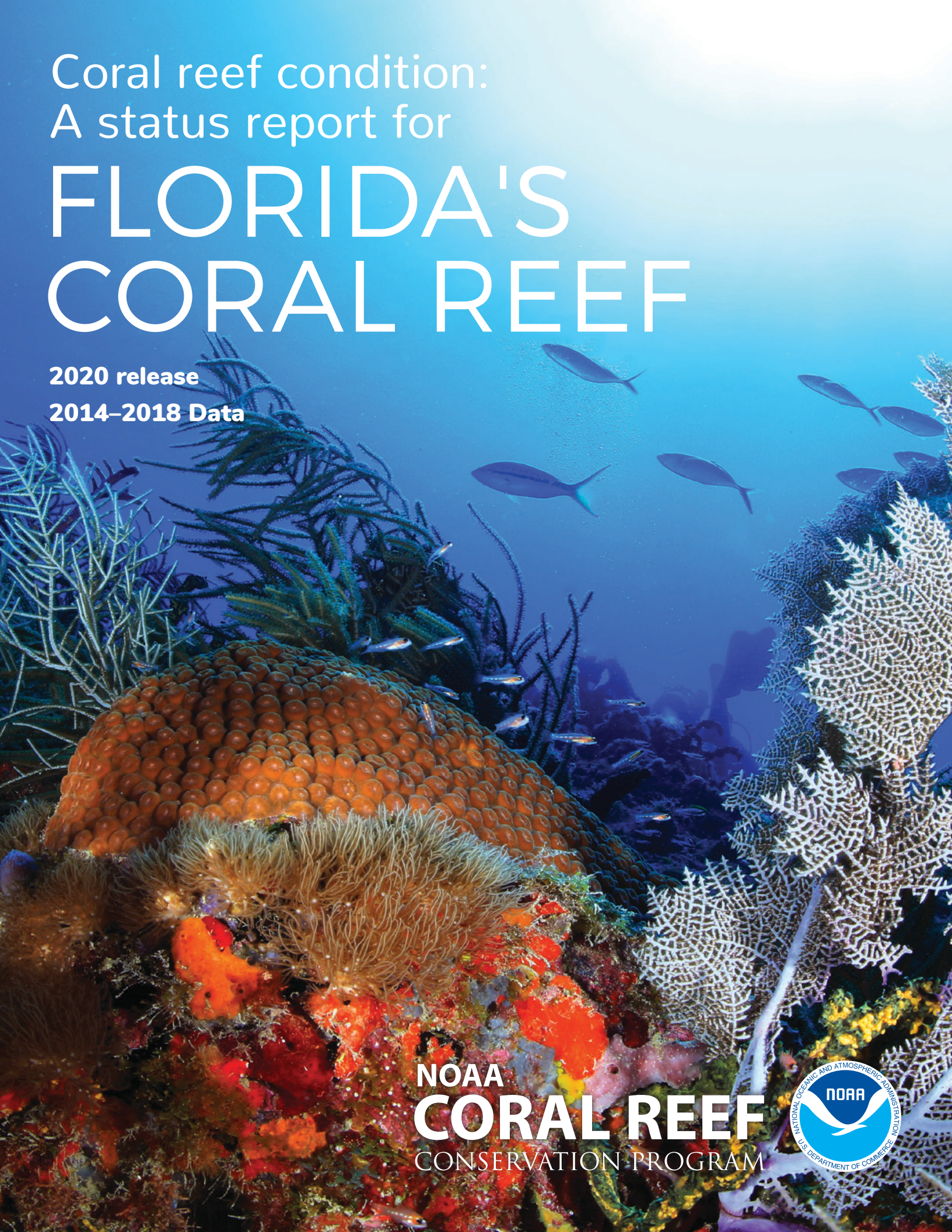
Coral reef condition: A status report for FLORIDA'S CORAL REEF

2020 release

2014–2018 Data



NOAA
CORAL REEF
CONSERVATION PROGRAM

CORAL REEFS ARE IMPORTANT

Healthy coral reefs are among the most biologically diverse ecosystems on Earth, with high cultural and economic significance. They provide billions of dollars in **food, jobs, recreational opportunities,** and other important goods and services to people around the world.

