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BOOK OF ABSTRACTS

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Cooperation scientific in the Caribbean: Le lambi comment indicateur de changement climatic avec histoire de travail sur le terrain

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ABSTRACT

For the Caribbean people, this region is much more than a place for leisure and relaxation. It is literally the lifeblood of their economies, supporting the transportation of goods and people through shipping, providing food from fisheries, and sustaining the most important economic activity in the region: tourism. The Caribbean Sea covers an area of 2.75 million Km2. Nevertheless, this sea is important for 40 million people who inhabit its many small islands, talking about "Blue Economy". Its activities generated revenues of US$407 billion that represents 14-27% of the global ocean economy, in an area that represents less than 1% of the world's ocean area.

The queen conch, *Strombus (Lobatus) gigas* is a marine gastropod mollusk. This is an endemic species from the Caribbean Sea, it is present in the water of 37 countries of the Caribbean Sea. It is a valuable marine invertebrate of significant commercial importance, which permit to use as indicator of climatic change. The aim of this work was to show results of a scientific collaboration in the Caribbean with various Universities, showing the field history of how we have organized various scientific collaborations using our friendly relations, starting from simple protocols and on a basis of trust, friendship and always sharing the results among all. Success stories of cooperation on issues of reproduction, abundance of larvae, contamination by micro plastics and educational programs are shown

KEYWORDS: cooperation, changement climatic, scientific

Marine resource management and fisheries governance in Belize: Historical analysis and ways forward

Gestión de los recursos marinos y gobernanza Pesquera en Belice: un análisis histórico y caminos a seguir

Gestion des ressources marines et gouvernance des pêches au Belize: analyse historique et perspectives

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ABSTRACT

Overfishing is one of the most severe anthropogenic threats to the world's oceans, marked by widespread degradation of marine food webs and disruption of ecosystem functioning. Global fisheries can be categorized as common-pool resource systems (CPRS) because restricting marine resource extraction is extremely challenging, and over-extraction contributes to an overall decline in availability to others. Because of these challenges, establishing effective institutions for the sustainable management of natural resources is essential. Community-based fisheries management (CBFM) offers a potential solution to overcome the challenges associated with fisheries as CPRs by including fishers in the management of their fisheries through collective action. The purpose of this study was to examine the institutional robustness (e.g. presence of nested and decentralized enterprises as indicators of resilience to shocks) of over 40 years of fisheries management in Belize. I used a mixed methods approach combining review of secondary literature, semi-structured interviews with key informants across the governmental, non-governmental, and fishers' sectors, and participant observation. The results of this study suggest that Belize has the institutions in place to overcome collective action problems and be a long-enduring CPRS. These conclusions have implications for the enforcement of Belize's new Fisheries Resources Bill (as of late 2019), and in other small-scale fisheries across the globe.

KEYWORDS: Small-scale fisheries, Governance, Marine Resources

Spatiotemporal Catch Trends and Fishery Indicators of the bull shark, *Carcharhinus leucas*, in the Mexican Atlantic

Tendencias espacio temporales de la captura e indicadores biológico-pesqueros del tiburón toro (*Carcharhinus leucas*) en el Atlántico Mexicano

Tendances spatio-temporelles des captures et indicateurs de la pêche du requin taureau, *Carcharhinus leucas*, dans l'Atlantique mexicain

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ABSTRACT

Mexican artisanal fisheries contribute to the international sale and consumption of elasmobranch species. While general capture records are known (only separated by small and large shark species), little to no species-specific data has been recorded over the course of the last fifty years, and monitoring efforts only show a glimpse of shorter time periods. This lack of information impedes the use of conventional fisheries analyses, leaving room for innovative ways to use available data. Over the course of an extensive literature review, including scientific papers, official government records, and technical reports, approximate catch proportions of bull sharks was calculated across the six Mexican Atlantic states. For the present study, the use of derived proportions from catch monitoring over the course of 50 years provides information for a historic reconstruction of bull shark (*Carcharhinus leucas*) catches across a host of management changes and fisheries development in Mexico. The historic reconstruction provides a view of shark captures, while punctual fishery indicators for the species will help determine changes and identify trends in population demographics. The observed catch volumes range, on average, between 100 and 400 tons per year among the six states, providing insight into approximate catch trends. Further analyses into the dynamics of shark fisheries in the Mexican Atlantic will detail information that could be potentially useful for the management of this migratory species found in the Gulf of Mexico.

KEYWORDS: Gulf of Mexico, small scale fisheries, historic reconstruction

Genetic variability evaluation of the *Chelonia mydas*, from mitochondrial DNA, nororiental sector Colombian Carribean

Evaluación de la variabilidad genética de *Chelonia mydas*, a partir de ADN mitocondrial, sector nororiental Del Caribe Colombiano

Évaluation de la variabilité génétique de *Chelonia mydas*, sur la base de l'ADN mitochondrial, secteur nord-est des Caraïbes Colombiennes

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ABSTRACT

The Program for the Conservation of Turtles and Marine Mammals -ProCTMM-, has been carrying out studies aimed at evaluating the genetic variability of specimens ready for rehabilitation processes, due to the incidental fishing of the green turtle (*Chelonia mydas*), while they transit through the sector study. Through buccal smear and dermal tissue techniques, DNA extractions and amplification of 800 bp segments were performed, using primers LCM15382 and H950; later, they were sequenced and identified in Genbank for a total of 22 sequences, of which 11 corresponded to specimens found in Santa Marta and the other 11 sequences in organisms from La Guajira. Three haplotypes (CM-A5, CM-A8.1 and CM-A3.1) were found for Santa Marta and five (CM-A1.1, CM-A5, CM-A3.1, CM-A8.1 and CM -A8.2) for La Guajira, which are registered globally in the West Atlantic, East Atlantic and Mediterranean regions. In both regions, CM-A5 is the most frequent (54.54% and 45.45% respectively) which is recognized in the main feeding and breeding areas of Tortuguero, Buck Island, Bird Island, Suriname and Brazil. The above suggests a high genetic diversity, possibly due to the pattern of local oceanographic currents, which have made it easier for females from other Atlantic colonies to reach the Colombian coasts.

