



Member's report on activities related to ICRI

Reporting period October 2013 - September 2014

1. Updates on your activities.

Project 1

Cornerstone(s) implemented through the project	Check all that apply: <input type="checkbox"/> Integrated Management <input type="checkbox"/> Capacity Building <input checked="" type="checkbox"/> Science & Monitoring <input type="checkbox"/> Periodic Assessment (Review)
Project Title	Panama Coral Reef Monitoring Network
Location	Bocas del Toro Province, Caribbean Sea
Dates	September 2013 and 2014
Main Organizer(s)	Smithsonian Tropical Research Institute
Main Stakeholder(s)	Smithsonian Tropical Research Institute
Description of Project (Please elaborate on how the project implements the FFA cornerstones)	Coral reef monitoring on permanent transects started in 1985 in Bahia Las Minas and the Portobelo-Isla Grande region in support of a project to monitor an oil spill. By 2008 with support from The Nature Conservancy the PCRMN's reached 33 monitoring sites nationwide to better capture changes that might be a result of new or intensified threats to the reefs at the local level and provide information for improved management. Presently, this program only has 11 reefs sites at the Bocas del Toro province. In this area the monitoring was started in 1999 when it was a lightly populated and nearly pristine archipelago on the western end of the Caribbean coast that has a wide variety of coral habitats. It is currently being developed as a tourist area.
Outcome (Expected outcome)	It intends to build on previous experience to achieve appropriate spatial scale to provide reliable and comprehensive data to detect short-term to long-term changes in reef community structure associated with natural and anthropogenic disturbances, at local and regional levels with the aim of providing information for improved resource management in key marine coastal areas.
Lessons learned	Monitoring has provided the background for long-term changes affecting reef structure. Particularly for this area of Panama, most changes are local and not regional, and generally associated to coastal development. Due the lack of budget the monitoring network was reduced by two-thirds.
Related websites (English preferred)	http://www.stri.si.edu/sites/esp/mesp/reef_monitoring_intro.htm

Project 2

Cornerstone(s) implemented through the project	Check all that apply: <input type="checkbox"/> Integrated Management <input checked="" type="checkbox"/> Capacity Building <input checked="" type="checkbox"/> Science & Monitoring <input type="checkbox"/> Periodic Assessment (Review)
Project Title	Status and monitoring of reef communities and key species to the fishery in the Coiba National Park and the Special Zone of Marine Integrated Coastal Management Las Perlas Archipelago (2013-2014).
Location	Coiba National Park and the Special Zone of Marine Integrated Coastal Management Las Perlas Archipelago
Dates	March 2014 and August 2014(dry and rainy season)
Main Organizer(s)	Conservation International (CI)
Main Stakeholder(s)	Faculty of Marine Science of the Panama International Maritime University (UMIP) and the Autonomous University of South Baja California (UABACS)
Description of Project (Please elaborate on how the project implements the FFA cornerstones)	<p>Two field trips, the first rainy season 2013 and the second in the 2014 dry season, to the Coiba National Park and the Pearl Islands Archipelago Special Management Zone will take place. The standard methodology used to assess coral reef ecosystems of the Marine Conservation Corridor of the Eastern Tropical Pacific prepared by Graham Edgar "Procedures for Monitoring Survey Standardized Reef Ecosystems" which quantifies the coverage and diversity of the substrate, and the diversity and abundance of mobile macro-invertebrates, cryptic fish and reef fish (Edgar et al 2004, 2001.). To study the reef complexity the roughness of the substrate, a variable closely related to the diversity, abundance and health of organisms in the reefs, will be measured.</p> <p>Additionally, the value of the monthly average sea surface temperature (SST) in the period February 2000 to January 2014 will be obtained from 1° x 1 ° latitude and longitude quadrants of both areas. Using the Web application "Giovanni" developed by NOAA (Acker and Leptoukh 2007 to obtain the linear slope for each quadrant of the TSM, and will be determined the historical trend of the temperature rise. Later he will make a projection to the year 2100, to detect the temperature trend during this century. Complementing these data, the coral bleaching threshold of each of the quadrants will be obtained and thus detect the possible effects that may occur on reef communities in the Panamanian Pacific, caused by climate change.</p> <p>In order to generate more information, GPS position of each of the sites to be assessed is taken, for the generation of geo-referenced maps of the results obtained, as well as temperature projections.</p> <p>Additionally Panamanian government employees and UMIP students will receive training in order to gain experience in such projects and provide technical support to UABACS specialists.</p>
Outcome (including expected outcome)	During this first evaluation (2014) of reef communities censuses were conducted in 31 sites, 16 are at Coiba National Park and 15 at Las Perlas Archipelago. Between the two areas of study a total of 42 macro-invertebrate species were found. So far, the richness of invertebrates is homogeneous in both areas. A total of 114 fish species were found, Coiba National Park presents significantly more species (99) compared to the Pearl Islands (86), and is consistently more diverse in terms of fish structure assemblies. Coiba National Park presented a 21.5% coral cover and the Pearl Islands had 22%, with most cases for both corals of