Economy

From tourism to sport fishing, coral reefs play an important role in the economy of Florida. NOAA suggests that coral reefs in Florida have an asset value of $8.5 billion, generating $4.4 billion in local sales, $2 billion in local income, and 70,400 jobs. In the United States, about half of all federally managed fisheries depend on coral reefs, and NOAA's National Marine Fisheries Service estimates the annual commercial value of U.S. fisheries from coral reefs to be over $100 million.

Greg McFall

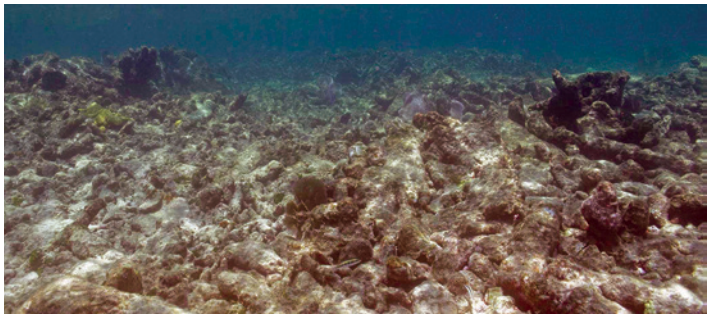
Shoreline Protection

Healthy coral reefs can absorb 97% of wave energy from storms and hurricanes, buffering shorelines, and helping to protect people and property. Coastlines protected by coral reefs are also less susceptible to shoreline and beach erosion than those without. One study estimates that reefs protect over $560 million worth of building infrastructure and $320 million worth of economic activity in Florida from storm-related flooding each year.

NASA

Legacy Conservation

It is estimated that more than one-quarter of the world's live coral cover has been lost in the last three decades due to climate change and other factors. Some scientists estimate that the world may lose all its reef ecosystems by 2050 if action is not taken to reduce global threats. Right now we risk leaving the next generation a world where coral reefs do not exist.



Phil Dustan

Access to Wildlife

Coral reefs are some of the most diverse ecosystems on Earth. They support more species per unit area than any other marine environment, including 4,000 species of fish and 800 species of hard corals. Scientists even estimate that there may still be millions of undiscovered reef species. If we want to protect ocean wildlife, conserving coral reefs is a priority.

Greg McFall

GREEN = biology and hurricanes

LIGHT BLUE = governance related to marine/reef management

BLUE = general historic/government events and governance

1513 Spanish explorer Juan Ponce de Leon leads the first European expedition to Florida.

1565 Spain establishes St. Augustine, the first permanent European settlement in North America.

1845 Florida becomes a U.S. state.

1846 First lighthouses built to aid in navigation.

1912 Overseas Railroad connects Key West to Florida via the East-Coast Railway.

1928 First commercial airline flights to Key West.

1935 Labor Day Hurricane.

1938 Florida Keys Overseas Highway opens, increasing public access to Florida Keys. *Photo: Florida Keys Public Libraries.*

1960 John Pennekamp Coral Reef State Park established.

1961 Bahia Honda State Park established.

1975 Key Largo National Marine Sanctuary established.

1980 Biscayne National Park established.

1981 Looe Key National Marine Sanctuary established.

1983 Snapper-Grouper fishery management plan.

1986 Ban on queen conch harvest. *Photo: NOAA.*

REEFS ARE UNDER THREAT

Coral reefs are declining globally, which has significant ecological, social, cultural, and economic impacts on people and communities. Florida's coral reefs are threatened by rapid development, climate change, overfishing, and disease.