KEYWORDS: Green turtle, Mitrochondrial DNA, Haplotypes

Multi-species Coral Rescue in Response to the Stony Coral Tissue Loss Disease on the Florida Reef Tract

Rescate de corales multi-especies en respuesta a la enfermedad de pérdida de tejido de coral pedregoso en el tracto de arrecifes de Florida

Sauvetage de corail multi-espèces en réponse à la maladie de perte de tissu corallien de Stony sur le secteur de récif de la Floride

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ABSTRACT

The Florida Reef Tract (FRT) is experiencing an unprecedented disease outbreak described as Stony Coral Tissue Loss Disease (SCTLD). First reported near Miami in 2014, SCTLD has since spread to the northernmost extent of the FRT and southwestward through the Marquesas resulting in the mortality of thousands of colonies from >20 coral species, including primary reef builders and species listed under the Endangered Species Act. Efforts to identify the pathogen(s), determine the mode(s) of transmission, and develop potential intervention techniques are currently underway, but our limited understanding of SCTLD greatly impedes management efforts to control the spread of this virulent disease. A multi-agency, multi-disciplinary Coral Rescue Team (CRT) was developed to: 1) design and implement a reef-tract wide coral collection plan for SCTLD-susceptible species, 2) preserve representative portions of the remaining genetic diversity of FRT corals in holding, and 3) plan for future propagation, restoration and reintroduction of such corals to the wild. The CRT has conducted seven successful coral rescue collection cruises, ahead of the disease margin, and an endemic zone collection. Coral care plans have been developed and rescue corals have been delivered to Florida-based non-governmental organizations and universities as well as long-term housing facilities from the Association of Zoos and Aquariums outside Florida. These facilities have started focusing on propagation, rearing, and induced spawning efforts. Lastly, the CRT has started genetic sampling to develop genetic markers from multiple species. The genotypes will help the broader restoration community, while the spawn from rescue corals will be used in more specific restoration efforts along the FRT and will help to understand SCTLD-resilience between species.

KEYWORDS: Stony Coral Tissue Loss Disease, Coral, Rescue Cruise

Comparison of age, size, and growth structure of lionfish in the Southern Caribbean and Northwestern Gulf Of Mexico

Comparación de edad, tamaño y estructura de crecimiento del pez león en el Caribe sur y el noroeste del Golfo de México

Comparaison de l'âge, de la taille et de la structure de croissance du lionfish dans le sud des caraïbes et le nord-ouest du Golfe du Mexique

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ABSTRACT

Indo-Pacific lionfish (*Pterois volitans, P.miles* complex) were first introduced off the coast of Florida in the 1980s and have become one of the most severe marine fish invaders in the Northwestern Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Age-specific life history parameters are required for use in models that can be used to determine removal rates needed to effectively manage lionfish densities. This study validated annual increment formation in sagittal otoliths to assess the age and growth of lionfish collected in Aruba in 2014 (n = 44) and the northwestern Gulf of Mexico (NWGoM) in the Flower Garden Banks National Marine Sanctuary (FGBNMS) in 2018 (n = 100). Additionally, Fulton's condition factor and asymptotic maximum lengths (L¥) were calculated for each of the populations to compare the favorability of environmental conditions and respective growth characteristics. Results suggested that populations were significantly different between the two regions, with lionfish from Aruba exhibiting a greater L¥, growth rate, and greater condition values than lionfish from the NWGoM. It is unclear if these differences were attributable to variability in species composition, or if they in fact, show that lionfish in Aruba have more favorable environmental conditions which resulted faster growth.

KEYWORDS: lionfish, age, national marine sanctuary

Oldest Indo-Pacific lionfish (*Pterois volitans/P. miles*) on Record Collected From the Northwestern Gulf of Mexico

El pez león del Indo-Pacífico (*Pterois volitans / P. Miles*) más antiguo registrado en los registros del noroeste del Golfo de México

Le plus ancien poisson-lion de l'Indo-Pacifique (*Pterois volitans / P. Miles*) enregistré dans le nord-ouest du golfe du Mexique

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ABSTRACT

Indo-Pacific lionfish (*Pterois volitans/miles*) were first detected off the coast of Florida in the 1980s, with aquaria release being the most likely mechanism for introduction. Since then, lionfish have proliferated through the northwestern Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Here, we report the oldest lionfish aged on record in their invaded range, removed from Flower Garden Banks National Marine Sanctuary (FGBNMS). In August 2018, a research expedition removed 776 lionfish from FGBNMS, of which a subset were retained for age and growth estimation. The oldest lionfish aged was a 10 yr old male, with total length 375 mm and weight 805 g. The back-calculated birth date (2008) preceded the first observation of lionfish at FGBNMS by three years (2011). It is not well understood if lionfish are having negative impacts at FGBNMS, but this report signifies the importance of continued monitoring and removal efforts of this protected area.