	<p>the genus Pocillopora.</p> <p>Within the Coiba National Park the sites that have higher coral cover are: Punta Sur, Santa Cruz Islet, Granito de Oro, Dos Tetas and Uva Island. Las Perlas Archipelago sites with the highest coverage were Mogo Mogo, Punta Galera, Saboga, Contadora and San Bartolome.</p> <p>Additionally, three Panamanian young scientists have been trained during the reef monitoring in both areas. Two of them are Panamanian Aquatic Resources Authority’s employees and one is a student of the Maritime International University of Panama.</p> <p>Expected outcomes:</p> <p>Determine the current status of coral reef communities and key species for the fishery in the Coiba National Park and Las Perlas Archipelago Special Management Zone, and compare it to other locations in the Eastern Tropical Pacific (Colombia, Costa Rica and Ecuador) to propose measures for Monitoring, Management and Conservation of Marine and Coastal resources.</p> <p>To know the current state of reef communities and key species for fisheries in pursuit of regional patterns of biodiversity and generate suggestions to support the management and conservation programs for the PN ZEM Coiba and Las Perlas.</p> <p>Update and improve the existing protocol (2010) for monitoring reef areas and key species of Coiba National park and Las Perlas Archipelago Special Management Zone to be adopted by the authorities as a management tool to strengthen conservation processes in both areas.</p>
Lessons learned	<p>Panamanian authorities should incorporate the results of such studies in the management of marine ecosystems and resources are related. Increase the capacity of the authorities for monitoring and evaluation of these ecosystems and species. And it is necessary to increase investment by the state to support marine monitoring programs.</p>
Related websites (English preferred)	

Project 3

Cornerstone(s) implemented through the project	<p>Check all that apply:</p> <p><input checked="" type="checkbox"/> Integrated Management <input checked="" type="checkbox"/> Capacity Building</p> <p><input type="checkbox"/> Science & Monitoring <input type="checkbox"/> Periodic Assessment (Review)</p>
Project Title	Regional strategy for the control of invasive lion fish in the Wider Caribbean
Location	Caribbean coast of Panama
Dates	2015
Main Organizer(s)	International Coral Reef Initiative (ICRI)
Main Stakeholder(s)	Panamanian Aquatic Resources Authority, Government of Costa Rica, Colombia and Nicaragua
Description of Project (Please elaborate on how the project	The Regional Strategy for the control of invasive lionfish in the Wider Caribbean of Panama, Colombia, Costa Rica and Nicaragua, is under development at this moment. The main aim is raising awareness

implements the FFA cornerstones)	<p>among the general population about problematic of the lion fish invasion, through workshops and talks targeting coastal communities, schools and universities. The consumption of the lionfish will be encouraged, through the organization of fishing tournaments, where at the end of it different dishes will be prepared in order to promote the lionfish meat as an alternative to other fish species traditionally consumed.</p> <p>Once the development of this regional strategy is completed, the government of Panama will proceed to elaborate the management plan to control this invasive species in the Caribbean coast of Panama, with the appropriate legal basis.</p>
Outcome (Expected outcome)	<p>Regional strategy for the control of invasive lion fish in the Wider Caribbean</p> <p>Panama's lionfish invasion control Management Plan</p>
Lessons learned	The elaboration of this project is still ongoing
Related websites (English preferred)	