Rapid Development

South Florida has seen significant population growth in the last few decades, and coastal development has rapidly increased to meet the demands of a growing community. Coastal construction, if done without best management practices, can be detrimental to adjacent ocean habitats and coral reefs in particular. For example, healthy mangroves help stabilize the shoreline, but when mangroves are removed for development, shorelines are more prone to erosion, and sediments can more easily pollute the reef.

Climate Change

Rapid development often correlates with rising greenhouse gas (e.g., CO_2) emissions. Burning fossil fuels for energy, industrial manufacturing, and deforestation are some of the ways these gases enter air and water circulation, warming both our atmosphere and our oceans. Carbon dioxide changes ocean chemistry by making seawater more acidic. The combination of warmer and more acidic oceans makes it harder for corals to grow, reproduce, and ultimately survive.

Overfishing

Fishing on coral reefs has economic, social, and cultural importance to Floridians. However, neither humans nor corals win when we remove too many fish too quickly from the reef. Lobster traps, nets, and boat anchors set on top of corals can damage reef structures and injure corals, while also destroying vital fish habitat. Overfishing large adult fish, which are likely to produce more biologically fit offspring, leads to dwindling fish populations over time. Florida's fishing legacy is inextricably connected to the health of its coral reefs.

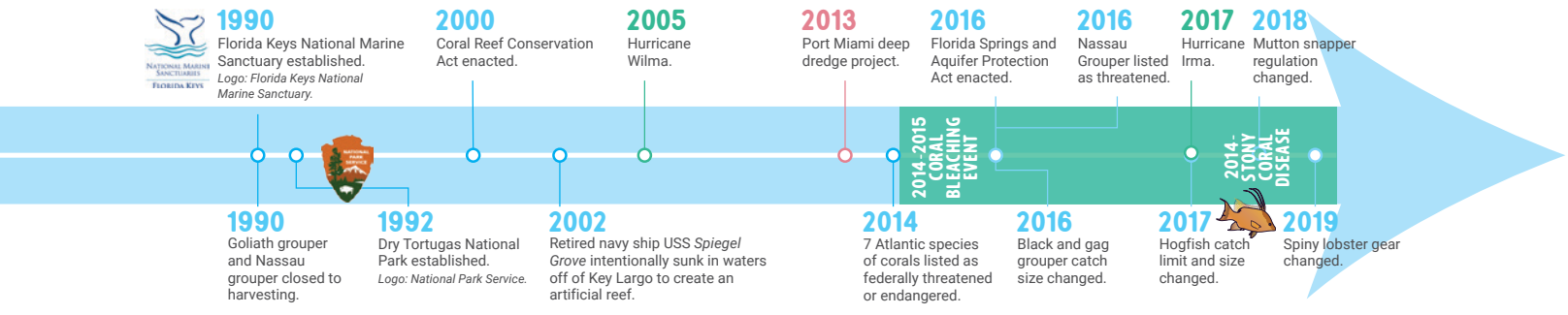
Disease

Growing in frequency and severity, coral disease outbreaks are now one of the major causes of reef degradation and coral mortality around the globe. Many factors are contributing to the problem, including pollution, septic and agricultural runoff, and warming ocean temperatures. In Florida, reefs are currently experiencing a widespread disease outbreak referred to as Stony Coral Tissue Loss Disease.

