

EXPEDITION REPORT

Expedition dates: 16 March – 11 April 2008

Report published: February 2009

Diving the Caribbean to safeguard the coral reef of the Cayos Cochinos marine protected area, Honduras.



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Authors:

**Jonathan Shrives
Oxford University**

**Marcio Aronne & Velvet Teos
HCRF**

**Kathy Wilden & Matthias Hammer (editor)
Biosphere Expeditions**

ABSTRACT

The Cayos Cochinos Natural Monument, located off the coast of Honduras in the Caribbean, was declared a protected area by the Honduran government in 1992 and in 2003 was awarded the status of a Marine Nature Monument. The Cayos Cochinos Natural Monument is an important and protected part of the Meso-American barrier reef and the world's second largest barrier reef system. In 2004 a management plan was published and new zoning and connected regulations were approved.

The current study was initiated in 2006 by the Honduras Coral Reef Fund and Biosphere Expeditions with the purpose of establishing scientific evidence and evaluating the effectiveness of new regulations in protecting the habitats and species residing within the Cayos Cochinos Natural Monument. This report summarises the finding of the third survey of this long-term monitoring programme, which was conducted from 16 March until 11 April 2008.

Reef Check is the methodology selected for this survey involving volunteer divers as it was designed to assess the health of coral reefs and because it is also quite different from other monitoring protocols in that it focuses on the abundance of particular coral reef organisms that best reflect the condition of the ecosystem and that are easily recognisable to the general public.

Two principle predators; groupers and moray eels, were both found in low abundance. These species are showing a decline in numbers over the last three years. In contrast, snappers, which are the most commonly fished family in this region, are encouragingly stable in numbers. Of greater concern is the very low abundance of conch and lobster. These are two of the most important and over-harvested invertebrate fisheries in Honduras. The algae grazing *Diadema* spp of urchin were found in relatively good abundance, especially at the El Avion site. This site is dominated by high algal cover and coral rubble following the impact of Hurricane Mitch 10 years ago. The high number of *Diadema* at this site could indicate the start of recovery, as they graze away the algae and make space for new coral growth. Coral cover is still low in the region. The reduction in spread of bleaching and coral damage is encouraging. However, where specific incidences were recorded, they were more severe, suggesting a more localised source of damage such as sediment or soil run-off from local islands.

The recommendations flowing from this report are (1) Avoid fishing during reproductive periods for threatened species such as Groupers, Conch and Lobster. (2) Find alternative, sustainable sources of income or fishing areas for fishermen to offset any change in regulation or no-fishing zones. (3) Immediately establish a monitoring programme for lobster and conch, with reef surveys and catch data and include an educational outreach program in the local community. (4) Maintain existing zonal system and no-fishing zones with adequate patrols both day and night. (5) Start a campaign and educational outreach programme on mainland Honduras to limit soil and agricultural runoff into local rivers and in turn, on to the reefs. (6) Continue integration of Honduran staff with the expedition team members of Biosphere Expeditions. (7) Establish long-term ecological monitoring of the reefs and sediment impacts and develop a strategic long-term plan for regulation and development of the expanding tourism industry and associated potential impacts. (8) Assess and monitor any impacts from the development of TV and media usage of the islands for filming, production and logistics.

RESUMEN

El Monumento Natural Cayos Cochinos, ubicado en la costa de Honduras en el Caribe, fue declarado área protegida por el gobierno hondureño en 1992 y en el 2003 fue premiada con el estatus de Monumento Natural Marino. El Monumento Natural Cayos Cochinos es una parte importante y protegida del Sistema Arrecifal Mesoamericano y es el segundo sistema arrecifal más grande. En el 2004 un plan de manejo fue publicado y nuevas zonificaciones y regulaciones fueron aprobadas.

El actual estudio fue iniciado en el 2006 por la Fundación Cayos Cochinos y Biosphere Expeditions con el propósito de establecer evidencia científica y evaluar la efectividad de las nuevas regulaciones en proteger los habitats y especies que residen dentro del Monumento Natural Cayos Cochinos. Este reporte resume los resultados de la tercer inspección de este programa de monitoreo de largo plazo, que fue conducido del 16 Marzo hasta el 11 de Abril del 2008.

Reef Check es la metodología seleccionada para esta inspección que involucra buceadores voluntarios, ya que fue diseñada para evaluar la salud de los arrecifes coralinos y porque también es algo diferente de otros protocolos de monitoreo ya que este se enfoca en la abundancia de organismos particulares de los arrecifes coralinos que mejor reflejan la condición del ecosistema y que son fácil de reconocer por el publico en general.

Dos predadores principales: los meros y las morenas, fueron encontrados en poca abundancia. Estas especies están mostrando un descenso en números sobre los últimos tres años. En contraste, los pargos, la familia mas comúnmente pescada en esta región, se encuentra estable. De más grande preocupación es la muy baja abundancia de caracol y langosta. Esto son dos de los más importantes y los invertebrados más sobre explotados en Honduras. El Erizo Diadema spp que se alimenta de algas fue encontrado en buena abundancia, especialmente en el sitio El Avión. Este sitio es dominado por una cobertura alta de alga y escombros coral seguidos por el impacto del Huracán Mitch hace 10 años. El alto número de Diadema en este sitio podría indicar el comienzo de una recuperación, como ellos se van alimentando de las algas hacen espacio para el crecimiento del nuevo coral. La cobertura coralina es aun baja en la región. La reducción en la extensión del blanqueamiento y daño coralino es alentadora. Sin embargo, donde específicas incidencias fueron registradas, eran más severas, sugiriendo una fuente mas localizada de daño como el sedimento o deslaves de las islas locales.

Las recomendaciones que se derivan de este reporte son (1) Evitar pescar durante periodos reproductivos para las especies que se ven amenazadas como los Meros, el Caracol y la Langosta. (2) Encontrar fuentes alternativas de ingreso o áreas de pesca para los pescadores para desviar cualquier cambio en regulaciones o zonas de no pesca. (3) Inmediatamente establecer un programa de monitoreo para la langosta y el caracol con inspecciones arrecifales y recolección de datos e incluir un programa educacional en la comunidad local. (4) Mantener el existente sistema zonal con patrullajes adecuados en el día y en la noche. (5) Empezar una campaña y un programa educacional en Honduras para limitar los deslaves de suelo y agrícolas a los ríos locales y hacia los arrecifes. (6) Continuar trabajar con biólogos hondureños con los miembros de los equipos de expedición de Biosfera Expeditions. (7) Establecer monitoreos ecológicos de largo plazo de los arrecifes y los impactos de sedimento y desarrollar un plan estratégico de largo plazo para regulaciones y desarrollo de la industria expansiva de turismo e impactos potenciales asociados. (8) Monitorear cualquier impacto del desarrollo de TV y uso de medios de las islas para producción, filmación y logística.

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Please note: Each expedition report is written as a stand-alone document that can be read without having to refer back to previous reports. As such, much of this and the following sections, which remains valid and relevant, is a repetition from previous reports, copied here to provide the reader with an uninterrupted flow of argument and rationale.

1. Expedition Review

K. Wilden & M. Hammer (editor)
Biosphere Expeditions

1.1. Background

Biosphere Expeditions runs wildlife conservation research expeditions to all corners of the Earth. Projects are not tours, photographic safaris or excursions, but genuine research expeditions placing ordinary people with no research experience alongside scientists who are at the forefront of conservation work. Expeditions are open to all and there are no special skills (biological or otherwise) required to join. Expedition team members are people from all walks of life and of all ages, looking for an adventure with a conscience and a sense of purpose. More information about Biosphere Expeditions and its research expeditions can be found at www.biosphere-expeditions.org.

This expedition report deals with an expedition to the world's second largest reef system in the middle of the Cayos Cochinos Natural Monument in the Caribbean Sea, off the coast of Honduras, which ran from 16 March to 11 April 2007. The purpose of the survey programme was to provide data on the current biological status of the reefs and islands and of population levels of protected species within the marine protected area. All this as part of an international coral reef research programme, called the Reef Check monitoring programme.

1.2. Research area

The Cayos Cochinos are a group of two small islands (Cochino Pequeno and Cochino Grande) and 13 small coral cays situated 30 kilometres northeast of the town of La Ceiba on the northern shores of Honduras. In November 1993, a Presidential Decree designated the Cayos Cochinos a Natural Protected Area and the Honduras Coral Reef Fund (HCRF) as the managing agency responsible for the conservation of the islands. In August 1994 a second Presidential Decree, confirmed the protected status of the islands. In November 2003 a Legislative Decree declared a Marine Natural Monument. The protected area covers 460 km² and HCRF are responsible for its management.

The Cayos Cochinos form part of the world's second largest barrier reef system, known as the Meso-American Barrier Reef, and have been identified by the Smithsonian Institute, The Nature Conservancy, the World Wildlife Fund and the World Bank as one of the key sections of the barrier reef system to preserve. The reefs are the least disturbed ecosystems in the so-called Bay Islands Complex and have had a strong and active NGO working with local communities, private sector bodies and government organisations to help manage the reefs and their fisheries over the last 10 years.



Map of the study area. See also [Google Maps](#) for an internet-driven view of the study site.

1.3. Dates

The expeditions ran over a period of four weeks divided into two two-week slots, each composed of a team of international research assistants, scientists and an expedition leader. Slot dates were:

16 - 28 March | 30 March - 11 April 2008.

Dates were chosen when survey conditions like the clarity of water and therefore visibility were best.

1.4. Local Conditions & Support

Expedition base

The expedition team was based on the island of Cochino Pequeno at the scientific station of Cayos Cochinos. The Cayos Cochinos site and scientific station was set up by the Honduras Coral Reef Foundation (HCRF) in 1994 and features spacious bungalow-style cabins, a fully equipped dive centre with compressors and equipment for hire, wet and dry labs, a computer and lecture room, common areas and a dining area. 4 – 8 team members shared a spacious bungalow-style cabin (2 – 4 persons to a room). Each cabin had a shower and toilet, a small kitchen cum lounge and a veranda overlooking the beach. A cook provided all meals and vegetarians and special diets were catered for.

Field communications

Each dive boat carried one radio for communication with other boats and with the scientific station. Mobile phones worked on the island and within a few kilometres out at sea, but very few European and North American providers seemed to have a roaming agreement with Honduran providers. There was e-mail and internet connection on the island for staff.

Transport, vehicles & research boats

Team members made their own way to the La Ceiba assembly point. From there all transport was provided for the expedition team and on the island a variety of HCRF boats were used to move to survey sites and back.

Medical support & insurance

The expedition leader was a trained divemaster and first aider, and the expedition carried a comprehensive medical kit. Further medical support was provided by a hospital and doctors within easy reach at La Ceiba. All dive boats carried safety equipment and oxygen. For urgent emergency cases there was a helicopter landing pad on Cochino Pequeno and a recompression chamber on nearby Roatan island. All team members were required to carry adequate travel insurance covering emergency medical evacuation and repatriation. There were no medical incidences in 2008.

Diving

The minimum requirement to take part in this expedition was a PADI Open Water or equivalent qualification. Team members who had not dived for twelve months prior to joining the expedition were required to complete a PADI Scuba Review before joining the expedition.

