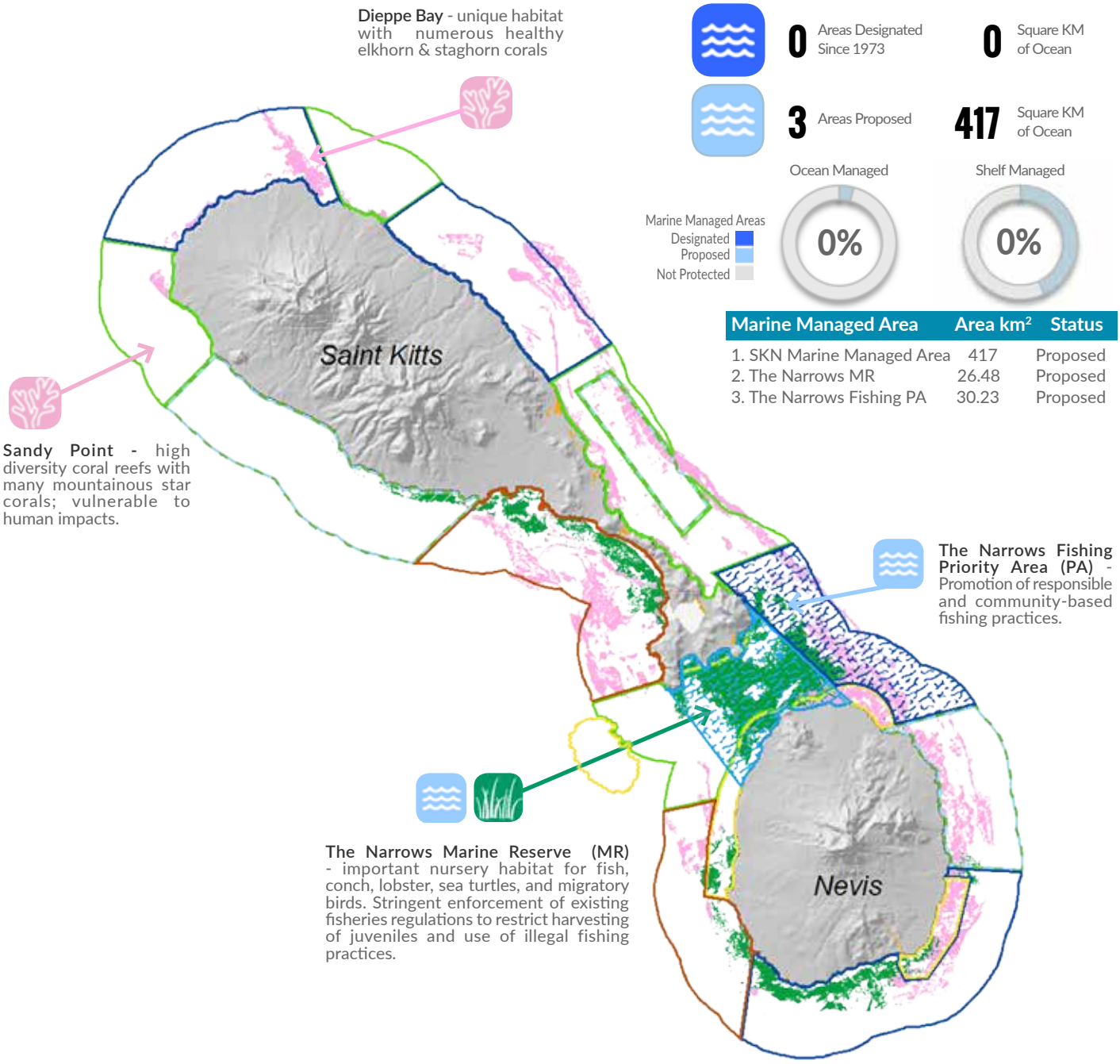
Climate Change Impacts

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 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