KEYWORDS: lionfish, age and growth, national marine sanctuary

The Ecology of Mojarras (Family: Gerreidae) inhabiting a brackish water estuary in Jamaica, W.I.

La ecología de las Mojarras (Familia: Gerreidae) que habitan un estuario de agua salobre en Jamaica, W.I.

L'écologie des Mojarras (famille: Gerreidae) habitant un estuaire d'eau saumâtre en Jamaïque, W.I.

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ABSTRACT

Salt River is a brackish water estuary in Clarendon, located on the southern coastal shelf of Jamaica. The Salt River channel acts as a nursery grounds for the juveniles of the fishes that live offshore and nearby Goat Islands.

The presence of Gerreidae (mojarras) is a defining aspect of tropical and subtropical estuarine fish communities globally. Fifteen families of fishes have established populations along the Salt River channel. In Jamaica, there are nine species of mojarras and five of those species have significant populations at Salt River. These secondary consumers form an important part of the food web of this ecosystem.

Mojarras have a unique protrusible mouth that allows successful foraging through sediment to consume benthic organisms. *Diapterus auratus, Gerres cinereus, Eucinostomus argenteus, Eucinostomus melanopterus* and *Diapterus rhombeus* are so morphologically similar that competition for the same resources is inevitable. These five species employ numerous resource partitioning mechanisms to decrease competition.

An analysis of the biology, ecology and habitat dynamics revealed that spatial, temporal, and dietary niches are a few of the measures employed to reduce competition. Stomach content analyses revealed the necessity of these measures as there is significant overlap in the food items consumed by these five species. The spatial distribution of these fishes at different sites along the channel help to limit the feeding competition.

This study appraises the spatial, temporal, and dietary resource partitioning mechanisms employed by these five species of mojarras.

KEYWORDS: Salt River, estuary, mojarras

Biscayne Bay - Miami's gem is losing its shine. How can stakeholders save it?

Biscayne Bay - la joya de Miami esta perdiendo su brillo. ¿Cómo puede los interesados salvarla?

Biscayne Bay - le joyau de Miami perd de son éclat. Comment les parties prenantes sauvegarde le?

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ABSTRACT

The clear blue waters of Biscayne Bay in South Florida have reflected the sparkle of the Miami skyline as it has shone and grown over the last hundred years, but the beauty of the bay is now suffering through many crises as the population grows, the water warms, and infrastructure ages. Over the past few years, the bay has lost acres of seagrasses, gained masses of macroalgae, and most recently has experienced a sudden and smelly fish kill.

The local solid waste and waste water systems have had many failures, with plastic waste clogging canals and covering bay islands. Sewage has spilled into neighborhoods and into the bay. Local residents have documented these issues on social media, have organized, and have pushed their government leaders to respond. I'll give a brief overview of what may have led to its troubles and how local citizens and government representatives have responded and are attempting to help regain some of its former brilliance.

KEYWORDS: Biscayne Bay, seagrass, nutrients

Comparative spatiotemporal analysis of accumulated pelagic Sargassum landings using community science data

Análisis comparativo espacio-temporal de las arribazones de Sargazo pelágico acumuladas utilizando datos científicos comunitarios

Analyse comparative spatio-temporelle des débarquements cumulés de Sargasses pélagiques à l'aide de données scientifiques communautaires

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ABSTRACT

The regional impact of pelagic Sargassum landings that have occurred periodically since 2011 requires large-scale visualization and monitoring efforts to forecast their arrival. While efforts to monitor Sargassum were largely focused on satellite imagery, these efforts were limited in nearshore areas where the imagery resolution is less refined. Community science initiatives and databases can not only compensate the shortcomings of satellite imagery, but can also enhance the resolution of the satellite imagery by ground-truthing the models at various sites. Here we present a preliminary analysis of Sargassum accumulation levels and species composition over time and location using currently available datasets from the "Sargassum Watch" Community Science Initiative. Data collection has been conducted since 2019 via collaborations with target groups, such as sea turtle monitoring groups. A comparative analysis was conducted using data collected from Broward County of south Florida and south Grand Cayman. Accumulation photos were classified on a scale from 0-5, and species photos were identified to morphotype level. Interannual comparisons showed 2019 having higher accumulation levels in earlier months (April-May) than similar months in 2020. Significant differences were found between locations and months during the 2020 season, with Grand Cayman showing higher accumulation levels in June than Broward, though accumulations did not differ in later months. No association was detected in species composition between locations or sampling times. This analysis hopes to showcase the potential of community science initiatives as a valid and robust method of data collection to monitor Sargassum in the Caribbean Region.

KEYWORDS: Sargassum, Community science, Monitoring

Governability of the Marine Small-Scale Fisheries of Venezuela in the Context of the Western Central Atlantic Fishery Commission

Gobernabilidad de la pesca marina artesanal de Venezuela en el contexto de la Comisión de Pesca del Atlántico Centro-Occidental

Gouvernabilité de la petite pêche maritime du Venezuela dans le contexte de la Commission des pêches de l'Atlantique Centre-Ouest

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ABSTRACT

The fisheries of the Bolivarian Republic of Venezuela is dominated by small-scale fisheries (SSF) accounting for 245,477 tons (81%) of the national production (302,146 tons). Thus, the socio-economic importance of marine SSF cannot be overemphasised – contributing significantly to the provision of employment, income and as a source of protein for the population. The legal and institutional framework of the fisheries of Venezuela comprise of both national regulations and ratified international conventions. In addition, Venezuela is a member of the Western Central Atlantic Fishery Commission (WECAFC) - as one of the main producing countries by volume. Accordingly, regional governance is crucial for sustainable fisheries resources stewardship in the WECAFC area. This present a nested institutional arrangement situation in WECAFC countries with far reaching demands for institutional compatibility at multiple levels. Another issue which immediately becomes a concern is, the capability of the governance framework emanating from such nested institutions to address the inherent features of the SSF systems. This study will try to find out how equipped or well-marched are the principles and institutions of the governance system in the fisheries of Venezuela so as to address challenges and create opportunities in the marine SSF system. Nested institutional analysis allied with the interactive governance framework will be brought to bear on analysing the fisheries system in Venezuela. This study results will provide the degree of institutional compatibility and the adequacy of the governing system to address the peculiar characteristics of the system to be governed for policy consideration.