Project 4

Cornerstone(s) implemented through the project	<p>Check all that apply:</p> <p><input checked="" type="checkbox"/> Integrated Management <input checked="" type="checkbox"/> Capacity Building</p> <p><input checked="" type="checkbox"/> Science & Monitoring <input type="checkbox"/> Periodic Assessment (Review)</p>
Project Title	The lionfish invasion: Management strategies for the Southern Caribbean Sea
Location	Bocas del Toro Province, Caribbean Sea
Dates	September 2013 and 2014
Main Organizer(s)	NGO Tropical Conservation Consortium
Main Stakeholder(s)	Tropical Conservation Consortium, Yarisonori Restaurant
Description of Project (Please elaborate on how the project implements the FFA cornerstones)	<p>During the months of November-December 2013 and then Jun-May 2014, throughout the Bocas del Toro Archipelago was explored to assess lionfish abundance and its currently invasion status. Those sites included fringing coral reefs, patch reefs, mangrove islands, rocky reefs, seagrass beds in and out the Bastimentos Marine Park. With support from The Rufford Foundation, Percy Sladen Memorial Fund and Idea Wild, we reached 60 assessment sites to better capture environmental factors that might be predictors of lionfish occurrence and provide information for improved management.</p>
Outcome (Expected outcome)	<p>It intends to build on previous experience in the Northern Caribbean to provide reliable and comprehensive data and detect short-term to long-term changes in reef community structure associated with lionfish invasion. Also we were able to conduct in May 2014 interviews with local restaurants in order to assess their willingness to include lionfish on their menu. Outreach campaign with restaurant clients in Boca del Drago is planned for September 2014.</p>
Lessons learned	<p>Assessment has provided the background for long- term changes in local lionfish population. Particularly for this area of Panama, derbies conducted periodically and fisheries by Ngobe indigenous people have contributed to maintain populations down. Most important, due the</p>

	lack of budget, monitoring is being focused on two sites, one known to be selected by fishermen and the other a non-fishing area. Presently, a lionfish population study is being planned for the next two years in order to improve invasion management strategies in most sensitive areas.
Related websites (English preferred)	http://www.tropicalcc.org

2. Contribution to the ICRI Plan of Action and GM.

a. Engaging other sectors

[Insert text here]

b. Reef zoning for multiple use

Location where a zoning plan has been implemented	Coiba National Park
Year when the zoning plan was implemented	2009 (Managing Plan)
Is the zoning plan accepted by the local community?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Did the zoning plan cause conflicts among stakeholders?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Did the zoning plan resolve conflicts among stakeholders?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Has there been effective enforcement for stakeholders to follow the zoning plan?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Overall, how would you rate the success of the zoning plan?	<input type="checkbox"/> Very successful <input checked="" type="checkbox"/> Somewhat successful <input type="checkbox"/> Not so successful <input type="checkbox"/> Unsuccessful