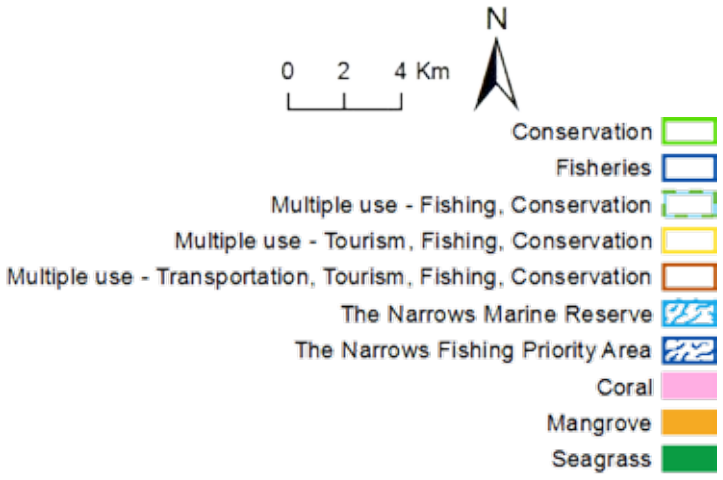
Marine Managed Areas



Marine Managed Areas

St. Kitts & Nevis' new proposed MMAs will:

- 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:

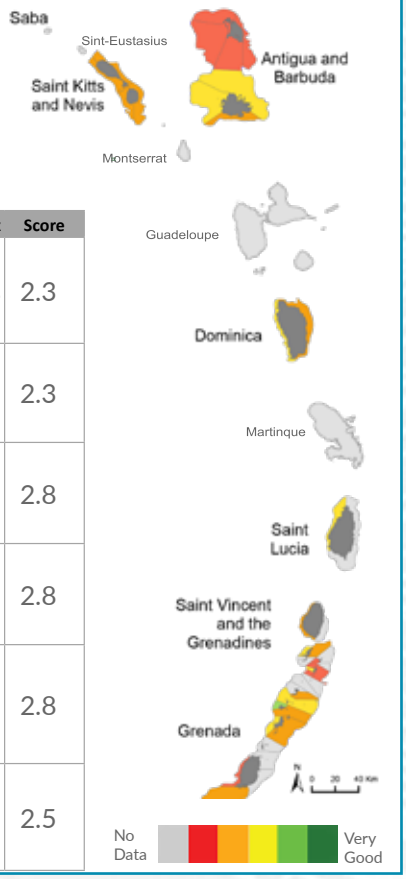
- Endangered elkhorn/staghorn corals are recovering (NE island areas)
- Fleshy algae are often found on leeward reefs and near settlements
- Lack of large parrotfish has reduced grazing on several reefs
- *Diadema* urchins are abundant on several reef types in the EC
- Reefs with greater structure and 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 km^2 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 km^2)
- 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 km^2 of marine resources

# sites	Reef Health Index	Score
St. Kitts & Nevis 25		2.3
Antigua & Barbuda 29/121		2.3
Dominica 16		2.8
Saint Lucia 17		2.8
St. Vincent & Grenadines 42		2.8
Grenada 27		2.5



Next Steps

The following Management Recommendations and Monitoring Priorities are suggested to help protect St. Kitts and Nevis' coral reefs:

I. Management Recommendations

A. Adopt and designate the proposed MMAs to help reefs recover
B. Protect parrotfish and other herbivores to reduce seaweed
C. Create more fully protected replenishment areas to let fish grow larger and produce more fish for the future
D. Protect reefs with healthy elkhorn and staghorn corals to help these endangered species recover
E. Improve nearshore water quality to help reefs prosper

II. Monitoring Priorities

A. Coral Reef Monitoring
   1. Repeat island wide surveys in 2016
   2. Survey strategic reefs (St. Mary's Biosphere Reserve, Sandy Point - human impact, tourism, Christophe Harbor-upland construction, The Narrows - seagrass & long-term, Southern Nevis - data gap, fish priority, Grid Iron and Punch Bowl - elkhorn reefs)
   3. Establish long-term monitoring sites (LOF legacy sites)
B. Socioeconomic monitoring
C. MMA effectiveness – prepare for proposed MMAs
D. Produce Report Cards in 2017 based on 2016 surveys
E. Update CaribNode data platform with new data

The return of healthy endangered elkhorn corals gives hope for the future

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