Standard PADI diving and safety protocols were followed.

Dive groups were divided into different teams, each working on specific areas of survey work. Divers were allocated to teams based on a mixture of personal preference, diving skills and knowledge of the species.

1.5. Local Scientists

Marcio Aronne is a reef biologist and Reef Check trainer who has been working with HCRF since 1998. Marcio has worked with community development programmes, fish, reef, fisheries and spawning aggregation monitoring programmes in close relation with international institutions such as The Nature Conservancy, the World Wildlife Fund, Inter American Foundation, Avina Foundation.

Velvet Teos is a B.A. in ecotourism and sustainable tourism, PADI dive instructor and Reef Check instructor. She has worked for NGOs in Guatemala, dive centres in the Honduras Archipelago and she has dived the entire Mesoamerican barrier reef.

1.6. Expedition Leader & Chief Scientist

Jon Shrives was born and educated on Jersey in the Channel Islands, where he developed a love of diving and marine biology from an early age. He graduated from Southampton University with a BSc in Biology, specializing in behavioural ecology, evolutionary ecology and marine tropical ecology. As part of his honours thesis research project, he travelled out to the remote Wakatobi islands of Sulawesi, Indonesia, and was bitten by the 'expedition bug' and diving science. Since then he has worked with several NGOs and ecotourism companies, teaching marine ecology and SCUBA diving. He has supervised several undergraduate research projects and led marine ecology programs in Indonesia, Honduras, Egypt and the UK. His experience varies from providing logistic management of a live-aboard research vessel, to completing baseline surveys for international organisations such as Reef Check and acting as head scientist to a team of five scientists and over a hundred volunteers in Honduras.

1.7. Expedition Team

The expedition team was recruited by Biosphere Expeditions and consisted of a mixture of all ages, nationalities and backgrounds. They were:

16 – 28 March 2008

Savanna Brom (USA), Yvonne Patterman (Germany), Steve Tredwell (UK).

Also: Biosphere Expeditions Director Kathy Wilden (UK).

30 March – 11 April 2008

Anna Hodson (UK), Sumie Kinura (Japan), Dominik Owassapian (Switzerland), Roland Petzel (Germany), Peter Scarlett (Canada), Thomas Schatzmann (Germany).

Also: journalist Curt Bowen (USA).

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of £1125 per person per two week slot. The contribution covered accommodation and meals, supervision and induction, special non-personal diving and other equipment and air, and all transport from and to the team assembly point. It did not cover excess luggage charges, travel insurance, personal expenses like telephone bills, souvenirs etc., as well as visa and other travel expenses to and from the assembly point (e.g. international flights). Details on how this contribution was spent are given below.

Income	£
Expedition contributions	12,256
Expenditure	
Accommodation and food includes all board & lodging	2,378
Transport includes fuel, boat maintenance, car transfers	1,039
Equipment and hardware includes research materials, research gear	249
Biosphere Expeditions staff includes salaries, travel and expenses to Cayos Cochinos	2,958
Local staff includes salaries, travel and expenses, Biosphere Expeditions tips, gifts	874
Administration includes registration fees, sundries, etc	74
Team recruitment Honduras as estimated % of PR costs for Biosphere Expeditions	3,380
Income – Expenditure	1,304
Total percentage spent directly on project	89%

1.9. Acknowledgements

This study was conducted by Biosphere Expeditions which runs wildlife conservation expeditions all over the globe. Without our expedition team members (who are listed above) who provided an expedition contribution and gave up their spare time to work as research assistants, none of this research would have been possible. The support team and staff (also mentioned above) were central to making it all work on the ground. Thank you to all of you, and the ones we have not managed to mention by name (you know who you are) for making it all come true. Biosphere Expeditions would also like to thank members of the Friends of Biosphere Expeditions and donors, Land Rover, Swarovski Optik, Cotswold Outdoor, Globetrotter Ausrüstung, Snowgum and Buff for their sponsorship.

1.10. Further Information & Enquiries

More background information on Biosphere Expeditions in general and on this expedition in particular including pictures, diary excerpts and a copy of this report can be found on the Biosphere Expeditions website www.biosphere-expeditions.org.

Enquires should be addressed to Biosphere Expeditions at the address given below.

2. Reef Check Survey

Jonathan Shrives, Oxford University and Marcio Aronne, HCRF and Velvet Teos, HCRF

2.1. Introduction

Study site

The Marine Natural Monument Archipelago Cayos Cochinos (MNMACC) is located at latitude 15° 57' N and longitude 86° 30' W in the Caribbean. The MNMACC belongs to the Honduran Bay Islands Department and covers an area of 485.337 square km, consisting of a core area (Fig 2.1a).and the five nautical mile buffer zone (Fig 2.1c).

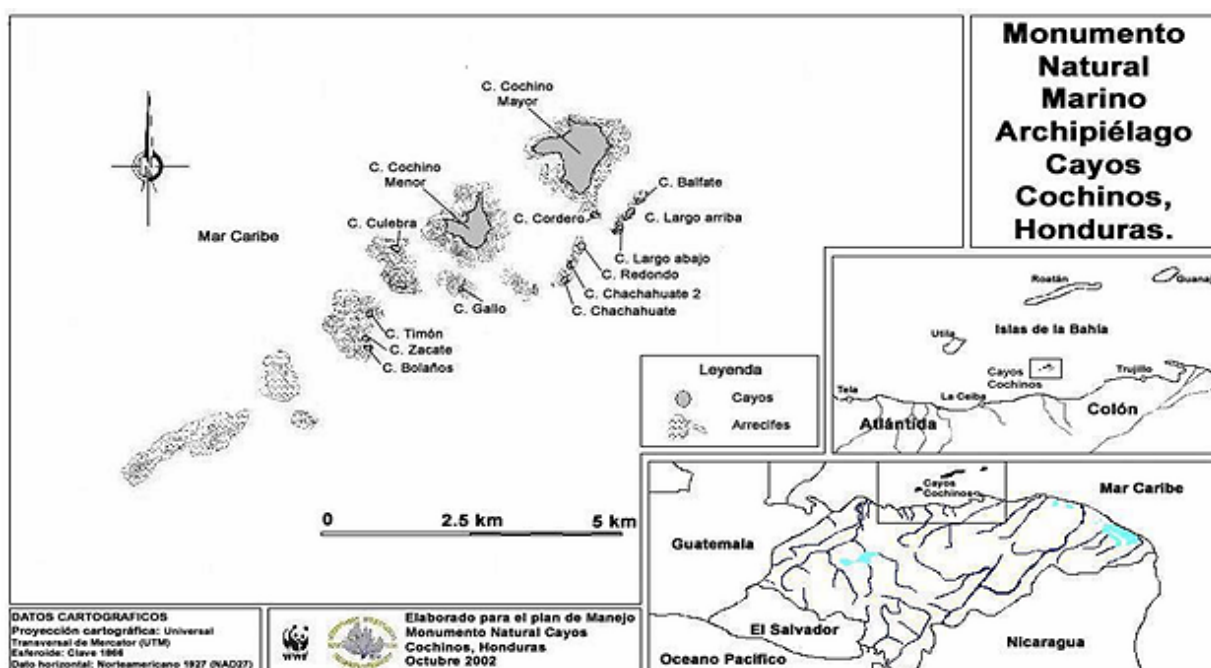


Figure 2.1a. Cayos Cochinos.

The main areas influencing Cayos Cochinos from east to west are the city of La Ceiba (39.35 km), Garifuna communities of Sambo Creek (25.83 km), Nueva Armenia (18.53 km), which belongs to the municipality of La Ceiba and Jutiapa in the Department of Atlántida; Garifuna communities of Balfate (23.27 km), and Río Esteban (23.27 km) part of the Department of Colón, and finally on the north side Roatan island (39.00 km) (Fig. 2.1c).

General characteristics

The MNMACC is characterised by a set of critical connected marine habitats with fish, crustaceans and other species. These habitats are coral reef, sea grass beds, octocoral formations, rock, sand, algae and mangroves. Among the biodiversity of the associated fauna are yellowtail snapper (*Ocyurus chrysurus*), lane snapper (*Lutjanus sinagris*), Caribbean spiny lobster (*Panulirus argus*), a highly important species for the economy of the area, and endangered species such as the Queen conch (*Strombus gigas*), hawksbill turtle (*Erethmochelys imbricata*); and other species of interest to the tourism industry such as the whale shark (*Rhincodon typus*) (Andraka et al. 2004).

The MNMACC is part of the Mesoamerican Barrier Reef System (MBRS), the world's second largest reef barrier (Fig. 2.1b), extending from the Bay Islands, Honduras to the north side of the Yucatán peninsula, México. Cayos Cochinos is within the sub-region of the north coast of Honduras, defined by two rivers: Ulúa and Patuca and includes the Bay Islands as well (Kramer & Kramer 2002).

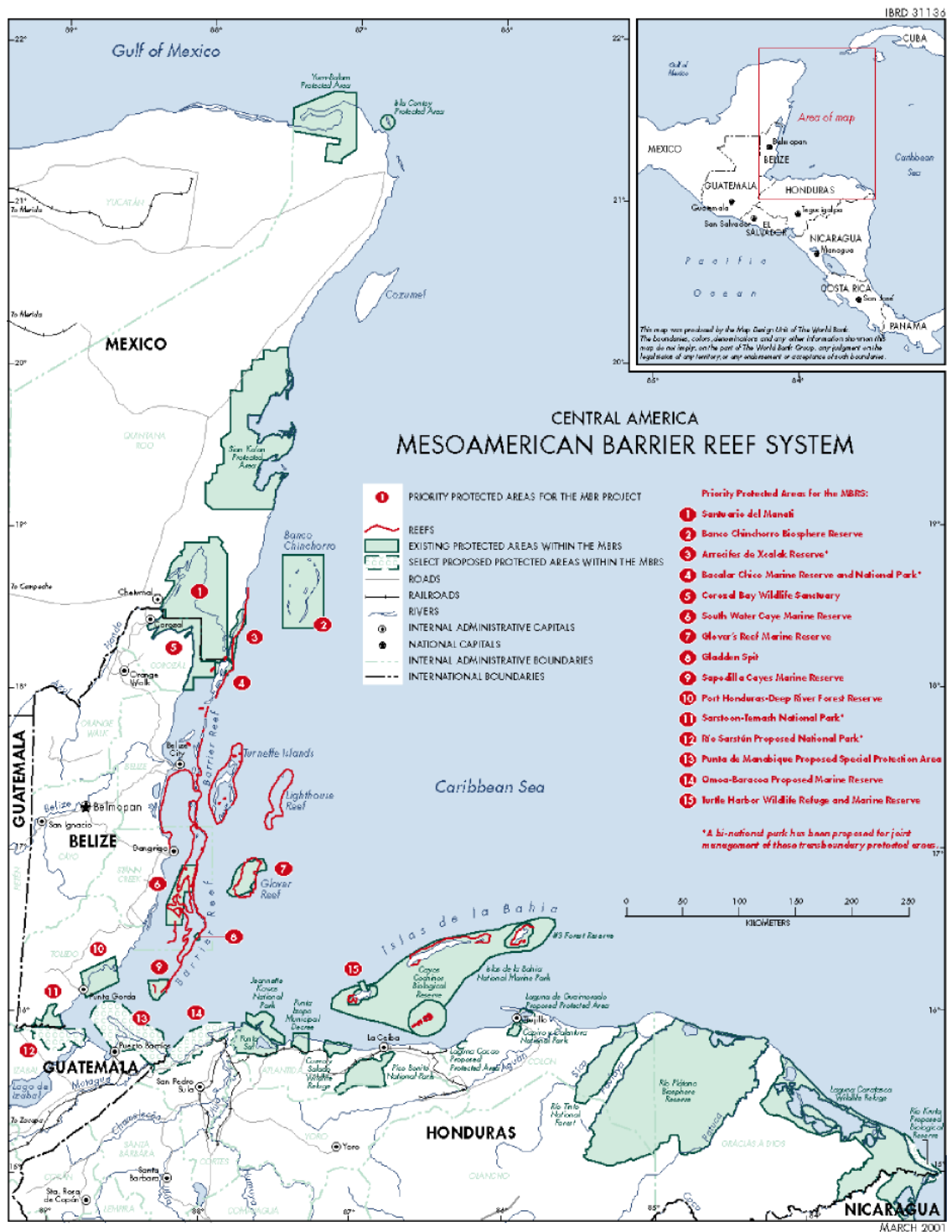


Figure 2.1b. The Mesoamerican Barrier Reef.