WHAT YOU CAN DO TO HELP

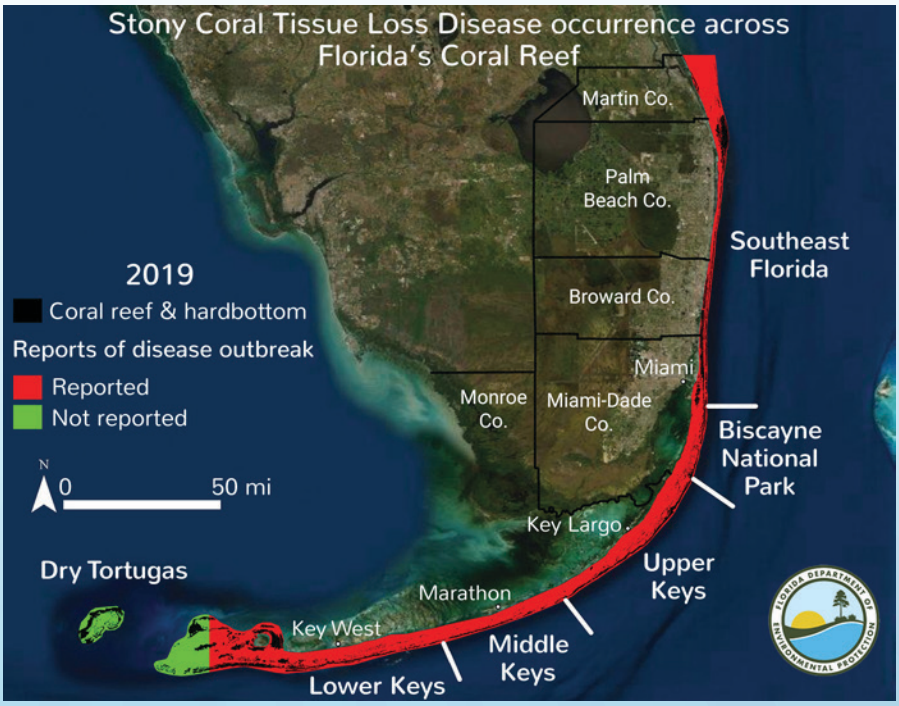
There are many threats to coral reefs. Here are a few actions YOU can take to help conserve coral reefs:

- **Pick up your own trash and the trash that others have left behind.**
- **Help protect mangroves and wetlands from filling and construction activities.**
- **Plant native vegetation to prevent sediment and pollutants from reaching the reef.**
- **Reduce energy use and your carbon footprint.**
- **Support initiatives that protect and preserve coral reefs.**
- **Be responsible for the fishing nets and other gear you use.**
- **Obey all marine preserve regulations; only take the regulated amount of fish.**
- **Do not drop your anchor in reef areas. Instead, use mooring buoys or sandy bottom areas.**
- **Don't stand on or touch live coral. Don't take pieces of corals home with you.**
- **Participate in volunteer-based/citizen science initiatives aimed at coral restoration.**



TRACKING CORAL DISEASE

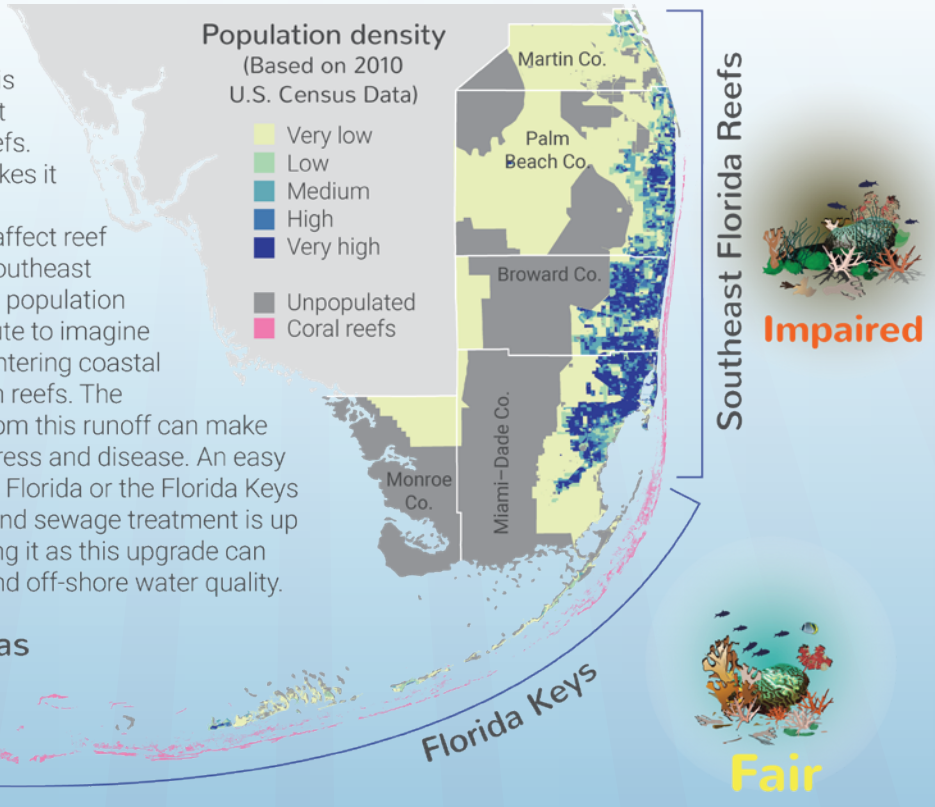
Florida's Coral Reef has been experiencing an outbreak of a coral disease termed Stony Coral Tissue Loss Disease for over five years. First reported off the coast of Miami-Dade County in 2014, this outbreak now spans almost the entire reef system, with the exception of the Dry Tortugas. The disease impacts roughly half of Florida's 45 stony coral species, including key reef building species, five species listed under the Endangered Species Act, and many other charismatic coral species. The disease affects certain coral species more than others and often kills the whole coral colony. This leads to significant declines of susceptible species on impacted reefs.