Coiba National park does not have communities living in it; most of the stakeholders of this protected area are from the Area of Influence. A Socioeconomic and Environmental diagnosis of 10 communities at the Area of Influence of Coiba National Park, prepared by the Alliance for Conservation and Development - ACD in coordination with the Smithsonian Tropical Research Institute and funded by Conservation International (2010), showed that a 95.4 % of people want to save coral reefs and mangroves for future generations and 89% consider them important for fishing and diving and 78% consider that the development should be restricted in some coastal areas. Most families (75%) have no information of Coiba National Park and its management, as well as social and economic benefits that can be obtained from managing it. 46% of residents believe the creation of the Coiba National Park has had impacts on the communities, 35% believe that this has been negative and 19% believe that the impact has been positive. The restriction to fishing (84%) appears to be the main cause of this negative perception. Tourism seems to have improved with the creation of Coiba PN (79%). 72% of people that are dedicated to fishing, consider that their income has decreased since the creation of the Coiba National Park and 70% of people consider fishing has worsened over the previous year. The lack of knowledge of the regulations of management (91%) can lead to taking action against the Coiba National Park as a protest if they feel adversely affected. Most families perceive conflicts and illegal practices occur rarely and they are being drastically sanctioned (57%). 74% of residents indicated that report to the authorities the illegal practices within the Coiba National Park. Despite the misinformation of the population there is willingness to participate in learning and take part in meetings concerning the park, which would allow people to identify themselves with it and to be partners in the management thereof, as well as access to higher benefits derived from their use and improve their quality of life.

A report made for CI (Guzmán, 2010) indicates that the short-term population response was relatively clear across the different studied organisms and trophic levels. The harvest refuge explanation in Coiba National Park is supported by the largest increases in biomass, were observed, in commercial rather than non-commercial fish species and the slight increase in fish biomass in unprotected areas possibly suggests spillover from protected sites. Ecosystems around CNP were most likely in poor condition at the time protection was established. In particular, reef corals have experienced serious changes and stress over recent decades (Guzman et al., 2004; Guzman and Breedy, 2008). Yet despite ongoing damage and stress that has presumably affected ecosystem function, species interactions, and ecosystem resilience, overall live coral cover remains relatively high at present; mean of 64% and 28% for coral communities and coral reefs, respectively, an estimate based on a survey of 24 sites rather than the nine protected sites analyzed here (Guzman et al., 2004). Guzman (2010) concluded that recovery is underway for populations of the most highly exploited species; however, this recovery is likely hindered by highly depressed state of some stocks, and the current fishing allowances and low-to-moderate level of enforcement.

3. Publications.

Title (incl. author and date)	Website URL if available	Type of publication (Paper, report, etc.)
Sal-Moyano, Maria; Lagos-Tobias, Ana; Felder, Darryl L.; Mantelatto, Fernando L.. 2014. Relative growth and reproductive parameters in a population of <i>Microphrys bicornutus</i> (Brachyura, Majoidea) from Bocas del Toro, Caribbean Sea, Panama. <i>Revista De Biología Marina Y Oceanografía</i> , 49(1): 81-90.		Paper
Aronson, Richard B.; Hilbun, Nancy L.; Bianchi, Thomas S.; Filley, Timothy R.; McKee, Brent A.. 2014. Land use, water quality, and the history of coral assemblages at Bocas del Toro, Panamá. <i>Marine Ecology Progress Series</i> , 504: 159-170.	http://dx.doi.org/10.3354/meps10765	Paper
Gomez, Catalina G.; Guzman, Hector M.; Gonzalez, Andrew; Breedy, Odalisca. 2014. Survival, growth, and recruitment of octocoral species (Coelenterata: Octocorallia) in Coiba National Park, Pacific Panama. <i>Bulletin of Marine Science</i> , 90(2): 623-650.	http://dx.doi.org/10.5343/bms.2012.1092	Paper
Seemann, Janina; Gonzalez, Cindy T.; Carballo-Bolaños, Rodrigo; Berry, Kathryn; Heiss, Georg A.; Struck, Ulrich; Leinfelder, Reinhold R.. 2014. Assessing the ecological effects of human impacts on coral reefs in Bocas del Toro, Panama. <i>Environmental Monitoring and Assessment</i> , 186(3): 1747-1763.	http://dx.doi.org/10.1007/s10661-013-3490-y	Paper
Baeza, Juan Antonio; Fuentes, M. S.. 2013. Phylogeography of the shrimp <i>Palaemon floridanus</i> (Crustacea: Caridea: Palaemonidae): a partial test of meta-population genetic structure in the wider Caribbean. <i>Marine Ecology</i> , 34(4): 381-393.	http://dx.doi.org/10.1111/maec.12038	Paper
Bonnert, Nadia Y. K.; Rocha, Rosana M.; Carman, Mary R.. 2013. Ascidiidae Herdman, 1882 (Tunicata: Ascidiacea) on the Pacific coast of Panama. <i>Zootaxa</i> , 3691(3): 351-364.	http://dx.doi.org/10.11646/zootaxa.3691.3.4	Paper