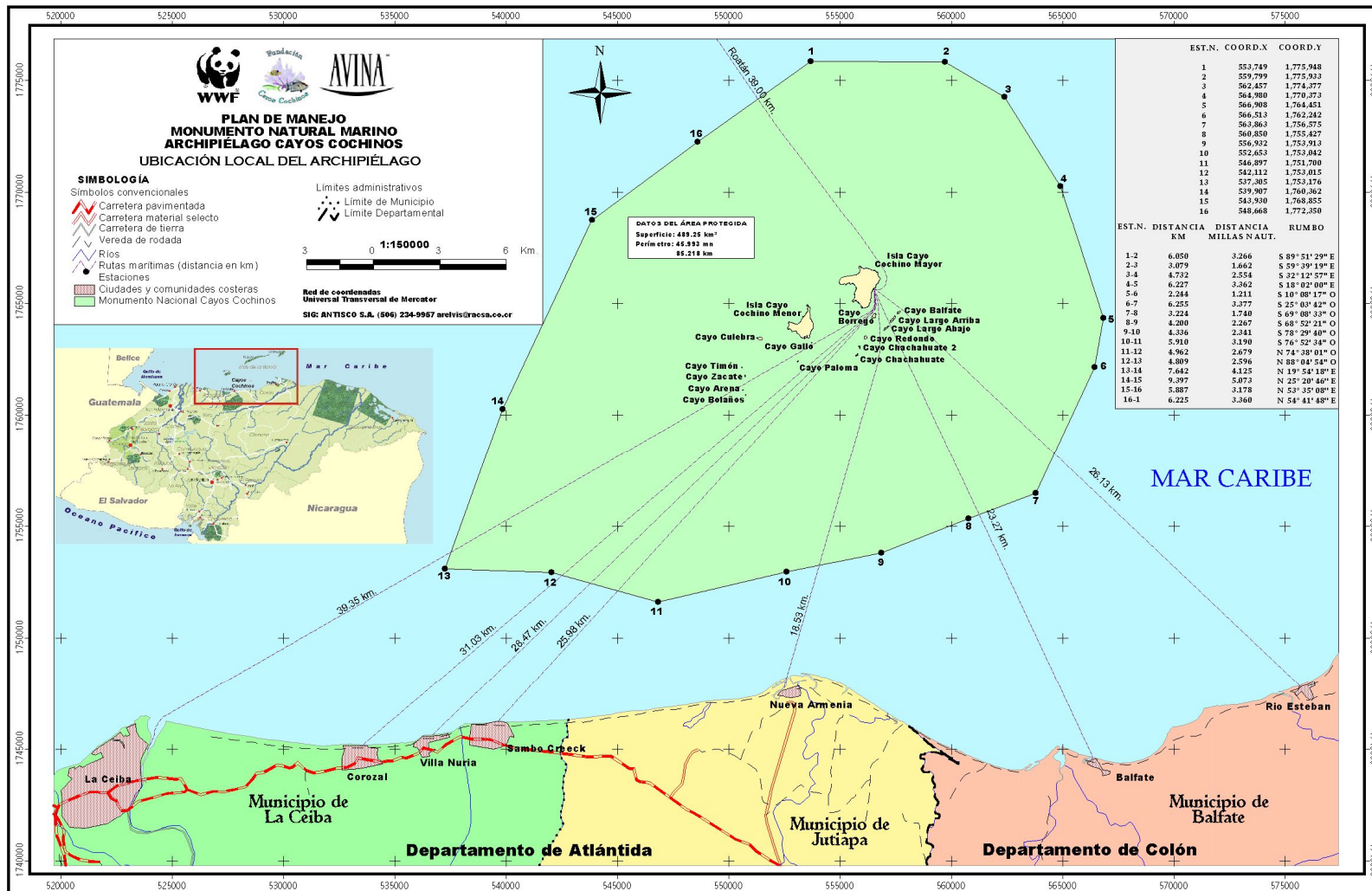


Figure 2.1c. Areas influencing Cayos Cochinos.

This eco-region is shared between four countries (Mexico, Belize, Guatemala and Honduras) that also share some of their watersheds. It provides a basis of living for several indigineous, Garifunas and Mestizo communities and is a critical natural resource of activities such fishing and tourism.

The MNMACC is part of an interconnected system of coastal habitats and sea currents that originate in the Caribbean and elsewhere. The MBRS is a coherent ecological unit that includes a set of characteristics unique in the Atlantic Ocean: atolls and a high diversity of commercial species (lobster, conch, shrimp and fish). The whale shark, manatees and sea turtles all have important habitats for their reproduction, nesting and foraging in the MBRS and the extensive sea grass beds and mangroves are important sites for the spawning aggregation of reef fish (Kramer & Kramer 2002).

Honduras Coral Reef Foundation

The Honduras Coral Reef Foundation (HCRF) was founded in 1993 and is the non-governmental organisation (NGO) officially responsible for the management and conservation of the MNMACC. The main tasks for HCRF are to enhance conservation and management activities; to enforce the natural resource use regulations; to increase scientific station development and to promote sustainable development options for local fishermen communities. To achieve all the objectives in a long term HCRF has been supported mainly by AVINA/MARVIVA, the World Wildlife Fund (WWF), The Nature Conservancy (TNC), Operation Wallacea and Biosphere Expeditions amongst other international institutions.

By the year 2004, HCRF along with WWF and the support of Cayos Cochinos' local communities published the first management plan for the area specifying regulations to help the conservation and protection of all natural resources. Also in the same year a sustainable development plan for tourism was created thus giving HCRF the tools to measure the carrying capacity and public use of the whole area.

Biosphere Expeditions has been invited to help with the implementation of this plan. As part of the management plan several zones with different use regulations were established. In order to find out if these zones and its regulations have been effective for the conservation of natural resources, a long term monitoring programme of the reef's conditions needs to be conducted. The Reef Check methodology provides an easy protocol for this purpose that is replicated all over the world and allows for the use of volunteer divers (Hodgson et al. 2006).

Reef Check

Reef Check is the name of both the most widely used coral reef monitoring protocol and an international coral reef conservation program. The Reef Check programme brings together community groups, government departments, academia and other partners to educate the public about the coral reef crisis, create a global network of volunteer teams which regularly monitor and report on reef health, scientifically investigate coral reef ecosystem processes, facilitate collaboration among academia, NGOs, governments and the private sector, and stimulate local community action to protect remaining pristine reefs and rehabilitate damaged reefs worldwide using ecologically sound and economically sustainable solutions (Hodgson 2000).

Reef Check was designed to assess the health of coral reefs and is quite different from other monitoring protocols. Since its inception Reef Check has focused on the abundance of particular coral reef organisms that best reflect the condition of the ecosystem and that are easily recognizable to the general public. Selection of these “indicator organisms” was based on their economic and ecological value, their sensitivity to human impacts and ease of identification. Sixteen global and eight regional indicator organisms serve as specific measures of human impacts on coral reefs. These indicators include a broad spectrum of fish, invertebrates and plants that indicate human activities such as fishing, collection or pollution. Some Reef Check categories are individual species, whilst others are families (Hodgson et al. 2006).

For instance, in the Caribbean the Nassau grouper (*Epinephelus striatus*) is the most desired fish in the live food fish trade, whereas the trumpet triton (*Charonia variegata*) is collected for the aquarium trade. Both species are very distinctive organisms and excellent indicators of human predation. On reefs where these organisms are heavily exploited, their numbers are expected to be low compared to their abundance on unexploited reefs.

Reef Check teams collect four types of data: (1) a description of each reef site based on over 30 measures of environmental and socio-economic conditions and ratings of human impacts, (2) a measure of the percentage of the seabed covered by different substrate types, including live and dead coral, along four 20 m sections of a 100 m shallow reef transect, (3) invertebrate counts over four 20 m x 5 m belts along the transect and (4) fish counts up to 5 m above the same belt (Hodgson et al. 2006).

Reef Check History (adapted from Hodgson et al. 2006)

Scientists have been monitoring coral reefs since the time of Darwin. The 1993 Colloquium on Global Aspects of Coral Reefs was a turning point for many reef scientists who met to discuss the health of the world's reefs. At the end of the meeting, it was clear that there was not enough information available to form a picture of the status of coral reefs on a global scale. A group of coral reef scientists felt that part of the problem lay with some of the standard monitoring methods scientists have used.

These detailed methods were designed to investigate community ecology and included measurements of many parameters that may not be affected when coral reef health is damaged. The scientists felt that more specific methods should be designed to investigate human impacts on coral reefs, because those are the impacts that are preventable.

It was recognized that another problem with the conventional approach to coral reef assessment and monitoring was that there are only a small number of reef scientists, most of whom are only able to carry out surveys periodically. Thus, the database of coral reef condition was incomplete and the data that existed were not easily comparable. The solution was to organize a global survey effort that would take place annually over a defined period using one standard method - a synoptic survey of the health of the world's reefs, with help from non-scientists. The Reef Check concept grew out of this initiative and was developed in early 1996. The methods were drafted and subsequently posted on the internet and peer-reviewed by many reef scientists. Reef Check was launched in 1997 and during that year conducted the first-ever global survey of coral reef health. The results provided scientific confirmation that coral reefs were facing a major crisis.

In the 1980s, many scientists thought that the major threats to coral reefs were primarily pollution and sedimentation. The Reef Check results demonstrated for the first time, that overfishing was a major threat to coral reefs on a global scale. Since then, hundreds of Reef Check teams have been monitoring reefs every year in more than 60 countries. The results of the first five years of monitoring were presented in a major report, "The Global Coral Reef Crisis – Trends and Solutions" at the World Summit on Sustainable Development in Johannesburg, South Africa in September 2002. The report documented the continuing global decline in reef health but also included coral reef conservation success stories from around the world. Monitoring was carried out on over 1500 reefs in the Atlantic, Indo-Pacific and Red Sea. Following quality assurance procedures, 1107 sites were accepted for analysis, amongst them the expedition study site.