Corals affected by Stony Coral Tissue Loss Disease on Florida's reefs. Image: https://floridakeys.noaa.gov/coral-disease/disease.html.

POPULATION DENSITY AFFECTS CORAL REEF HEALTH

It is not uncommon for coral reefs to be within just a few meters of the Florida shoreline. This proximity is great for recreation but potentially detrimental for coral reefs. Being so close to the shoreline makes it easy for wastewater and sewage pollution runoff from the shore to affect reef habitat. Millions of people live in Southeast Florida. These five counties have a population greater than 31 states; take a minute to imagine the sheer volume of wastewater entering coastal waters and what effect that has on reefs. The excess nutrients and chemicals from this runoff can make corals more susceptible to heat stress and disease. An easy way to help if you live in Southeast Florida or the Florida Keys is to make sure your wastewater and sewage treatment is up to date. If it isn't, consider upgrading it as this upgrade can improve your community's local and off-shore water quality.



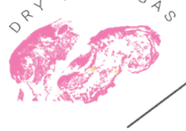
FLORIDA'S CORAL REEF IS **IMPAIRED**

FLORIDA'S CORAL REEF

Florida's Coral Reef extends from Martin County on the Atlantic Coast of Florida, through the Keys, and to the Dry Tortugas in the Gulf of Mexico. The Florida Coral Reef is the only coral reef system found along the coast of the continental United States. It is adjacent to intense human development and is heavily used for its resources. The Florida Coral Reef was divided into three sub-regions to evaluate the condition of four categories—corals & algae, fish, climate, and human connections. Florida's Coral Reef is impaired overall. Corals, algae, and fish in the system are moderately impacted. Diversity of fishes is good. Climate is a factor negatively affecting coral reefs. Temperature stress and ocean acidification, which lead to coral bleaching and less coral growth respectively, are global problems seen locally in Florida. Despite these threats, management actions can make a difference. Awareness and participation in pro-environmental behaviors are lacking in Florida, and support for management actions that may improve the reefs is also lacking. These conditions show that Florida's Coral Reef is struggling against threats, such as pollution, overfishing, and global climate change. Public participation in preservation and conservation of coral reefs is needed to protect Florida's Coral Reef.

DRY TORTUGAS

The Dry Tortugas encompass a small group of islands approximately 67 miles west of Key West, Florida. Most of the Dry Tortugas, above and below water, lie within the National Park. The park is a popular tourist attraction and receives tens of thousands of visitors each year. The Dry Tortugas are in fair condition overall. Corals, algae, and fish are moderately impacted. While two fish indicators related to fishing pressure score much better than the rest of Florida, macroalgae cover is very high. High macroalgae cover reduces the amount of space available for corals to grow. Climate conditions are very impacted in this region. Despite its remote location in comparison to the rest of Florida's reefs, the Dry Tortugas are impacted by human pollution, overfishing, and climate change.



