

New Reports of Echinoderms on the Caribbean Continental Slope of Central America

Nuevos Reportes de Equinodermos en el Margen Continental Caribe de America Central

Nouveaux Rapports d'Échinodermes sur le Versant Continental des Caraïbes de l'Amérique Centrale

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EXTENDED ABSTRACT

Introduction

The Caribbean is considered a unique biogeographic region that represents an important hotspot of marine diversity in the Atlantic Ocean (Tittensor et al. 2010). Remarkable biodiversity thrives on the Caribbean thanks to its complex geological history, starting 130 million years ago and determined specifically by the emergence of the Isthmus of Panama in the Pliocene (3.0 - 2.8 Ma) (Rivera-Monroy et al. 2004). This process resulted in increased evolutionary divergence and radiation of species living today in variety of ecosystems ranging from shallow coral reefs to deep-shelf habitats and partially isolated basins and trenches (Miloslavich & Klein 2005, Miloslavich et al. 2010) which are characterized by its limited documentation and ecological knowledge, especially on the Central American region (Benavides et al. 2014).

The Caribbean region is divided into six ecoregions (Spalding et al. 2007, p. 580) from which the Caribbean Coast of Central America contains two (Western Caribbean and Southwestern Caribbean). This is a mostly unexplored area that exhibits a total coastline extension of 3800 km and its continental shelf accounts for an area of 125 000 km² (OSPESCA, 2009). The size of the continental shelf is very narrow on the coasts of Belize, Costa Rica and Panama, while broader off the coast of Honduras and Nicaragua. The remarkable variety of habitats along the extent of the coastline makes this area an utterly understudied site, especially on the deep sea biota research (Alvarado et al. 2008; Alvarado 2010). According to Hernández-Ávila et al. (2018) the diversity of deep-water megafauna such as corals and echinoderms tends to be higher in this area than in other Atlantic regions.

Methodology

The oceanographic fishing survey campaign was made on board of the R/V Miguel Oliver in 2011, from January 3rd to February 3rd and coordinated by the Central America Fisheries and Aquaculture Organization (OSPESCA). Sampling was done using a Lofoten bottom trawl equipped with a pair of 850 kg oval steel doors (POLY-ICE) each attached to a 48.7m long polyethylene net by a 100 m long warp. The horizontal mouth opening was 31 m wide and 3.5 m of vertical opening when deployed at the bottom, with a cod end of 14.3 m long and a 35mm polyamide mesh size; trawl net was deployed with 27 steel balls of approximately 1000 kg and 20 floaters at its mouth opening. The ship's side-scan sonar (EM 302) was used to locate a suitable area of relatively level, unobstructed bottom prior to each trawl.

Taxonomic identification of the specimens was based on Clark and Downey (1992), Hansen (1975) and Solís-Marín (2003). Total Biomass was calculated for each sampling section and was compared to Total Echinoderm Biomass. Also we calculated the Total Catch Biomass separating between Fishes, Echinoderms and other taxa and we calculated the Total Echinoderm Biomass Catch (whole weight, including viscera and gonads) discerning between taxonomic classes. Geographical and distribution reports were made for each country based on the extensive echinoderm review for Latin America by Solís-Marín and Alvarado (2013) in conjunction with online consultation of the World Register of Marine Species website (WoRMS) (Boxshall et al. 2014).

Results and Conclusions

A total of 3599 kg of biomass were collected in the four sampling sections (Figure 1). Section 1 and 2 showed the highest echinoderm biomass values (277 kg and 172 kg, respectively). Section 1 and 3 had the highest echinoderm relative biomass (27% and 18%) of the total catch. Section 4 showed the lowest biomass values of echinoderm catch with 23 kg in eight transects. In a total of 96 effective trawls, we identified 11 echinoderm species grouped in nine families. All taxonomic information and depth range are detailed in Table 1. We report new species records for Central American countries: one for Belize and Guatemala, two for Nicaragua, five for Honduras and six for Costa Rica and Panama each. The whole catch of echinoderms was of 596 kg comprising the five echinoderm classes (Asteroidea, Crinoidea, Echinoidea, Holothuroidea

and Ophiuroidea) although the ophiuroids were practically absent in the whole sampling range except for just one specimen found at sampling section 1 (transect 2-station number 6) in Panama that could not be identified because of its damaged condition. We found one specimen that was identified as member of family Brisingidae in sampling station six however it could not be identified because of deteriorated condition. The southernmost part (section 1 and 2) showed 75% of the echinoderm biomass, being notably higher compared to northern region. Holothuroids accounted the 99% percent of the total echinoderm biomass and echinoderms were more abundant at south (section 1) and decreased towards north direction.