2.2. Methods

Site selection & sampling design

Reef Check's regional coordinator advised us on the site selections as well as other aspects of setting up our Reef Check team. All teams had a team scientist and a team leader trained by a Reef Check trainer.

The Reef Check protocol is designed to be as simple as possible so that untrained volunteer divers can participate. Practical team sizes are two, three, or four pairs of divers. However, larger or smaller groups are possible. Divers should be sufficiently experienced (> 30 dives or equivalent experience) that they are able to perform simple activities underwater. It is the role of the team leader to decide if the team members are adequately qualified to undertake these activities.

Reef Check surveys can be carried out by snorkellers in shallow water (Hodgson et al. 2006). An ideal Reef Check team includes six members (three buddy pairs) plus support crew, each with different specialties and experience. In our case we selected a team of six members plus the team leader and the scientific leader of the expedition. Some adaptations to local conditions were made (i.e. substrate, underwater hand signals) for the team members.

Seven dive sites (Table & Figure 2.2a) within the different management zones inside the marine protected area were selected according to their level of use in relation to the regulations of the management plan. Selections were made so that over time the effectiveness of the recently established zoning and regulations can be monitored.

Table 2.2a. Dive sites and impact patterns.

Dive site name	Fishing allowed	Tourism impact (2006)	Tourism impact (2007)	Tourism impact (2008)	Remarks
Cayo Timón	No	Medium	High	Medium	Some beach and dive tourism
Dickie C	No	Medium	Medium	Medium	Some yacht/boat diving
El Avión	Yes	High	High	High	Local community tourism & fishing
La Arena	Yes	Medium	Medium	Medium	Some beach tourism
Pelican Point 0	Yes	Not surveyed	Not surveyed	Medium	Some yacht/boat & dive tourism
Pelican Point 2	No	Medium	Medium	Medium	Some yacht/boat & dive tourism
Pelican Point 4	No	Low	Low	Low	Some dive tourism
Jena's Cave	No	None	Not surveyed	Not surveyed	No buoy available
Jena's Cove	No	None	Not surveyed	Not surveyed	No buoy available
Pelican Point 1A	No	High	High	Not surveyed	Main mooring site for yachts & boats
Pelican Point 1B	No	Medium	Not surveyed	Not surveyed	No buoy available
Pelican Point 1C	No	Medium	Not surveyed	Not surveyed	No buoy available
Pelican Point 3	No	Medium	High	Not surveyed	Some yacht/boat tourism

All sites were recorded by Global Positioning System (GPS) coordinates for future comparative surveys. All positions were collected in degrees, minutes and seconds NAD27 Central, in accordance with Reef Check methodology.

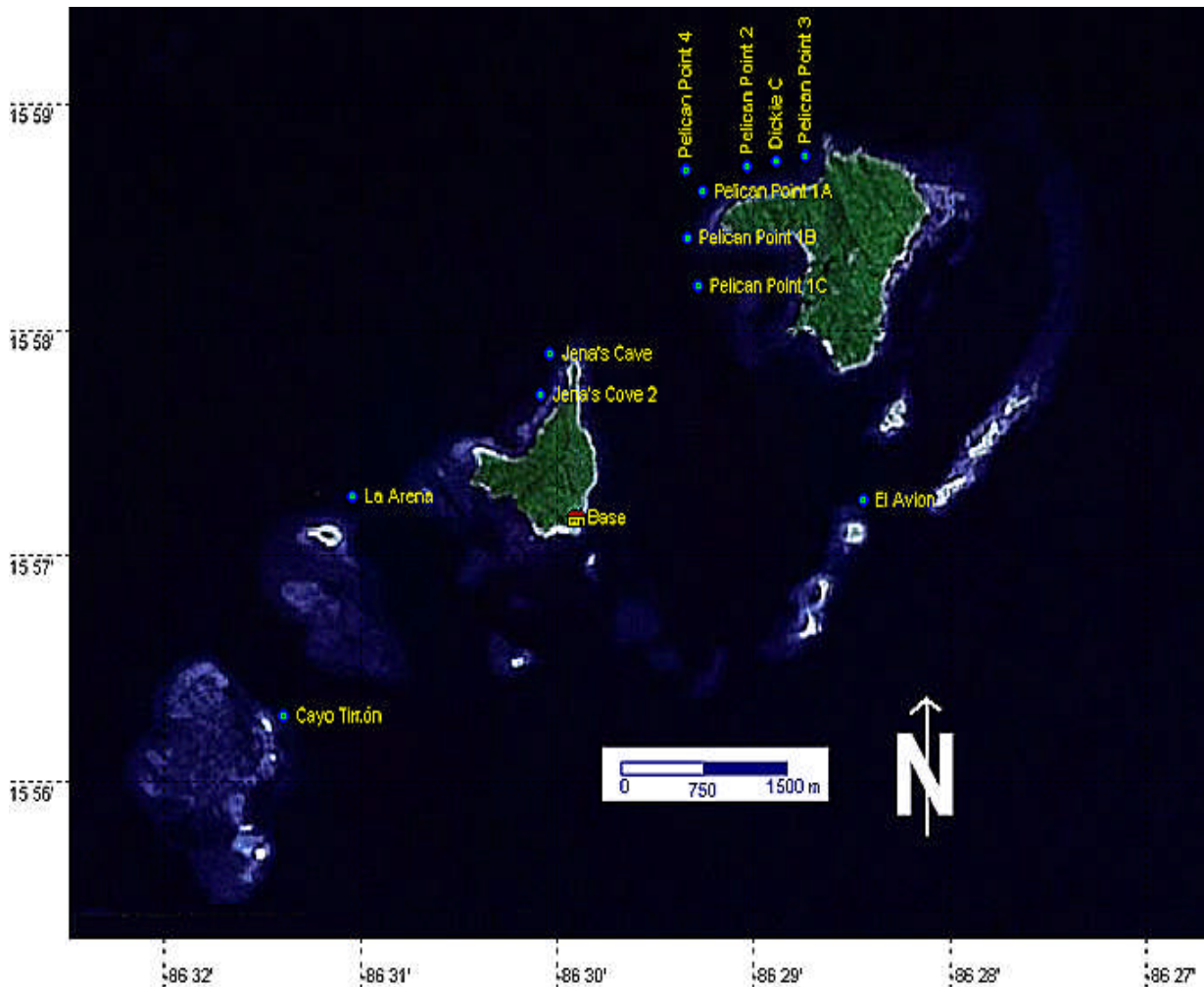


Figure 2.2a. Position of dive survey sites 2006 and 2007 in relation to base and longitudinal/latitudinal grid. Map of the study area. See also [Google Maps](#) for an internet-driven view of the study site.

Training of expedition team members

The first three days of each expedition slot were spent on land and in the water with training. Each group was prepared for its fieldwork, and received lectures on the research methods and goals over and above what is recommended by Reef Check. Open water dives were organized so that everyone could get comfortable in the water and put into action the fish, invertebrate and other ID skills taught before the actual survey work began. Talks were organized to make team members familiar with the research and the area and to tell teams about species assemblages and their function in the ecosystem. Once the survey work started, the tasks of the expedition team as a whole were dive-based and consisted of several distinct underwater activities. Diving ability was assessed and team members were allocated to suitable tasks. Training in organism, substrate and disease identification skills was given using Reef Check teaching materials and special slide shows and discussion forums (Cubas et al. 2006).

Survey procedures & data collection

Data collection was based on methods described in Hodgson et al. (2006) with some minor adaptations to local conditions, such as designing a new set of hand signals to simplify underwater communication between team members (see appendix 1). Data were recorded using underwater slates and then transferred at the end of the day onto one of the computers provided by HCRF onto standard Reef Check Excel datasheets. These Excel sheets were then submitted to Reef Check.

2.3. Results

2.3.1. Fish

In total the expedition counted 1004 indicator fish across all 7 sites and all transects. The sampling strategy for 2008 focused more on within-site repeats, whilst continuing to visit 'core' sites similar to those of 2006 and 2007. As such, each slot's team completed eight 20 m transects at each of the 7 sites, giving a grand total of 16 transects per site. Most of the sites visited in 2007 were kept, with one more site, Pelican Point 0, added.

Pelican Point 0 is a reef wall on the north-western tip of Cayo Grande (the largest island). It is the western-most tip of the same reef system as Pelican 2, Dickie C and Pelican 4. This position and unique topography makes it an important site for monitoring, not just for the large fish population, but also because it is one of the main sites in the no fishing zone, and is one of the most popular sites for tourist divers coming on day excursions from Utila, Roatan and the mainland coast.

The survey sites of 2008 and 2007 were also part of the same set that made up the broader 12 site reconnaissance survey of 2006. Re-visiting sites over time is beginning to provide stakeholders with a unique and in-depth data set for continued monitoring of both fish populations and reef health.

Table 2.3.1a shows the change in relative percentage of each indicator species of fish over the last three surveys. Note that two important groups of predators, the groupers and moray eels have dropped substantially in number over time, regardless of number of sites surveyed or number of fish counted. It is possible that the decrease in grouper numbers is due to a continued pressure from overfishing or illegal fishing activities, one of the chief threats in the region. However, moray eels are not a commercial fish species in this region, and their decline may be indicative of loss of prey items that are commercially fished in the region, or, more worryingly, due to habitat loss.

Table 2.3.1a. Indicator fish species as a percentage (%) of total indicator fish counted in surveys over the last two expeditions, and the 2008 expedition.

Indicator	2006	2007	2008
Grouper	1.77	4.51	1.00
Butterflyfish	13.57	22.54	19.52
Haemulidae	24.19	18.38	18.82
Snapper	16.52	16.88	19.32
Parrotfish	43.36	37.23	41.24
Moray eel	0.59	0.46	0.10
Total number of fish counted	339	865	1004
Number of sites surveyed	12	6	7

Snapper, also a popular commercial fish, have not (yet?) declined in number. However, a quick comparison with Figure 2.3.1a. shows that the inclusion of Pelican Point 0 this year, may be artificially overrepresenting snapper for all of Cayos Cochinos. Snapper are almost twice as abundant at this site than anywhere else. It may also be that although a commercial fish, open to exploitation, snapper are more fecund and replace their numbers quicker than groupers or moray eels. Indeed this is often why the yellowtail snapper, in particular, is referred to as the ‘currency of Cayos Cochinos’. It is readily abundant at most sites around the Marine Protected Area.