Coral Reef Habitat

Land

Port St. Lucie

West Palm Beach

SOUTHEAST FLORIDA

Miami

Government Cut

Gulf of Mexico

Florida Bay

FLORIDA KEYS

Key West

0 10 20 Kilometers

N

0 10 Miles

What do the scores mean?

90–100% Very Good

All or almost all indicators meet reference values. Conditions in these locations are unimpacted, or minimally impacted or have not declined. *Human connections are very high.

80–89% Good

Most indicators meet reference values. Conditions in these locations are lightly impacted or have lightly declined. *Human connections are high.

70–79% Fair

Some indicators meet reference values. Conditions in these locations are moderately impacted or have declined moderately. *Human connections are moderate.

60–69% Impaired

Few indicators meet reference values. Conditions in these locations are very impacted or have declined considerably. *Human connections are lacking.

0–59% Critical

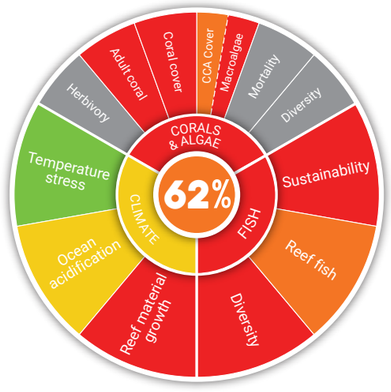
Very few or no indicators meet reference values. Conditions in these locations are severely impacted or have declined substantially. *Human connections are severely lacking.

Insufficient Data

Not scored.

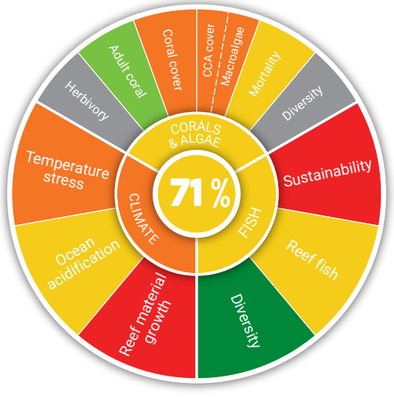
*Human connections data are only collected at the overall Florida level, not the sub-region level.

SOUTHEAST FLORIDA



The Southeast Florida reefs, located north of the Keys, stretch along the Atlantic coast of Florida. This area is heavily populated and has been altered by human development and agriculture. The reefs here are ecologically different than the other reefs of the Florida Coral Reef. The Southeast Florida reefs are impaired, meaning that they are very impacted by human activities. Corals, algae, and fish are in critical condition, while climate is moderately impacted. Restoration of these reefs is needed to improve overall conditions.