KEYWORDS: Fisheries Governance, Governability, Regional Fisheries Management Organization

Snails on the menu?: Characterizing the resilience of an emerging California shellfish species to marine heatwaves

Caracoles en el menú?: Caracterizando la resiliencia de una especie emergente de mariscos de California a olas de calor marinas

Escargots au menu?: Caractériser la résilience d'une espèce émergente de crustacés de Californie aux vagues de chaleur marines

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ABSTRACT

Since climate change (e.g. ocean warming and acidification) threatens marine ecosystems that support millions of livelihoods, more global change biology research is necessary to address challenges in managing natural resources. For example, California's kelp forests are one of our planet's most productive and dynamic ecosystems--supporting large and small-scale fisheries. However, thermal stress induced by marine heat waves has been documented to have impacts on the productivity of coastal ecosystems. There remains to be a limited understanding on how thermal stress will affect economically important shellfish species at early life stages. To fill this gap, I will present my thermotolerance findings on the Kellet's whelk (*Kelletia kelletii*), an emerging seafood species of temperate California reefs. In this study I tested the tolerance to marine heat wave temperatures of two early life stages: veligers and hatchlings. By exposing larvae to a range of temperatures (15-38 ˚C) in acute thermotolerance trials (1 hr) my major findings were that temperatures that induced developmental abnormalities were at a lower temperature than temperatures that caused mortality. In this presentation, I will share some of the first insights into a molluscan shellfish species that shares both habitat and biology with similar species of high ecological and economic value. Finally, I will compare my findings with long-term environmental data collected at the sites where whelks are found. Marine heatwaves present conditions that may decrease the quality of performance necessary for larvae to make it through early development. My work highlights the significance in understanding how economically important species respond to marine heatwaves so we may ensure sustainable livelihoods at sea.

KEYWORDS: Marine heatwaves, Ocean warming, Shellfish

Barriers and motivations for divers to harvest lionfish in Florida: It's not all about the money

Barreras y motivaciones para que los buzos pesquen pez león en Florida: no se trata solo del dinero

Obstacles et motivations pour les plongeurs à pêcher le poisson-lion en Floride: tout n'est pas une question d'argent

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ABSTRACT

Lionfish (*Pterois volitans*) are an invasive species from the Indo-Pacific that have rapidly grown in number in the Caribbean, Gulf of Mexico, and West Atlantic since they were introduced in Florida in 1985. They reproduce early in their lifecycle and frequently and consume the juvenile native reef fish that are important to reef health and human livelihoods. In order to combat the spread of this species, management efforts in Florida have in part focused on the development of a market for lionfish. Despite their venomous spines, lionfish is safe to eat and tastes good. The lionfish market is established in Florida and currently supply cannot meet demand. Given that lionfish numbers are still high, why is there a shortage? We examined the motivations and barriers for recreational and commercial divers to harvest lionfish and for chefs to prepare and serve lionfish. We conducted 50 semi-structured interviews via snowball and convenience sampling with divers and chefs throughout Florida at lionfish events (tournaments, cook-offs). Thematic coding of interviews revealed primary motivations for spearing lionfish are recreational, financial, conservation-oriented, and for consumption. Barriers for most recreational and commercial divers to spear lionfish include time and cost, skill, diving risks, licensing, profit, and/or depth. Most chefs reported barriers as inconsistent supply, the small size of lionfish, price, and risk-oriented in relation to employees handling venomous spines. Combined with ecological data on lionfish populations and behavior, these findings elucidate opportunities for improved engagement with divers and chefs and, therefore, strategies for suppression of the invasion.

KEYWORDS: Lionfish, Florida, Diver

Policy actions needed to support adaptation to climate change in Caribbean fisheries

Acciones de política necesarias para apoyar la adaptación al cambio climático en las pesquerías del Caribe

Mesures politiques nécessaires pour soutenir l'adaptation au changement climatique dans les pêcheries des Caraïbes

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ABSTRACT

Negative impacts of climate variability and change are already evident in the Caribbean, affecting fisheries through multiple pathways from changes in biological productivity, fishery yields and practices, community livelihoods, governance implications, to impacts on national economies and the wider society. Fortunately, there are also many initiatives across the region that are supporting ongoing adaptation measures such as the FAO-Climate Change Adaptation in the Eastern Caribbean Fisheries Sector (CC4FISH) project. We highlight these initiatives and examine some key policy actions that could be implemented to enhance existing efforts to ensure long-term adaptation of the fisheries sector to climate change. These include mainstreaming disaster risk management, greater governance flexibility, improved stakeholder engagement and support for innovative public-private partnerships. We also outline the need for better participation of fisherfolk in social protection schemes, recognition and best use of different skill sets of gender and youth, and facilitation of additional livelihood opportunities. These key policy actions are urgently needed to reduce vulnerabilities and increase the resilience of the fisheries sector to climate risks.