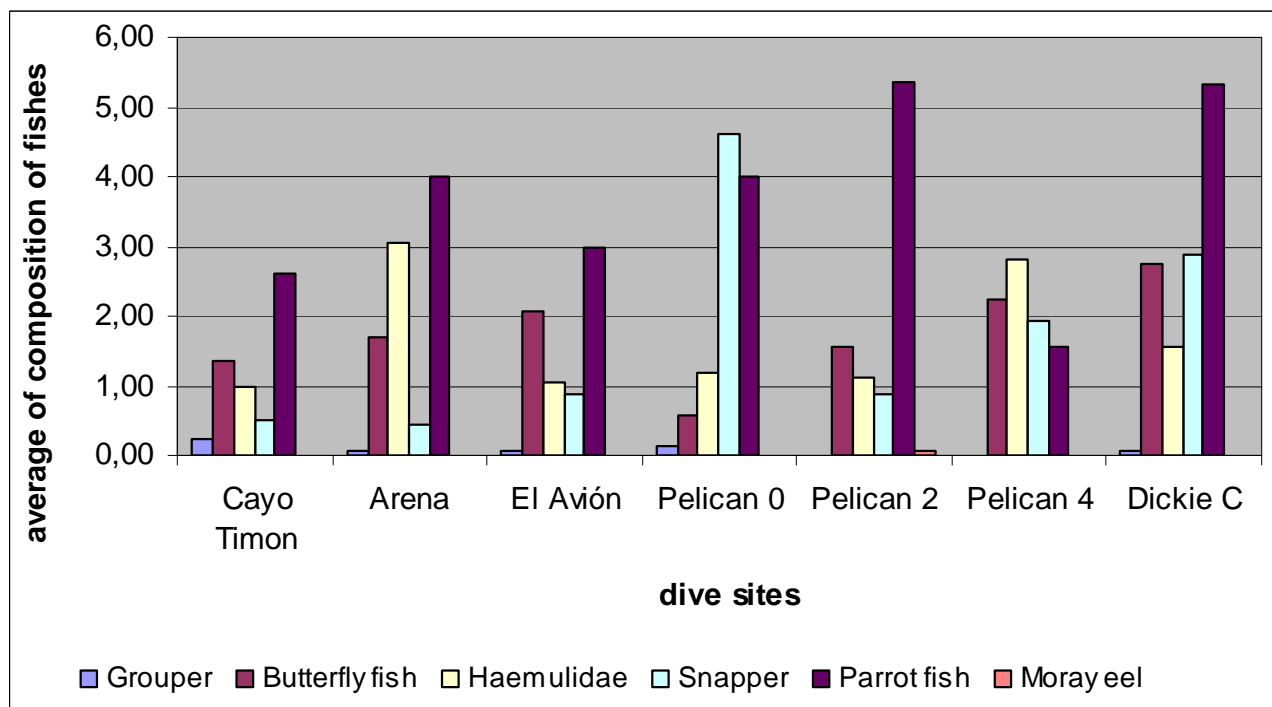


Figure 2.3.1a. Average (mean) number of fish for each 20 meter transect for all dive sites and depths, 2008.

The high abundance of parrotfish is an encouraging sign that traditional commercial fisheries at Cayos Cochinos are not as depleted for this relatively large fish under threat, as elsewhere in the Caribbean. Butterflyfish are an indicator of hard coral cover and species richness – a key component of healthy reefs. They are found at similar abundances through out Cayos Cochinos, except at Pelican Point 0. This may be due to the wall topography of this site, compared to the slopes of the other sites. A wall topography steeply descends in depth, leaving less of the shallow coral species that butterflyfish prefer.

The high number of Haemulidea (grunts and margates) found at Arena may be indicative of the large amount of macroalgae found at this relatively impacted site. Yet at Pelican 4, their relatively high abundance could be due to a increased variety in substratum and diversity of soft corals and sponges (Fig. 2.3.2a).

2.3.2. Invertebrates

Table 2.3.2a provides a summary of mean average numbers of indicator invertebrate species found at each site. Note that the mean is calculated by dividing the total observed number by the number of transects conducted at each site. Surprisingly the highest abundance of flamingo tongues were not found at the site with the most gorgonians – their prime habitat. It may be that the high number of gorgonians at Pelican 4, are not all sea fans, which are the preferred habitat of flamingo tongues (Fig. 2.3.2a).

Table 2.3.2a. Average number of invertebrates for each 20 metre transect for all dive sites and depths in 2008.

Indicator	Cayo Timon	Arena	El Avi3n	Pelican Point 0	Pelican 2	Pelican 4	Dickie C
Flamingo tongue	1.25	0.62	0.69	0.87	1.00	1.12	0.00
Tripneustes	0.12	0.06	0.00	0.00	0.00	0.00	0.00
Trumpet triton	0.00	0.00	0.12	0.00	0.00	0.00	0.00
Banded coral shrimp	0.69	0.00	0.12	0.00	0.06	0.00	0.06
Pencil urchin	0.00	0.12	0.25	2.06	1.50	1.62	0.19
Lobster	0.06	0.31	0.00	0.00	0.25	0.25	0.19
Gorgonacea	283.75	278.12	227.19	261.94	470.62	747.50	331.25
Diadema	5.25	4.94	56.44	1.25	2.81	0.50	1.81

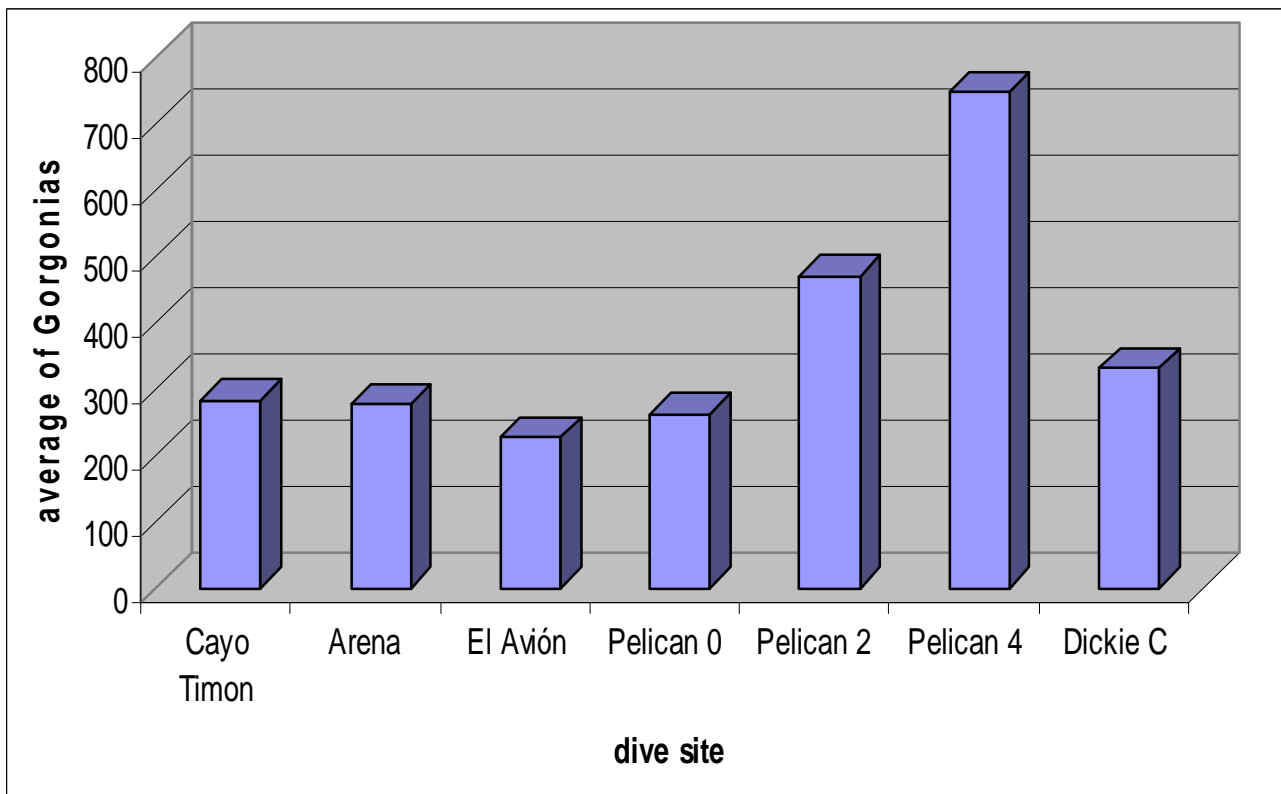


Figure 2.3.2a. Average (mean) number of *Gorgonaceae* for 20 metre transects at all sites and all depths in 2008.

Both *Tripneustes* spp. and trumpet triton conch types were found at worryingly low levels across Cayso Cochinos. There is an ongoing demand for conch as both curios for tourists and for dishes of “cerviche” or conch soup. This is driving a Caribbean-wide crash in conch numbers, particularly in Honduras where they may go locally extinct in the next 20 years. Banded coral shrimp were found at low numbers, as expected. They are both rare and difficult to find, often sheltering in cracks and crevices. There is currently no known aquarium trade in Cayos Cochinos for this species.

Similarly there is no known trade in pencil urchins or deliberate extraction of them for creating jewellery and their distribution as shown here is typically controlled by variation in habitat between the sites. However, there is a developing tourist industry in Cayos Cochinos, particularly day visitors from the mainland and other bay islands. The increased demand in shell jewellery, make pencil urchins and flamingo tongues important species to monitor in the future, in case extraction becomes an issue.

Similarly lobsters are an important commercial shellfish, whose numbers may be threatened by an increase in tourism. There is already high demand for lobster from the mainland and other bay islands. Lobsters were found at low levels, particularly at sites close to centres of population and fishing.

Diadema are an ecologically important indicator species. They are one of the chief grazers of algae on a reef and prevent corals from being overgrown or supplanted by the quick growing seaweeds and algae. The 1980s saw a steep regional decline in Diadema, most likely from a pollution accelerated disease epizootic. Thus the monitoring of the recovery of Diadema is important in preventing coral reefs becoming algal reefs. In Cayos Cochinos, most sites are still suffering from low numbers, except El Avion – a site heavily impacted by Hurricane Mitch in 1998, resulting in fields of algae and rubble. These form an ideal mixture of habitat and food for Diadema, and it is hoped that their large numbers at this site will eventually clear the way for new coral growth and recovery of the reef (Fig. 2.3.2b).