Okamura, Beth; O'Dea, Aaron; Taylor, Paul; Taylor, Anna. 2013. Evidence of El Niño/la Niña–southern Oscillation Variability in the Neogene-Pleistocene of Panama Revealed by a New Bryozoan Assemblage-Based Proxy. <i>Bulletin of Marine Science</i> , 89(4): 857-876.	http://dx.doi.org/10.5343/bms.2012.1041	Paper
Cramer, Katie L.. 2013. History of human occupation and environmental change in western and central Caribbean Panama. <i>Bulletin of Marine Science</i> , 89(4): 955-982.		Paper
Meylan, Anne B.; Meylan, Peter A.; Ordoñez Espinosa, Cristina. 2013. Sea Turtles of Bocas del Toro Province and the Comarca Ngöbe-Buglé, Republic of Panama. <i>Chelonian Conservation and Biology</i> , 12(1): 17-33.	http://dx.doi.org/10.2744/CCB-0948.1	Paper
Coppard, Simon E.; Alvarado, Juan José. 2013. Echinoderm Diversity in Panama: 144 Years of Research Across the Isthmus. In: Alvarado, Juan J. and Solís-Marín, Francisco Alonso, <i>Echinoderm Research and Diversity in Latin America</i> . Springer Berlin Heidelberg, pp.107-144.		Paper
López-Calderón, Jorge M.; Guzmán, Héctor M.; Jácome, Gabriel E.; Barnes, Penélope A. G.. 2013. Decadal increase in seagrass biomass and temperature at the CARICOMP site in Bocas del Toro, Panama. <i>Revista De Biología Tropical</i> , 61(4): 1815-1826.		Paper
O'Dea, Aaron; Collins, Laurel S.. 2013. Environmental, ecological, and evolutionary change in seas across the Isthmus of Panama. <i>Bulletin of Marine Science</i> , 89(4): 769-778.		Paper
Key Jr., Marcus M.; Hollenbeck, Paige M.; O'Dea, Aaron; Patterson, William P.. 2013. Stable isotope profiling in modern marine bryozoan colonies across the Isthmus of Panama. <i>Bulletin of Marine Science</i> , 89(4): 837-856.		Paper
Schloder, Carmen; O'Dea, Aaron; Guzman, Hector M.. 2013. Benthic community recovery from small-scale damage on marginal Caribbean reefs: an example from Panama. <i>Bulletin of Marine Science</i> , 89(4): 1003-1014.		Paper
Neal, B. P.; Condit, C.; Liu, G.; dos Santos, Sergio; Kahru, M.; Mitchell, B. G.; Kline, D. I.. 2013. When depth is no refuge: cumulative thermal stress increases with depth in Bocas del Toro, Panama. <i>Coral Reefs</i> , 33(1): 193-205.	http://dx.doi.org/DOI10.1007/s00338-013-1081-6	Paper
Wake, Thomas A.; Doughty, Douglas R.; Kay, Michael. 2013. Archaeological investigations provide Late Holocene baseline ecological data for Bocas del Toro, Panama. <i>Bulletin of Marine Science</i> , 89(4): 1015-1035.		Paper
Gonzalez, M. M.; Reynolds, N.; Chaves, L. C. T; Marty, M. J; 4, Ormond, C. G. A, McGinty, E. S.; Green, S. J. 2013. Monitoring and managing the invasion of Indo-Pacific lionfish in Bocas del Toro, Panama. IV Congresso Brasileiro de Biologia Marinha, Florianópolis, Brazil.		Abstract

4. General Information.

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