KEYWORDS: climate change, adaptation, policy

Biometric parameters and population aspects of *Callinectes bocourti* of the Cienaga Grande De Santa Marta, Colombian Caribbean

Parámetros Biométricos y Aspectos Poblacionales de *Callinectes bocourti* de la Cienaga Grande de Santa Marta, Caribe Colombiano

Parametres Biometriques Et Aspects De La Population De *Callinectes bocourti* de la Cienaga Grande De Santa Marta, Caraibes Colombiennes

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ABSTRACT

Con el propósito de proveer información para la adopción de medidas de regulación y manejo sostenible de la pesquería de jaiba en la Ciénaga Grande de Santa Marta - CGSM -, Caribe colombiano, se determinaron parámetros biométricos y poblacionales de *Callinectes bocourti* procedentes de la pesca de pequeña escala desembarcadas en una planta de proceso, entre julio y diciembre de 2018. Se registraron 1801ejemplares, a los cuales se les tomó información biométrica: Abertura de la Base de las Espinas Laterales - Abel (cm), Longitud del Cefalotórax - Lca (cm), Peso Total Pt (gr), Sexo y Madurez sexual. Se encontró que los intervalos de Abel oscilaron de 11,105 cm a 7,05 cm, los intervalos de Lca de 6,725 cm a 4,385 cm y el Peso total de 166,7 g a 45,7 g. La proporción machos:hembras fue de 1:9, lo cual se explica por el hecho de ser capturadas en zonas de alta salinidad, próximas a la comunicación del mar con el estuario, sitios que marcan la distribución espacial en estas especies. Con respecto a las tallas de captura se determinó que el 73,8 % se encontraba por encima de 8,5 cm, talla mínima legal establecida para *C. bocourti*.

KEYWORDS: Callinectes bocourti, manejo sostenible, CGSM

What can we do with one metric ton of sargassum?

¿Qué podemos hacer con una tonelada métrica de sargazo?

Que pouvons-nous faire avec une tonne métrique de sargasses?

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ABSTRACT

The 'sargassum crisis' began in 2011, precipitated by repeated mass influxes of pelagic sargassum stranding along Caribbean shorelines. Over the last nine years, the damage to key economic sectors and critical nearshore habitats has been enormous. The costs and manpower required to repeatedly clean and dispose of stranded sargassum in an environmentally responsible manner, are unsustainable. Hence the growing need to consider opportunities for valorizing sargassum to offset costs, mitigate damage and provide additional employment and income, especially in coastal communities that have been heavily impacted by the sargassum events. In this FAO-Climate Change Adaptation in the Eastern Caribbean Fisheries Sector (CC4FISH) study, we have gathered information firsthand from entrepreneurs and research teams across the Caribbean who are developing uses for sargassum, or who have already commercialized their products. We have used the information shared with us to develop a 'Biomass Index' to show what can be produced from one metric ton of fresh sargassum. Although it is considered as a crude index, it demonstrates the wide range of possible products, and helps to inform what might be possible with regard to 'scaling-up' potential uses. We anticipate that this study will enhance the growing community of practice (CoP) to support innovation for enterprise sustainability.

KEYWORDS: sargassum, valorization, uses

Status of Stony Coral Tissue Loss Disease in the Caribbean Region

Estado de la enfermedad de pérdida de tejido en corales duros en la región del Caribe

Situation de la maladie de la perte de tissu corallien sur coraux durs dans la région des Caraïbes

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ABSTRACT

Stony Coral Tissue Loss Disease (SCTLD) affects approximately half of all known stony coral species in the Caribbean region. The SCTLD epidemic started in 2014 in Florida and this aggressive disease has now spread to at least 16 Caribbean countries and territories. The number of affected Caribbean countries and territories has more than doubled in the 12 months to October 2020. We present the latest known status of this disease in the Caribbean region using the recently-developed SCTLD regional dashboard. We summarize the status of cooperation efforts to build capacity for monitoring, detection and correct identification of SCTLD, and for response including outreach and partnership efforts for prevention, treatment, rescue and restoration in the Caribbean region.

KEYWORDS: Stony coral, disease

An assessment of the biology and ecology of *Sicydium* spp. (Family Gobiidae) from Yallahs and Swift Rivers, Jamaica.

Una evaluación de la biología y ecología de *Sicydium* spp. (Familia Gobiidae) de Yallahs y Swift Rivers, Jamaica.

Une évaluation de la biologie et de l'écologie de *Sicydium* spp. (Famille Gobiidae) de Yallahs et Swift Rivers, Jamaïque.

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ABSTRACT

The suckstone goby (Sicydium spp.) is from one of the most speciose and widely distributed fish families in tropical and subtropical zones of the world. Sicydium spp, is abundant in Jamaican rivers; but little known about this species in Jamaica and throughout the Caribbean. Sicydium are migratory freshwater fishes that spend most of their life cycle in rivers, but larvae emerge and drift downstream to the sea where further development of juveniles occurs (Bell 1994). The aim of this study was to compare feeding habits of Sicydium present on the island. Sicydium were captured using dip nets and bottom kick nets at three sites along a south coast (Yallahs River) and north coast river (Swift River). A total of 253 gobies were captured, measured, weighed and stomach contents analysed.