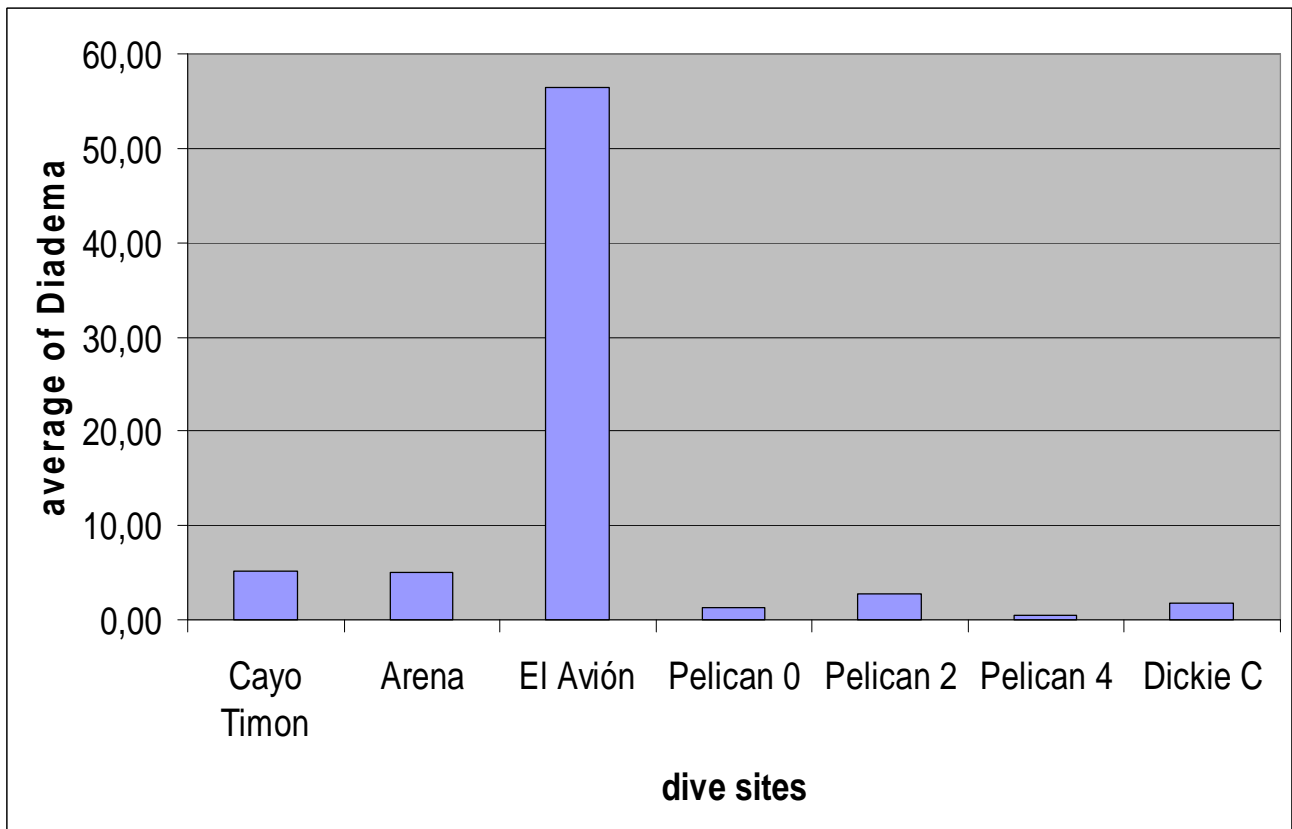


Figure 2.3.2b. Average (mean) number of *Diadema* spp. urchins for all dive sites and all depths in 2008.

2.3.3. Substrate & Coral Damage

At first glance it would appear there has been a decrease in nutrient indicator algae (NIA) since 2007 and an alarming amount of rock (RC) found at each site (Fig. 2.3.3a). However, this is mainly the result of a re-categorization of NIA by Reef Check between the years. A certain amount of algae on reefs is a natural process and unless it is over 3cm in length, it is now no longer NIA, but classed as RC or other (OT) depending on the species. Hard coral (HC) and soft coral (SC) are still decreasing in cover from previous years. This is unfortunately part of a Caribbean-wide trend, and if this continues, detailed monitoring of reefs is more important than ever to record, map and try to better understand this decline.

A more encouraging trend is the reduction in recently killed coral (RKC), also know as bleaching. In 2007 some sites had as much as 5% of their cover logged as RKC. In 2008 the highest amount seen was 1%.

Percentage Cover of Substratum Categories at 2008 Survey Sites

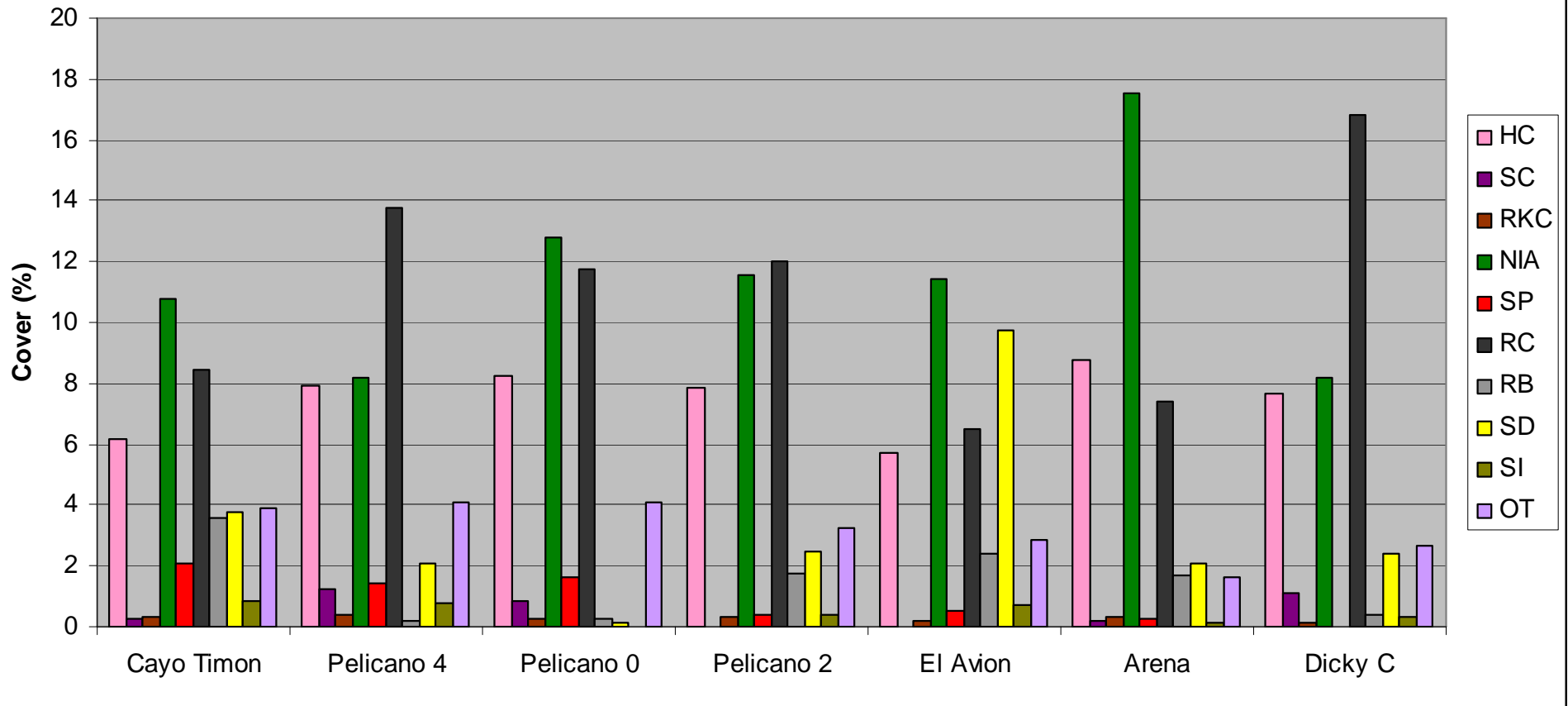


Figure 2.3.3a. Average (mean) percentage cover of substratum categories for all dive sites and all depths in 2008.

Reef Check substratum codes are HC = hard coral, SC = soft coral, NIA = nutrient indicator algae, SP = sponge, OT = other, RKC = recently killed coral, RC = rock, RB = rubble, SD = sand, SI = silt.

Although the amount of bleaching has decreased, those colonies that are bleached tend to have a higher proportion of that colony bleached, as reflected in figure 2.3.3b. In 2007 the maximum percentage of a colony bleached was 10%, at Arena. In 2007, few of the colonies undergoing bleaching reached more than 5% of the colony bleached. In 2008 four sites had colonies that bleached at over 12% of their total area.

This suggests that whilst bleaching was more widespread in 2007, it affected individual corals to a lesser extent. Corals can bleach for many reasons, and the 2008 data suggest more localised stresses than in 2007. One possible reason is a localised stress such as increased run-off of sediment and soils from island developments or building projects. Indeed, the sites in figure 2.3.3b with the highest figures are all closer to islands and developments than Pelican Point 0, Pelican Point 2 or Pelican Point 4.

Encouragingly coral disease is lower than previous years, again suggesting that the higher incidence of disease and bleaching in 2007 may have been a more widespread temperature-related, albeit brief impact.

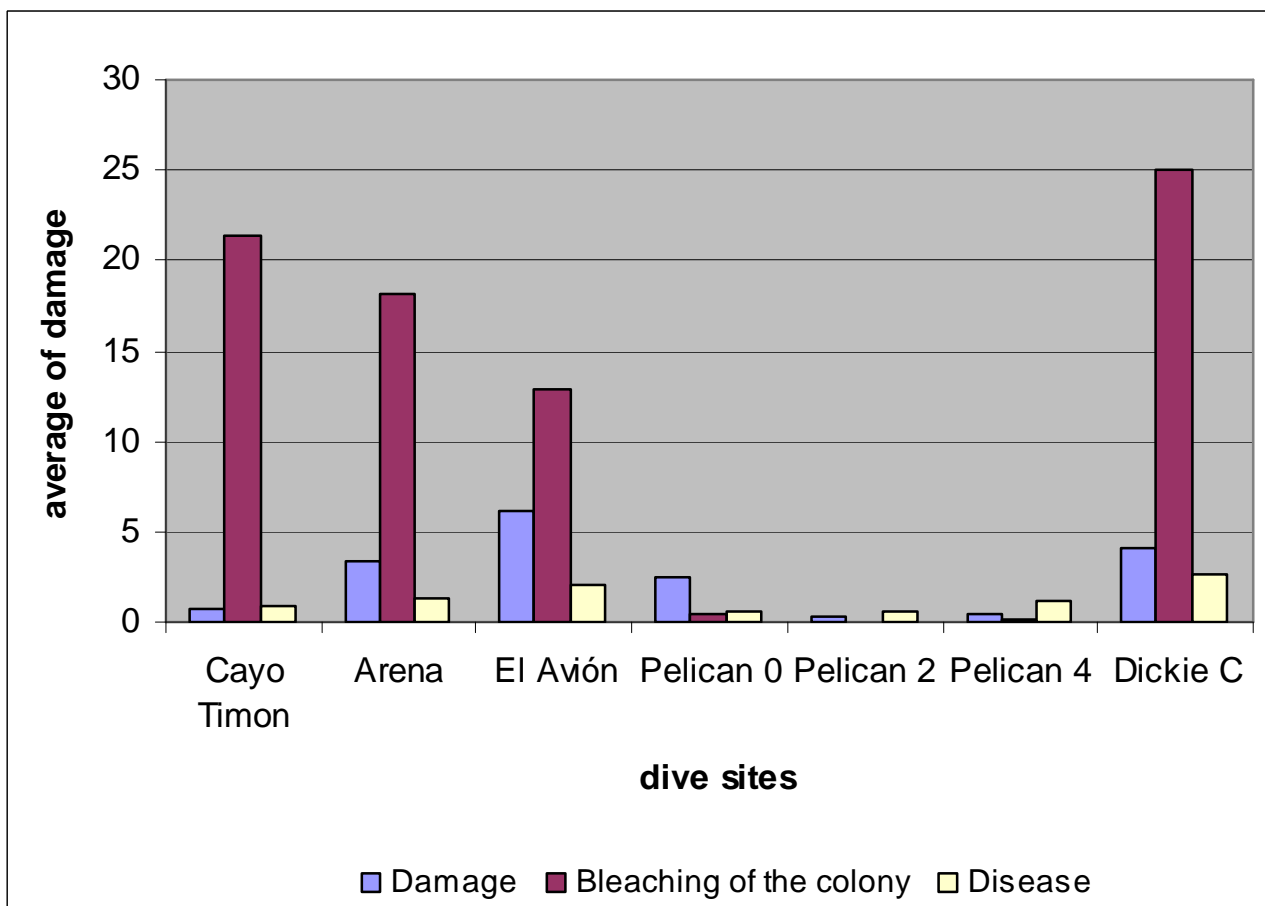


Figure 2.3.3b. Average (mean) coral damage at each dive site for all depths in 2008.