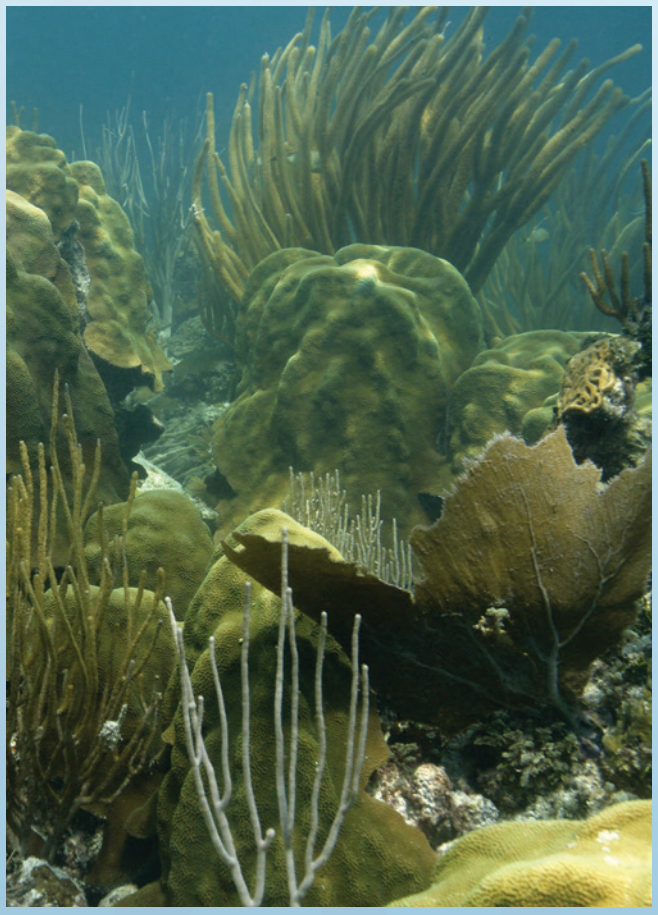
FLORIDA KEYS



The Florida Keys is a chain of islands stretching south of Miami and just past Key West. The reefs of the Keys stretch well beyond the populated islands that most people are familiar with. Human development and reef use are characteristic of this area. The Keys reefs are in fair condition overall. Corals, algae, and fish are moderately impacted. While coral cover has declined on many reefs in the Keys, some offshore reefs have remained relatively healthy, which justifies a higher adult coral density score in this region. Climate conditions are impaired. Despite the heavy recreation and fishing, the reefs are only moderately impacted.

PROTECTING FLORIDA'S CORALS FROM DISEASE

The Coral Rescue Project is a multi-agency effort that aims to rescue healthy corals in response to the current Stony Coral Tissue Loss Disease outbreak. The project consists of numerous organizations, including non-profits, state, and national agencies. Such large-scale commitment is a testament to the severity of this outbreak as well as public demand for enhanced coral conservation. The goal of the Coral Rescue Project is to create a repository of key coral species that can be drawn upon in the future to re-seed reefs destroyed by this disease. Such efforts will be possible once scientists have a better understanding of the disease. The various teams involved aim to collect around 5,000 individual corals. These teams are currently harvesting brain corals, star corals, and other species from areas so far unharmed by the outbreak. Harvested corals are then housed at land-based nurseries and aquaria, where they are propogated for later use. Despite the high toll this disease is having on corals, it is inspiring to see such a large-scale response from members of the Coral Rescue Project to this marine epidemic.



Healthy corals on the Florida Coral Reef. Photo: Derek Manzello.

KEY THEMES & INDICATORS

CORALS & ALGAE

Corals & algae make up the base of the coral reef ecosystem, providing food and shelter for fish, shellfish, and marine mammals. The indicators for corals & algae are:

- **Coral cover**, a measure of what percentage of the bottom (benthos) is living stony coral.
- **Macroalgae cover**, a measure of what percentage of the bottom (benthos) is macroalgae.
- **Crustose coralline algae (CCA) cover**, a measure of what percentage of the bottom (benthos) is crustose coralline algae.
- **Adult coral**, a measure of the density of reproductive age coral species.
- **Herbivory**, a measure of the level of grazing pressure by fish on corals and algae.
- **Mortality**, a measure of the amount of old dead coral skeleton exposed as scars on live coral colonies.
- **Diversity**, a measure of unique coral species present.

FISH

Coral reefs serve a vital ecological role for fish species. Fish are important to the ecology of the reef, the economy, and the livelihoods of local communities. The indicators for fish are:

- **Reef fish**, a region-specific measure of density for selected fish species.
- **Sustainability**, a measure of human-related fish mortality relative to natural fish mortality.
- **Diversity**, a measure of unique fish species present.