The results indicate that both populations of Sicydium sp. are omnivorous and feed primarily on organic detritus and sand. The diet of Sicydium sp., from the Swift River consisted of organic detritus, sand, Chironomidae, Trichoptera, Cladophora, fish eggs and fish scales. Sicydium from Yallahs River consume similar items in addition to Oscillatoria, Fragillaria, Spirogyra, Cladophora and Ultorix. Schoener's index of diet overlap (alpha = 0.679) and Spearman's rank correlation test ($r_s = 0.240$, $p<0.005$) showed that there is a biologically significant similarity between the diets of Sicydium in both locations. Given the diet composition of Sicydium in both rivers, this species contributes significantly to nutrient availability and cycling in tropical rivers.

KEYWORDS: Sicydium, Jamaica, Yallahs River

Movement Patterns of Juvenile Goliath Grouper (*Epinephelus itajara*) in two South Florida Estuaries

Patrones de movimiento del mero juvenil (*Epinephelus itajara*) en dos estuarios del sur de la Florida

Modèles de mouvement du mérou Goliath juvénile (*Epinephelus itajara*) dans deux estuaires du sud de la Floride

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ABSTRACT

Goliath Grouper populations in US waters have shown significant recovery following the closure of the fishery in 1990 but despite a higher abundance of adults offshore and juveniles inshore, the extent of this recovery is unknown. Most research efforts to date have focused on adults and their associated spawning aggregations, while less information exists on juveniles that utilize mangrove estuaries as nursery habitats. We tagged juvenile Goliath Grouper in three south Florida estuaries starting in 2017 using Vemco acoustic telemetry tags (V9 and V16; 440 days and 6.5 years battery life) to investigate habitat use and movement patterns. To date we have tagged 30 juveniles (size range = 502 – 1132 mm TL) in the St. Lucie River and adjacent Indian River Lagoon; 8 juveniles (216 – 1130 mm TL) in the Caloosahatchee River and Charlotte Harbor; and 22 juveniles (270 – 846 mm TL) in the Faka-Union Canal system and adjacent Pumpkin Bay in the Ten Thousand Islands. Here we present preliminary results of movements by these tagged fish. Tracking will continue through the duration of tag life as these fish undergo ontogenetic shifts in habitat utilization and the results will help elucidate the ecology and life history of this iconic species.

KEYWORDS: Movement, Goliath, Grouper

Environmental DNA Analysis of Forage Fish Diversity and Distribution in the Indian River Lagoon

Análisis de ADN ambiental de la diversidad y distribución de peces de forraje en la laguna del Indian River

Analyse ADN environnementale de la diversité et de la distribution des poissons fourragers dans la lagune de l'Indian River

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ABSTRACT

The Indian River Lagoon is one of the most species-rich estuaries in the United States, providing habitat to over 400 species of fish. Among these are critical forage fishes, such as menhaden, anchovy, and sardines, as well as many of their commercially important predators. The Florida Fish and Wildlife Conservation Commission (FWC) conducts monthly seine surveys in the IRL, which provide the basis for most fisheries resource management and conservation decisions in the region. However, many key species are systematically overlooked by these surveys due to gear bias, resulting in data deficiencies for many forage fish species and their dependent predators. This ongoing study aims to circumvent these issues by utilizing environmental DNA (eDNA) metabarcoding to conduct a survey of forage fish species in the IRL and create a rapid and cost-effective survey toolkit complimenting existing survey efforts. As part of this effort, we have collected water samples from 16 sites across the northern IRL alongside FWC's monthly surveys just before seine net deployment. Using protocols optimized in our lab at the University of Central Florida, we will extract DNA from these samples and prepare Illumina libraries using 16S primers. Species composition and individual occurrence records at each sample site and habitat will be evaluated based on the eDNA data. These results will be compared to those obtained from the FWC survey to evaluate the relative strengths and weaknesses of each method. Combining the data, we will create local and regional biodiversity hotspot maps for forage fishes that can be used to supplement FWC's species occurrence database.

KEYWORDS: forage fish, environmental DNA, metabarcoding

Cetacean-based food products: polluted and popular

Productos alimenticios basados en cetáceos: contaminados y populares

Aliments à base de cétacés: pollués et populaires

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ABSTRACT

Recent research has shown that odontocetes taken by whalers from St. Vincent & the Grenadines are heavily contaminated with mercury. Additional research has found that the food products derived from this small-scale whaling operation are highly popular among the Vincentian population. This poster summarizes the data on contamination and consumption, then considers the health, policy, and sustainability implications of this situation.

KEYWORDS: cetaceans, whaling, ecotoxicology

Site fidelity and monthly growth rates of invasive Lionfish calculated from in-situ observations in Choctawhatchee Bay Estuary, Florida.

Fidelidad del sitio y tasas de crecimiento mensual del invasor pez león calculadas a partir de observaciones in situ en el estuario de la bahía de Choctawhatchee, Florida.

Fidélité au site et taux de croissance mensuels des poissons-lions envahissants calculés à partir d'observations in situ dans l'estuaire de la baie de Choctawhatchee, en Floride.