2.3.4. Reef Check Results & Data Submission

All survey data obtained served as a standard Reef Check survey. All data collected during the surveys were also submitted to Reef Check following their standard data submission protocol (Hodgson et al. 2004). These data will be analyzed by Reef Check and used to scientifically monitor, restore and maintain coral reef health. Please refer to www.reefcheck.org for further details.

2.4. Conclusions

Whilst it is encouraging to see some fish populations stable, including the important snapper fisheries, there are some concerns about low populations of other key predators. Groupers are a prized fish by fishermen and divers alike, and their low numbers suggest there is still some overharvesting occurring in Cayos Cochinos, regardless of the no fishing zones. Groupers tend to be large fish in low numbers, with the larger individuals being responsible for the majority of reproduction in a population. It could be that illegal night-time fishing is picking out these important larger fish, and thus having a negative effect on the whole population. Of even more concern are the low numbers of moray eels recorded. These are not a commercially fished species, but are an apex predator that reflects the overall health of an ecosystem. Their steady decline since the first surveys of 2006 makes them a priority species to record for future surveys.

There are similar concerns over the two chief invertebrate fisheries in Cayos Cochinos. Both conch and lobsters are still being found in only low numbers at all sites, particularly at sites near populations. The loss of these two flagship species from a marine protected area is of great concern, and they may become locally extinct if greater conservation measures and a more sophisticated fishery management is not developed. It is, however, encouraging that other commercial curio species such as flamingo tongues and pencil urchins do not currently seem to be negatively impacted, regardless of the relatively recent increase in tourism. Also the increased numbers of algal grazing urchins such as *Diadema* are an encouraging finding. One such case is the high abundance of *Diadema* at the impacted site El Avion, where they may be the harbingers of reef recovery.

Both hard and soft corals are still undergoing a decline in percentage cover on the reefs of Cayos Cochinos. This makes continued monitoring of these sites a greater priority than ever before. However, on a positive note, regional coral damage and bleaching appears to have decreased, with fewer and more localised cases of bleaching. These localised cases are more severe, and suggest a more specific source of coral stress such as increased terrestrial run-off and sedimentation.

2.5. Recommendations

The purpose of this expedition was to establish a baseline to monitor the influence of the zoning and regulations implemented recently on the status of the resources within the Cayos Cochinos Natural Marine Monument. In light of this the following recommendations are made:

- Avoid fishing activity in reproduction periods. New regulations within the management plan should aim to re-establish the optimal conditions for the reef. Within this plan it should be noted that no fishing zones alone will not work, unless alternative subsistence fishing sites for the local communities are found.
- Establish a programme for the monitoring of important and exploited shellfish fisheries, such as the conch and the lobster fishery. This programme should include educational activities with the local people.
- Maintain the status of no fishing zones at the sites where they are already implemented. The expedition observed subsistence fishing in some of the no fishing zones. We therefore recommend that HCRF should regularly patrol these and other important areas within the limits of the marine protected area.
- Start a campaign to reduce the input of nutrients coming from the mainland and local island developments in order to decrease the dominance of nutrient indicator algae and sediment impacts on corals. Establish a long-term sedimentation study, with regularly checked sediment traps at a wide range of sites around Cayos Cochinos
- Continue the monitoring programme to obtain medium- and long-term information on the effect of the zoning and regulations contained in the Cayos Cochinos management plan.
- Biosphere Expeditions teams to continue to work with local people in increase their understanding and integration
- Establish a long-term carrying capacity study for tourism and other related activities, which is re-assessed at least once a year.
- Monitor the impact of TV crew activity and establish a formal impact monitoring protocol so that decision-makers can balance the need for funding and conservation based on reliable evidence and with conservation as the ultimate goal of HCRF.

2.6. References

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Appendix 1: Hand signals designed by the expedition team to simplify underwater communication.



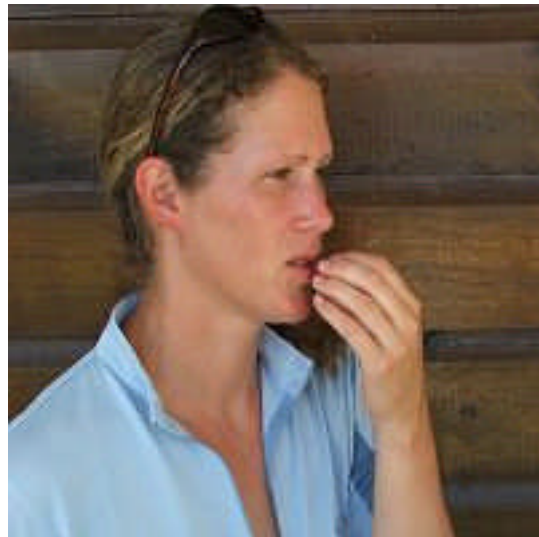
HARD CORAL – HC
Closed fist up and down



SOFT CORAL – SC
Open fist up and down



RECENTLY KILLED CORAL – RKC



NUTRIENT INDICATOR ALGAE – NIA



SPONGE – SP



ROCK – RC
Closed fist (NOT up and down)



RUBBLE – RB
Circular motion with downpointed finger



SAND – SD
Wiggling fingers downwards
(because sand sinks)



SILT/CLAY – SI
Wiggling fingers upward
(because silt stays suspended)



OTHER – OT
Shrugging action with one hand

Appendix 2: Expedition leaders' diary by Jon Shrives

6 March

Hello everyone and welcome to the Honduras 2008 diary. I'm Jon, your expedition leader, and you will be hearing from me regularly over the next few weeks. Kathy and I are just getting ready here in England, ready for the off in a couple of days. All if things go to plan of course!

Anyway, I look forward to meeting you in La Ceiba soon. My Honduras mobile number (FOR EMERGENCY USE ONLY OR IF YOU ARE ABOUT TO BE LATE FOR ASSEMBLY) is +504 9842810 and I'll see you at the Banana Republic.

If you are still trying to swot up for the expedition, remember to read the published reports from previous expeditions available via www.biosphere-expeditions.org/reports.

So long

Jon Shrives
Expedition leader

12 March

Just thought I'd send out a quick update now we've arrived on the island. We arrived in Cayos Cochinos very early on Monday morning, after a long journey from Heathrow to Miami, Miami to San Pedro Sula in Honduras, and then a night time dash in a pick-up truck down to the coastal port of La Ceiba. You will all be glad to hear that all the travelling is well worth it. As I sit here now writing this e-mail the brilliant morning sun is trickling through the gently swaying leaves of the palm trees on this idyllic Island. The science station you will be calling home for twelve days is situated on a lovely sweeping sandy bay, dotted by coconut palms and lapped by a beautiful turquoise Caribbean. Equally the sky is now a clear pale blue, marked only by a few misty clouds clinging to the mountainous coastline of mainland Honduras. A stark difference to the rainy, cold England I left behind only a few days ago!

I hope all your last minute preparations are going ok – some of you may want to bring out a couple of dive torches (one main, plus one back up) in case you fancy a night dive. There is a good possibility that if enough people are interested, we may be able to cram in a night dive on the local reefs – certainly a site to behold. Also make sure you bring long sleeve shirts, trousers and insect repellent – we had a bit of rain here a few days ago and the sand flies can be quite aggressive!

Also on the Island is Kathy, who works for Biosphere too, and together with Velvet, (the expedition's dive instructor) we've been finalising the dive sites and survey schedule for the next few weeks. On Friday, Kathy and I will travel back over to La Ceiba to finalise some paperwork and do a bit of shopping. For the Slot One team, Kathy and I will be hanging around the Banana Republic Guesthouse at 7-7:15pm on Saturday night, looking for company to join us for dinner! Otherwise the official meeting / start of the expedition is at 6:40 am on the Sunday morning. Apologies for the early start – but I promise it's the earliest one you have to deal with for the whole expedition! The reason for such an early start is the need to get on the boat nice and early, so as to have a nice smooth crossing over to the island.

Otherwise we're all looking forward to meeting you and getting on with doing some great diving and surveys! Hope the packing goes well, and stay tuned for another update on Friday! Buena suerte!

15 March

Just a little update from Kathy and myself. We are now over in La Ceiba and having finished our last bits of paperwork and shopping, we are looking forward to rendezvousing with the Slot One team. Last night Kathy and I checked out the 'Expatriate's Bar', where we will be having dinner tonight. It's a great place with a great atmosphere and a good selection of food - most of which is home grown by the owners or their friends. However we have been warned by one of the owners that the price of salad may go up soon. Apparently their main supplier was keeping a female jaguar on the farm in a converted macaw aviary! Of course the weight of an amorous male jaguar looking for a date, is a bit more than your average macaw, and so a breakout was facilitated! As you can imagine, the farmer and his staff are now a bit nervous to venture out into the fields now that they have two jaguars wondering around. Biosphere have several jaguar projects in other countries (www.biosphere-expeditions.org), but unfortunately Honduras isn't one of them! So for the meantime we'll keep the focus on reef conservation and assessment!

17 March

Hello again everyone! You'll be glad to hear that all the slot one team made it safely to the rendezvous on Sunday morning, regardless of jaguar breakouts! We had a good trip over to the island. The morning mist was just clinging to the mountains on the coast, otherwise it was a clear day with a smooth sea. Once we arrived, the team settled in and proceeded upstairs to the restaurant for a welcome brief, introduction and safety talk.

The team then regrouped in the dry lab for an introductory lecture on coral reef ecology, followed by lunch. The afternoon we went over the Reef Check methodology, which involved watching the Reef Check instructional video featuring the now legendary Craig from Reef Check – "Outstanding!", who is a firm favourite amongst Biosphere Expedition teams. The video was followed by the traditional beach practice transect, involving a special guest appearance by a duck tape denizen of the deep! Dive gear was then issued as required, and after a long day, the team relaxed on the veranda of the hut, sipping a nice cold (and well earned!) beer.

