

The ReefCheck survey involves counting target fish and invertebrate species along four 20m transects at each site. Coral cover, bleaching, damage and disease are also recorded. Surveys we conducted at 11 sites (Appendix 2) between October 5-9, 2012. This summary does not include a discussion of all ReefCheck species.



Photo: Jorge Sanchez (ReefCheck survey at Blue Wall, San Andrés)

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Food species

Generally, the reefs of San Andrés Island are in good condition, however over fishing was evident throughout the study.

Grouper

Grouper are top predators, some reaching over a meter in length when they are full-grown. Their value as a food fish has led to high fishing intensity however slow growth and late maturity makes it very difficult for this species to recover. No grouper over 30cm was recorded at any of the 11 sample sites, indicating that this species has been severely overharvested in San Andrés waters.

Between 1997 and 2001 Nassau Grouper, an endangered species according to the IUCN Red List, were found in only 8 of 162 reefs surveyed in the Caribbean region. A vast majority of the Nassau grouper spotted during those surveys (76 of 106 total) were found on San Andrés reefs (Hodgson & Liebler, 2002). Ten years later, during this survey, not a single Nassau grouper was found during ReefCheck surveys in San Andrés.

Queen Conch

Queen conch is not a target species for ReefCheck, however we added this species to our survey due to its significance to the culture and economy of San Andrés Island. Unfortunately, queen conch was recorded at only one site out of eleven. It's clear that despite conservation efforts (including a regional ban on conch harvest), this species is still under pressure.

Reopening harvest on queen conch in MPAs, as San Andrés plans to do this November, is predicted to "rapidly deplete the conch population in a fraction of the time necessary for the initial buildup at the current fishing mortality rate" (Hernandez-Lamb et al., 2012).



Photo: Emilie Novaczek (Biologist records queen conch at Dry Shoal, San Andrés)

Spiny Lobster

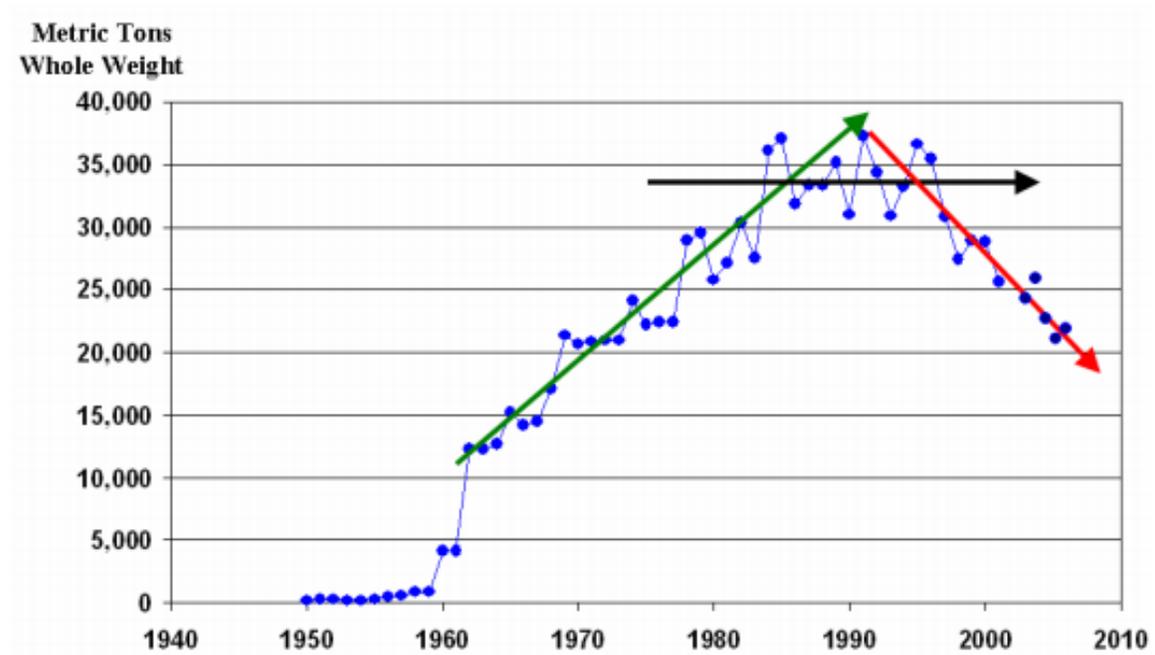
Spiny lobster were found at four sites during the survey, at a density of only $0.13/100\text{m}^2 \pm 0.23$ (compared to $0.6/100\text{m}^2 \pm 0.69$ in 2001) suggesting that these species are also under pressure from over fishing. In this, San Andrés is not unique; overfishing has

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eliminated spiny lobsters from shallow reefs everywhere. In 2001, no spiny lobster were recorded at 83% of shallow reefs around the world (Hodgson & Liebel, 2002).

Over the last decade Spiny lobster populations have decreased dramatically. It is hugely important that government, CORALINA and communities collaborate on conservation measures if we are to maintain populations in our region.



Total Caribbean wide (including Brazil) landings of Caribbean spiny lobster. (Ehrhardt et al., 2009)

Attraction Species

Many species support the tourism industry in San Andrés. Some species are favourites of divers and snorkelers and others, like the parrotfish, provide crucial ecosystem services that support the tourism industry indirectly.

Although they account for only 10% of visitors, dive tourists make up 17% of tourism revenue in the Caribbean, making this sector a very important factor in tourism development planning (WRI, 2004).

Parrot Fish

Parrotfish, with their large size and bright colours are popular among divers and snorkelers. They are also reef herbivores; by grazing algae off of coral skeletons, they prevent algae populations overtaking coral colonies and they convert coral skeleton into white sand for nearby beaches. A single adult parrotfish produces about 90kg of sand every year (Thurman & Webbes, 1984).