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ABSTRACT

Invasive lionfish (*Pterois volitans*) and their impacts to the ecosystems they have invaded have been well documented since their invasion begin in the mid-1980s. Life history characteristics such as age and growth have been estimated from lionfish otoliths but there is a paucity of studies utilizing in-situ tag recapture methodologies to describe lionfish growth. Further, invasive lionfish have been observed in estuaries around the Caribbean and in South Florida but site fidelity in bays and estuaries of northwest Florida have not been described. Due to the relatively shallow artificial reef habitat (<8m) utilized for this study, lionfish were able to be captured and brought to the surface for tagging and measurement with no observed effects of barotrauma. The water temperature in the Choctawhatchee Bay Estuary (CBE) can drop to temperatures close to and in some cases below the lethal limit of lionfish (~10°c). Observations from the last year indicate that lionfish in the CBE are able to survive these lower temperatures for short periods of time. While this study is still ongoing, 12 tagged lionfish have been at large for 14 to 103days and have a mean growth rate of 0.33mm per day which is less than growth rates reported for lionfish studied in Loxahatchee River estuary, Florida (0.46mm/day). Lastly, all lionfish tagged in the CBE have strong site fidelity with the exception of one lionfish which moved 1,114m from its tagging location to another reef site monitored for this study.

KEYWORDS: Tagging, Fisheries, Estuary

Addressing lost and abandoned fishing gear at global scale: An introduction to the Global Ghost Gear Initiative

Abordando los artes de pesca perdidos y abandonados a escala mundial: una introducción a la Iniciativa Global Ghost Gear

Lutter contre les engins de pêche perdus et abandonnés à l'échelle mondiale: une introduction à la Global Ghost Gear Initiative

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ABSTRACT

The Global Ghost Gear Initiative (GGGI) is the only cross-sectoral alliance dedicated to solving the problem of abandoned, lost, or otherwise discarded fishing gear (ALDFG) – widely referred to as "ghost gear" – around the world. The GGGI brings together more than 100 stakeholder groups, including 15 national governments as well as representatives from civil society, the private sector, public agencies, academia, intergovernmental organizations, and others from across the fishing industry to tackle ghost gear at a global scale. Since its founding in 2015, the GGGI has worked to implement a wide variety of preventative, mitigative and curative approaches to ghost gear, shaping fisheries management policy and building the evidence base around the prevalence and impact of this threat. In 2017, the GGGI developed the Best Practice Framework for the Management of Fishing Gear, which has been adopted by a range of seafood companies and in national and regional marine litter and fisheries management action plans. The GGGI has made meaningful change on the ground in fishing economies and communities, partnering with local fishers to remove ghost gear in places like the Gulf of Maine, Panama City, and Vanuatu. Currently the GGGI is working in the Caribbean region helping to incorporate best management practices to prevent gear loss into fisher insurance for hurricane events; trialing innovative fishing gear tracking technologies; performing "hotspot" mapping to locate areas with high levels of gear loss; and facilitating gear recovery where possible. The project will be expanded to additional Caribbean countries in 2020 and 2021 through collaboration with GCFI, and CRFM.

KEYWORDS: marine debris, ghost gear, policy

Testing Modified Self-Release Hooks for Use in Recreational Fishing

Probando losAnzuelos de Auto-liberación Modificados Para su Uso en Pesca Recreativa

Test des Hameçons Modifiés à Libération Automatique Pour la Pêche Récréative

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ABSTRACT

Discard mortality can make fishing unsustainable even in catch-and-release or highly regulated consumption fisheries. However, the fitness and survival chances of released fish can be improved considerably if anglers utilize best fishing practices to minimize hook injury, handling, and air exposure. This study tested standard and modified hook designs to assess whether a novel, bite-shorted modified hook (versus standard and barbless hooks) could allow anglers successfully land a popular coastal sport fish, Spotted Seatrout (*Cynoscion nebulosus*), and then self-release it in the water and without handling. The bite-shortened hook demonstrated promising results by allowing anglers to land a similar proportion of fish: 91% for bite shortened hook versus 94% and 99% for barbless and standard hooks, respectively. Bite shortened hooks also enabled anglers to self-release 87% of fish, compared to 47% and 20% for barbless and standard hooks. Eighty percent of these fish were self-released <5 seconds. Continued study of self-releasing hooks appears warranted with other lure types, fish species, and anglers. With further validation of self-releasing hooks, catch-and-self-release fishing practices could allow for increased fishing opportunities in recovering fisheries or sensitive areas, e.g., to allow catch-and-release fishing in no-take aquatic protected areas, with minimal discard effects.

KEYWORDS: Discard mortality, Catch-and-release fishing, Aquatic protected areas

The importance of subsistence fisheries during the COVID-19 pandemic: a case study from queen conch in The Bahamas

La importancia de la pesca de subsistencia durante la pandemia de COVID-19: un estudio de caso del caracol rosado en las Bahamas

L'importance de la pêche de subsistance pendant la pandémie de COVID-19: une étude de cas sur le lambi aux Bahamas

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ABSTRACT

Subsistence and artisanal fisheries have played a vital role in sustaining human populations of the Caribbean for hundreds of years, particularly in times of hardship. The onset of the coronavirus pandemic earlier this year led to a dramatic rise in unemployment throughout the region and fears around food-security. Subsistence fishing was one of the few activities permitted during the emergency curfew restrictions, leading many to turn to the marine environment for food.

To better understand this phenomenon, I undertook a study of conch landings at previously documented sites near the Cape Eleuthera Institute in The Bahamas during the weeks following the implementation of COVID-19 lockdown. A sharp increase in small scale fishing activity was evident at these sites and I will present weekly conch landings data with an analysis of fishing activity and size structure of the catch.

I discuss what this data can tell us about the role of subsistence fisheries during the pandemic and the degree to which we can rely on the marine environment as a "natural-insurance" in the case of future emergencies.

KEYWORDS: conch, susbistence, COVID

How can small islands harness the blue economy to build climate resilience and protect biodiversity?

¿Cómo pueden las islas pequeñas aprovechar la economía azul para generar resiliencia climática y proteger la biodiversidad?