The next day we awoke to a very exciting boa spotting. The Cayos Cochinos are home to the endemic pink boa constrictor, a rare variation of the mainland boas, which are normally a greeny-grey to brownish colour. This snake can only be found on these two islands, and nowhere else in the world! Often scientists spend days in the local forest, hoping to find one. We found two sitting in the tree next to the hut, just on the way up to breakfast! We were then treated to a presentation about the history of the region by Adoni Cubas, the Director of Conservation for the foundation that manages the marine park. We also had a presentation from Tony Ives, founder and Director of the Development Support Group (GAD – Grupo Apoyo y Desarrollo) – a relatively new NGO, that has set up in the region to help local communities with sustainable development projects and education scholarships. Their website is <http://cayoscholarships.org/> for those interested in more information. It was really exciting and encouraging to hear the progress that is being made in the region. The rest of the morning was spent in identification lectures, as the team honed their skills in anticipation of practice surveys tomorrow.

We did, however, take a break from lectures in the afternoon, with an opportunity to get wet! The team visited Pelican Point 3 – a gentle, shallow dive site with some nice patch reefs and bombies. The site was ideal for a check dive and the reefscape was perfect for practicing identification following this morning's lectures.

23 March

Hello everyone! Sorry for the delay in the latest diary, but we've suffered a patch of bad weather and limited connectivity to the web. After initial Reef Check training for two days, the team started their first day of data collection. The previous day we all had a practice dive on the warm, shallow reef flat of Pelican Point Buoy 4, and so everyone was now settled into their specific roles. Steve and I started first, laying the 100 m transect tape, then returning to the start, to count indicator species of reef fish. We were then followed by Yvonne and Lydia collecting invertebrate data and our Gorgonian 'counter-in-chief'; Kathy. Last, but by no means least; we have Savanna and Velvet assessing the substratum that comprises the reef itself. The team has been collecting data like a well oiled machine, but sadly dives have been interrupted for the last couple of days, by a series of unusual cold fronts causing bad weather. However bad weather and cancelled dives have not interrupted the slot one team's adventures!

The station now has its own herpetologist, Lesley, who is out here studying the local black-chested ctenosaur (looks like an iguana, but I'm told by Lesley it's definitely not an iguana!). Lesley employed the services of our team, thinking up elaborate ways to catch the surprisingly agile reptiles! Unfortunately one of the larger ctenosaurs managed to give Lesley a nasty bite on her thumb, and the team had to suspend catching activities to do a bit of first aid. A couple of stitches and a thumb splint later, Lesley and Kathy were gallantly leading the team over the top of the island to explore the remote and untouched beach on the other side. The trek took the best part of the afternoon, with the team finding all sorts of interesting creatures in the rock pools of the other beach. Now the weather has cleared up, and we have sprung back into action with some back to back diving, increasing the sample rate to three dives a day, making up for lost time! Today we lost Kathy and Lydia from the team. Kathy is returning back to the Biosphere office in the sunny UK and will be sorely missed by everyone. Lydia who was visiting Velvet, had been drafted (press-ganged!) into working with us, and has been a key ally. Although we've been spoilt by having two extra pairs of hands on the dives, we are still raring to go, and our spirits have been lifted today, by the kind donation of chocolate Easter bunnies, flown in all the way from Austria by Yvonne! So Buena viaje Kathy and Lydia and Happy Easter to everyone too!

26 March

Well we've been dogged by bad weather again! But it hasn't deterred the Slot 1 team one bit! Although we lost a day of diving yesterday, the team has made up for it with some extra dives today. Even with all this work going on, we've still had the chance to see some great reef life whilst diving. On the day that Kathy and Lydia left, we performed two survey dives (no time off, when making up the dives missed due to bad weather!). On the first dive, we had enough spare time to explore 'El Avi6n' the namesake of this site. Lying just off the reef is a small twin engine Cessna plane wreck, which crashed at the site in the mid 1990s.

Many a story abounds about the wreck's origins and reasons for crashing. Tales vary from drug trafficking, to aerial surveys for the United States Geological Survey, to rumours of CIA involvement! All depending on which divemaster you ask, of course! If exploring the now coral encrusted wreck wasn't exciting enough for one dive. We were then greeted by a wonderful formation of eight Caribbean reef squid, performing a fine multi-coloured underwater ballet for us. Being somewhat of self-confessed cephalopod geek, I couldn't believe my luck; I've only seen reef squid twice before in 500 dives within the marine park. Far rarer than turtles – which we see all the time (unless you're Kathy, in which case they tend to hide from you. Sorry Kathy!).

As if that wasn't enough for the team and I, we were treated to something really unusual on our second dive of the day, at the dive site 'Arena'. There at the end of our fish transect, Steve and I stumbled upon a real oddity and photographic opportunity; an octopus, out in the open (they're normally tucked away in a crevice during the day), bold as blue, eating a queen conch! The canny creature had turned the gigantic snail on its back, and was merrily chomping away at the soft underside.

When disturbed, the octopus dragged the conch back to the lair, using it as composite shield and living larder! Our series of underwater adventures was ultimately topped off last night, when on a night dive in the local bay, Steve and Savanna's torches attracted in a school of eagle rays, who gently glided in to inspect these strange bubbly creatures. All Savanna and Steve could do was gaze back in awe, as the rays cruised into within a meter of the divers, chomping away at small fish and jellies on the way!

27 March

Hello again everyone. I just wanted to send out a quick note to let the incoming Slot Two Team know that I will be in La Ceiba again this Saturday and hanging around Banana Republic Guesthouse at 7:15 pm local time, if anyone fancies meeting up for a pre-expedition dinner. Otherwise the Expedition will officially start at 6:30 am on the Sunday morning at the Banana Republic, where we will all meet up with the Honduran Coral Reef Foundation's truck to load up our luggage for our trip to the dock and then onwards to Cayos Cochinos! Again if anyone needs to contact me in an emergency (i.e. problems meeting up or you will be late for assembly on the Sunday morning), then my cell number is: (+504) 99842810. Otherwise I look forward to meeting the Slot Two team this weekend! I hope you all have a good flight over and please feel free to bring dive torches for a night dive. Buen Viaje!

30 March 2008

¡Hola! You'll be glad to know the Slot 2 team have successfully made it out to the island. We had a smooth crossing, where, despite having done the La Ceiba to Cayos route countless times over the last few years, the only person who got wet was yours truly!

After a day of briefings and introductions to the Reef Check method for surveying coral reef health, the team are now settling in to their new Caribbean home. We've had great weather the last few days, which has been a welcomed return to the norm after the Slot 1 team's unlucky rainy patch. Tomorrow the team continues training with a three hour session on identification followed by a check dive in the afternoon. Team 'Buffs' and T-Shirts have been issued and already people are keen to get out diving and collecting data. This enthusiasm combined with the good weather forecast (keep your fingers crossed!) bodes well for the next 12 days of the expedition, and there is a lively atmosphere of anticipation and excitement on the island.

I'm now off to watch the Biosphere Expeditions versus Honduran all-stars, volleyball match, which has just started. Although the Honduran staff have the home field advantage, we have a secret weapon; Lesley the herpetologist has played professionally and at international level, so we might be in with a chance! Stay tuned for more news from the field within the next few days. ¡Hasta luego!

6 April

The Team has seen and done a lot since my last entry!

We returned to Cayo Timon (site of the hawksbill turtle and self-publicising stingray) to conduct another survey dive, this time at a slightly deeper depth. Halfway through the transect, Roland and Anna spotted a huge adult hawksbill sitting on the crest, contently watching us swim up and down laying transect tapes. In contrast to the previous turtle, this adult had obviously seen it all before and wasn't fazed by divers snapping away with their cameras. As if that close encounter wasn't exciting enough, the second dive of the day was even more exhilarating. After laying down the transect tape at the dive site 'Peli 2', Dominik and Tom spotted something distinctly not reef shaped, sticking out of the rocks. Suddenly I heard them signalling me, both clanging on their tanks. I turned around to see what all the commotion was about. In a blur of bubbles, they were both making a hand signal that all divers hope to see. A hand signal that is sadly all too infrequent these days; one I had longed for since 2004. There was no mistaking their gestures, as they frantically hit top-centre of their heads in a vertical palm salute.

The mock dorsal fin signal could mean only one thing: shark! Sure enough, in a small sandy hole on the reef below, a nurse shark had curled up for a daytime nap. Fast asleep, the shark did not care a bit as we all crowded in to take pictures. You could practically hear it snoring underwater! We were ecstatic! Shark numbers are seriously threatened globally and they are in danger of extinction, mainly due to the shark finning trade. For example; we have seen three turtles here in the last week. In 500 dives within Cayos Cochinos over the last six years, I have only ever seen two other nurse sharks! It was a real treat!

The next day was reasonably uneventful in comparison. Plenty of data collected though, and with the good weather we've had, we are actually ahead of schedule! Time enough for a night dive! The team visited the dive site 'Arena'; so called for its round stadium-like shape. With the torches briefly switched off, the team experienced the bioluminescence, their movements exciting the glowing plankton in the water. Sleeping parrotfish and huge wandering lobsters also impressed the team. One of the most beautiful sites was the elegant and delicate basket stars, roaming slowly over the reef, wafting their giant fern-like arms in an attempt to catch a night time snack.

Today the team is off for a well deserved break. This afternoon we'll visit the local Garifuna communities in Cayo Chachahuate and the east end of Cayo Major (the big island opposite the island we are based on.) to see how the local fishermen live and view successful community development projects, such as extensions to the local school and construction of the new ecotourism lodges.

It's back to work tomorrow. We only have three more days for the last few data collection dives, before we pack up for our departure. We wouldn't mind seeing another shark before then though!

10 April

Well, sadly this is my last diary entry from Cayos Cochinos, as the expedition comes to an end. Today has mostly been spent packing as we have a very early departure tomorrow morning! Yesterday was our last day of diving, and due to the team's eagerness, we were ahead of schedule with data collection. This meant we had all day free to do some fun dives and explore some other dive sites around the region. First thing in the morning we ventured out to 'Peli 1'. Part of the 'Peli' series of sites (you might recall diary entries about Peli 4 and Peli 0), this site boasts a breath-taking sheer wall, that drops down to 30 meters. The team just roamed around the top 18 meters though, admiring the myriad of fish life swarming around the delicate branching corals of the reef crest. This was followed by a dive off Cayo Largo Arriba, a relatively un-explored site in the east of the marine park. Here the team discovered a huge underwater bank, covered in corals and algae – completely unexpected! Even though the team saw yet another turtle (they're a lucky lot the slot two team!), the highlight was a very up-close and personal encounter with an eagle ray. Completely unafraid, this magnificent spotted giant, cruised within feet of the team, circled around us for a good look and then majestically glided off into the deep! What a way to end the expedition! In the evening we celebrated with a tense, yet hilarious game of volleyball, where Dominik proved once and for all, the Swiss are very good at bobsleigh and skiing, but not so great at beach volleyball! He did make up for it in buckets of enthusiasm though. At the post-volleyball party, we celebrated our successful data collection with a little treat – I'd squirreled away some chilled white wine, some red wine and a jar of olives! Needless to say, all was gobbled up by the team pretty quickly!

Well with packing almost done, its time to pop over to the hotel on the larger island for some R&R followed by a surprise cake I've order for the team's last dinner this evening!

Thank you again everyone for all your help, enthusiasm, humour and hard work. It's been a great month and you can all be proud of what we have achieved here. Perhaps see you again some day, if not same place next year?

Hasta luego

Jon