Beach tourism is a major source of revenue for San Andrés, almost 75% of tourists surveyed in 2011 said they would not be interested in visiting the island if there were no beaches and almost 60% said they would not return if erosion reduced beaches by half (Castano, 2011).

When reefs are subject to heavy fishing, the normal pattern is for predators to be fished out first, followed by the herbivores such as the parrotfish. ReefCheck records parrotfish over 20cm, gathering data on the reproducing, adult population. Parrotfish abundance in the Atlantic region declined between 1997 and 2001 from a high of $13.2 \text{ per } 100 \text{ m}^2 \pm 24.0$ in 1998 to a low of $5.1 \text{ per } 100 \text{ m}^2 \pm 4.3$ in 2001 (Hodgson & Liebeler, 2002). During our study, parrotfish over 20cm were recorded at a density of only $2.8 \text{ per } 100\text{m}^2 \pm 3.6$ on San Andrés reefs. This suggests that the decline noted between 1997 and 2001 may have slowed slightly, however parrotfish are still being removed from the reef faster than the population can replace them.

Banded coral shrimp

The banded coral shrimp was chosen as an indicator of aquarium fish collecting. The shrimp is collected in shallow reefs around the world, and sells for approximately US\$20 in United States pet shops.

ReefCheck surveys between 1997-2001 in the Caribbean recorded an average of 1.2 per 100m² ± 3.3 (Hodgson & Liebeler, 2002). Our surveys recorded banded coral shrimp just over half the 2001 density: 0.8 per 100m² ± 0.7.

Moray Eel

Aside from groupers, moray eels were the most rarely recorded species during our surveys. Morays serve as an indicator of spearfishing; they are relatively large and their predictable, territorial behavior makes them an easy target. They are also one of the many species that attract divers. Of the 44 transects over 11 reef sites, only 4 moray eels were recorded (0.09 per 100m² ± 1.3).



Photo: Emilie Novaczek (juvenile moray at Punta Padi, San Andrés)

Coral

Hard Coral Cover

Hard corals are the essential reef builders of these delicate ecosystems. Hard coral cover in the survey sites ranges from about 10% to 35%. It should be noted that 100% coral cover is not the target for a “healthy” reef. Many of the healthiest reefs in the world have never had more than 30% hard coral cover (Hodgson & Liebeler, 2002). During the 1997-2002 global ReefCheck analysis period, Caribbean reefs fluctuated between an average of 20-30% hard coral cover (Hodgson & Liebeler, 2002). During our survey, most reefs fell between 18-35% hard coral cover. Only 4 sites had hard coral cover below 18%.

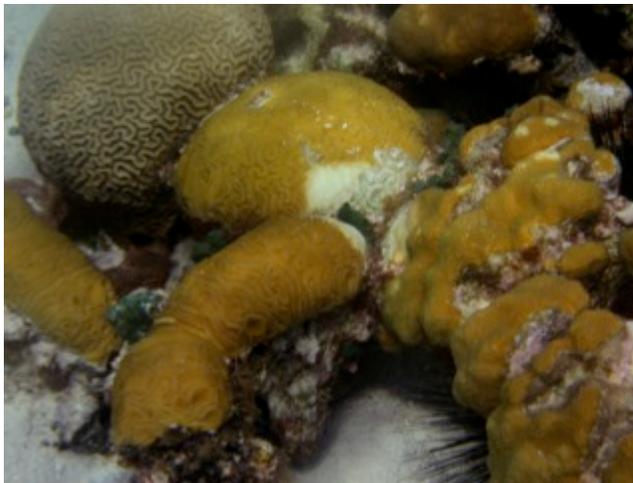


Photo: Emilie Novaczek (Brain corals affected by recent bleaching in Long Shoal, San Andrés)

Disease & Bleaching

Coral disease rates are relatively low in the sample sites however White Band disease and *Aspergillus* are not uncommon in San Andrés. Based on this survey, about 9.5% of San Andrés coral colonies have been affected by recent bleaching.

Dead and Damaged Coral

Recently killed coral or coral rubble is low in about half the survey sites (1%-5%). However, a higher percentage (10%-23%) of dead and damaged coral was found in five of the shallower areas that experience a greater mix of activities, more new divers (certification and mini-courses) and higher boat traffic.

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Appendix 1: Participants

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Appendix 2: Sample Sites

We completed ReefCheck surveys at 11 sites around San Andrés. The sites were chosen to represent a variety of MPA use zones and user activities.

Site	Zone	Major Activities
Bajo Bonito	No Take	<ul style="list-style-type: none"> • SCUBA (high use)
Blue Wall	No Take	<ul style="list-style-type: none"> • SCUBA
Dry Shoal	No Entry	<ul style="list-style-type: none"> • Snorkeling
Elsy Bar	No Take	<ul style="list-style-type: none"> • SCUBA
Faro	No Take	<ul style="list-style-type: none"> • SCUBA (high use) • Spear fishing (illegal)
Little Reef	No Entry	<ul style="list-style-type: none"> • SCUBA • Snorkeling • High boat traffic • Glass bottom boat tours
Long Shoal	No Entry	<ul style="list-style-type: none"> • Snorkeling • Glass bottom boat tours
Montanita	No Take	<ul style="list-style-type: none"> • SCUBA (high use)
Piramide	Special Use	<ul style="list-style-type: none"> • SCUBA (high use; mini course/certification) • Snorkeling • Glass bottom boat tours • High boat traffic
Punta Padi	General Use	<ul style="list-style-type: none"> • Artisanal fishing • SCUBA
Reggae Nest	General Use	<ul style="list-style-type: none"> • Artisanal fishing • SCUBA