KEYWORDS: Deep-sea, echinoderms, Caribbean

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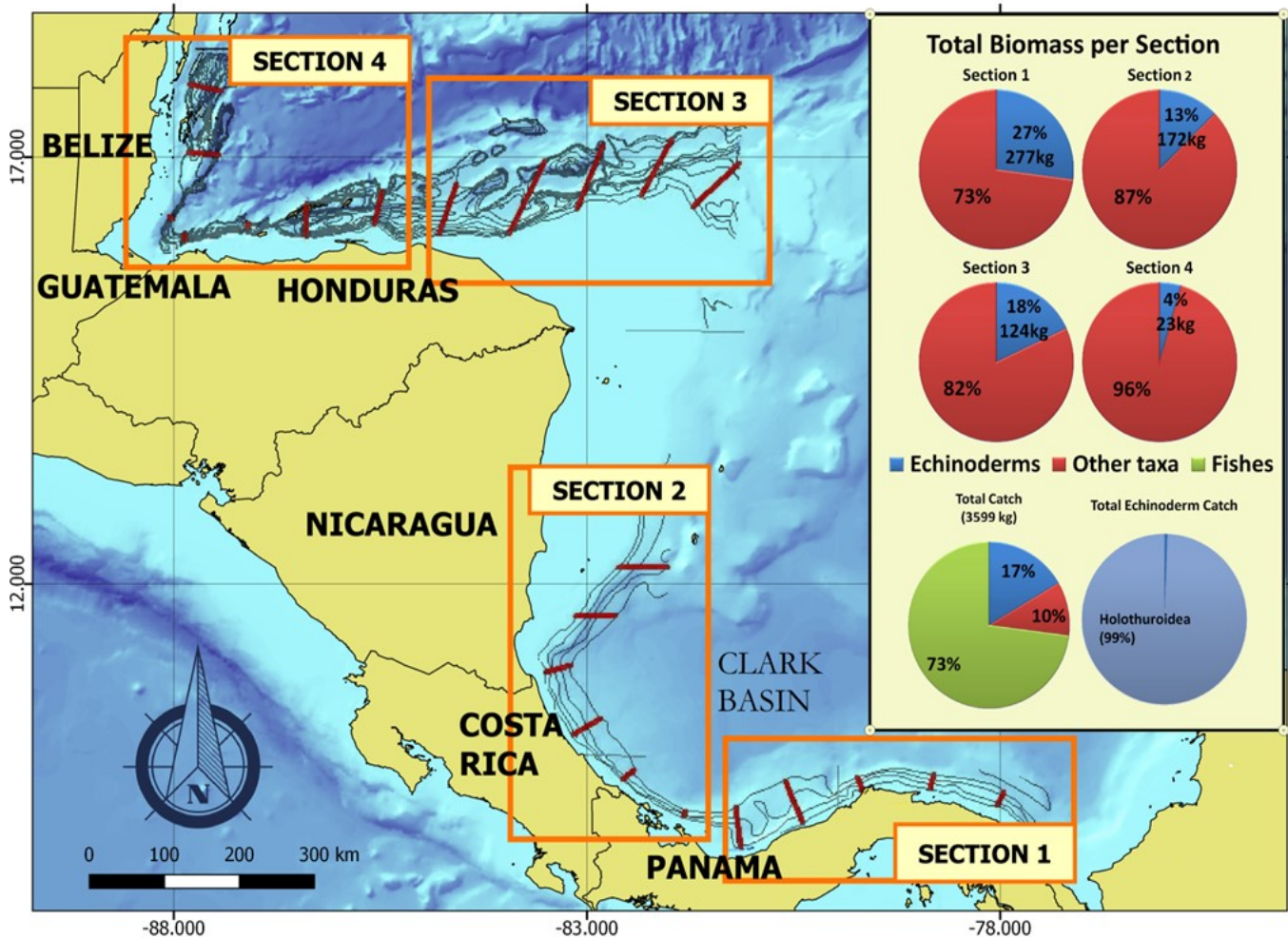


Figure 1. Study area showing the location of the 25 sampling transects divided in four major sections. Total biomass per section and detailed echinoderm biomass is shown on the upper right panel.

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Table 1. New reports of echinoderms in six Central American Caribbean coast countries. BEL: Belize, GUA: Guatemala, HON: Honduras, NIC: Nicaragua, CRC: Costa Rica, PAN: Panama. *Depth range extension. Species name in bold: new report on the Caribbean. "X": new report in country. "P": past reported for the Caribbean.

Species	Depth (m)	Country					
		BEL	GUA	HON	NIC	CRC	PAN
Class Crinoidea							
Family Comasteridae							
<i>Neocomatella pulchella</i> (Pourtalès, 1878)	1095*			X	P		P
Class Asteroidea							
Family Benthoplectinidae							
A) <i>Cheiraster (Cheiraster) planus</i> Verrill, 1915	485-596			P			X
Family Zorasteridae							
B) <i>Doraster constellatus</i> Downey, 1970	579-761			P		X	P
Class Echinoidea							
Family Clypeasteridae							
C) <i>Clypeaster euclastus</i> (Clark, 1941)	1050*			P		X	
Class Holothuroidea							
Family Deimatidae							
D) <i>Deima validum validum</i> Théel, 1879	1017, 1300			X		X	
Family Gephyrothuriidae							
E) <i>Paroriza pallens</i> (Koehler, 1896)	385-1481			X	X	X	X
Family Mesothuriidae							
F) <i>Zygothuria lactea</i> (Théel, 1886)	704, 1292						X
Family Psychropotidae							
G) <i>Benthodytes sanguinolenta</i> Théel, 1882	385-1481	X		P	X	X	X
Family Synallactidae							
H) <i>Bathypotes natans</i> (M. Sars, 1868)	520, 1308, 496		X	X			
I) <i>Benthothuria funebris</i> Perrier, 1898	1225						X
J) <i>Hansenothuria</i> Miller & Pawson, 1989	742 -1481			X		X	X