CLIMATE

Climate affects all components of a reef system. Climate change and ocean acidification influence reefs across the globe, but conditions vary at the regional and local level. The climate indicators are:

- **Temperature stress**, which evaluates the frequency and severity of high temperature events.
- **Ocean acidification**, which indicates if the water chemistry is suitable for the growth of corals and other calcifiers.
- **Reef material growth**, which is a calculated measurement of the yearly gain or loss of three-dimensional reef habitat.

HUMAN CONNECTIONS

Coral reef management agencies protect reef resources through management plans, public education, and involving communities in managing their resources. The indicators for human connections are:

- **Awareness**, an indicator of residents' familiarity with threats to and the importance of reefs.
- **Support for management actions**, an indicator of support for reef management activities.
- **Pro-environmental behavior**, an indicator of residents' participation in activities to protect the environment.

SUCCESSFUL REEF MANAGEMENT IN FLORIDA

For centuries, Florida's shallow reef ecosystem has fostered a diversity of fishes and corals while simultaneously being a dangerous navigational hazard for mariners. This long history of human interactions with the reefs has led to many management actions, beginning with lighthouses, state and national parks, and a national marine sanctuary. More recently, multi-pronged management approaches have been implemented by local, state, and federal jurisdictions to establish marine reserves that spatially protect areas from user conflicts and fishing pressure. Enacted legislation has established the legal infrastructure needed to prevent and/or mitigate unpermitted impacts such as sewage discharge and illegal fishing. Regulations also exist that promote sustainable fishing practices and further enable coral reef habitat protection. Florida's numerous ornamental fishes, including larger rainbow and midnight parrotfishes, are typically less common in the Caribbean and exemplify successful coastal management practices.

The residual ecological stressors of recent and rapid human population growth along Florida's Coral Reef present new environmental management challenges, and local resource managers are working to rise to these challenges. They are striving for solutions to water quality, habitat (coral disease and reef restoration), and fisheries concerns so that healthy reefs can coexist alongside coastal communities.

FISH THRIVE AT DRY TORTUGAS

The Dry Tortugas encompass the most pristine coral reefs in Florida. Located approximately 67 miles from Key West, their remote location and current conservation status help to minimize fishing pressure. The marine reserves in this region make up the Tortugas Ecological Reserves and Research Natural Area; they provide much needed protection for populations of valuable species such as snappers, groupers, and hogfish to recover. The no-take regulations within the marine reserves also allow for higher fish densities and larger individual adults when compared to areas with open fishing. Coincidentally, the marine reserves in the Dry Tortugas were designated right as spawning aggregations of mutton snapper in the southern reserve reformed. Healthy spawning aggregations in this region are particularly important as ocean currents flow from here to the Florida Keys, supplying new fish, including mutton snapper, to fisheries throughout Florida's Coral Reef.

WHY A STATUS REPORT?

Effective coral reef conservation cannot be accomplished without an informed and engaged public. This status report is part of an ongoing series of documents to track the status and trends of coral reefs across the U.S. and its territories. **Florida's Coral Reef status report is part of a larger effort to provide the public and decision-makers with information about managing and conserving coral reef ecosystems.**

This status report provides a geographically specific assessment of Florida's Coral Reef condition for the period 2014–2018. The Florida Coral Reef was divided into three sub-regions based on data resolution, geographical features, and impacts to the ecosystem. Data were collected by NOAA's National Coral Reef Monitoring Program. For more detailed information on methodologies, indicators, thresholds, and scoring, visit http://www.coris.noaa.gov (keyword: status reports).

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About this status report

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The CRCP supports effective management and sound science to preserve, sustain, and restore valuable coral reef ecosystems for future generations. For more information, visit coralreef.noaa.gov. Cover photo by Greg McFall.

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government or the National Fish and Wildlife Foundation and its funding sources. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government, or the National Fish and Wildlife Foundation or its funding sources.

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The status report working group during the workshop in Miami, FL, May 2019.

NOAA CORAL REEF CONSERVATION PROGRAM

University of Maryland CENTER FOR ENVIRONMENTAL SCIENCE