Comment les petites îles peuvent-elles exploiter l'économie bleue pour renforcer la résilience climatique et protéger la biodiversité?

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ABSTRACT

Small islands support a disproportionate amount of biodiversity. They are also amongst the most vulnerable to human colonization and the adverse effects of climate change, such as sea-level rise, changes in precipitation patterns, and increases in tropical storm intensity and frequency. There is growing recognition for the need to develop strategies specifically designed for small islands' typically unique ecological fragility and economic vulnerability alongside the numerous opportunities they also possess. The recent COVID-19 crisis exacerbated the need to find sustainable Blue Economy initiatives that incorporate social, economic and ecological goals that will also allow to diversify the economy. To reach these goals, four key components have been identified. Long-term ecosystem based marine spatial management (EB-MSM) (1) and multi-level cooperation between islands (2) will be paramount. The advancement of ocean science and technology (3) will equally be key contributors in enabling responsible and sustainable Blue Economy. Finally, better governance, policies and regulations (4) must be implemented at the global, regional, national and local levels to protect our oceans, mobilize partnerships, boosts blue investments and build island resilience. However, a series of knowledge gaps will hindering our progression towards these goals such as a limited map data availability, our limited knowledge on the sensitivity of various ecosystem components to stressors, or the current and future interactions among stakeholders and possible conflict mitigation options to name a few. As a new world emerges from the 2020 crisis, small island nations business and political leaders have the opportunity to rebuild better by harnessing the potential of the Blue Economy to pave the way for more sustainable and resilient communities.

KEYWORDS: Blue Economy, Biodiversity, Small islands

Vulnerability analysis of local fishing resources from fishers' traditional knowledge

Análisis de vulnerabilidad de los recursos pesqueros locales a partir del conocimiento tradicional de los pescadores

Analyse de la vulnérabilité des ressources halieutiques locales à partir des connaissances traditionnelles des pêcheurs

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ABSTRACT

We integrated fishers' traditional knowledge and scientific information to assess the vulnerability of the stocks in Dibulla, La Guajira, Colombia. We gathered local information on commercial important fishes in Dibulla, to contribute to a Productivity and Susceptibility Assessment (PSA), an expert opinion-based model that combines information about the productivity of a stock with its susceptibility to fishing activities, pollution, habitat degradation, or other factors. This project sought local expertise to develop a PSA for nearshore species at a small spatial scale, so we can better understand local dynamics, pressures, and vulnerabilities of the stocks. We applied this technique by combining biological data for 11 species with information obtained from fishermen during a series of surveys. We found high susceptibilities for all the species and prioritized three species with a high vulnerability to overfishing, and identified the activities that are negatively impacting small-scale fisheries in the area. While PSA provides only general information on vulnerability and stock status, it can be useful to identify important local differences in stock susceptibility to fishing or other impacts that may be lost when stocks are monitored at a wider scale.

KEYWORDS: Small-scale fisheries, Traditional ecological knowledge, Productivity and susceptibility analysis

Regional Synthesis of Invasive Lionfish Citizen Science Programs in the Tropical Western Atlantic

Síntesis regional de programas de ciencia ciudadana sobre el pez león invasor en el Atlántico occidental tropical

Synthèse régionale des programmes scientifiques citoyens envahissants du poisson-lion dans l'Atlantique occidental tropical

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ABSTRACT

Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) have established populations throughout the tropical Western Atlantic Ocean with demonstrable effects on native species, fisheries, biodiversity, and ecosystem processes. Effective management of this invasion is proving to be beyond the capacity of natural resource management agencies alone and requires innovative approaches as well as collaboration among a diverse set of stakeholders. In response, government entities and other groups throughout the W. Atlantic region have mobilized citizen groups, particularly SCUBA divers, to physically remove lionfish and to collect important data needed to manage the invasion. Here, we survey lionfish citizen science initiatives to inventory these programs in terms of member composition, cooperation with local governments, financial support mechanisms, operations, objectives, scientific involvement, and successes and shortcomings. We categorize these operations based on their development, structure, and effectiveness since initial detection of lionfish in the mid-1980s, and consider how lessons from lionfish programs in the W. Atlantic can inform groups working on the novel invasion in the Mediterranean. Patterns from the broad emergence of lionfish citizen science initiatives and groups can increase public engagement-in and scientific impact-from other environmental citizen science programs.

KEYWORDS: Management, Invasive Species, Citizen Science

How space can save our reefs

Cómo el espacio puede salvar nuestros arrecifes

L'espace peut sauver nos récifs

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ABSTRACT

Despite occupying less than 1% of the ocean's surface, coral reefs support around a quarter of known marine species, including more than 4000 species of fish and 7000 species of coral, with an estimated worth of US$9.9 trillion to the human economy, and by 2050, all corals are at risk, we are in a losing battle. However, the emergence of space data and its commercialization may just help protect continously more of our precious reefs.

Reef.io is an award-winning startup based in the Netherlands, that builds an online monitoring and predictive maintenance platform, using AI and satellite imaging to create models to track coastal reef health, or so-called 'remote' conservation monitoring. In addition, it is a one-stop dashboard consolidating all relevant information to a coastal or project manager. The innovation of Reef.io lies in the backend, which produces different types of data analytics which together is used to build a picture of reef ecology across a wide range of spatial and temporal scales, that is comprehensible and rapidly accessible to small business owners. To illustrate the current gap in technology, a senior professor of coastal management at Wageningen University said in 2016 'coral bleaching is impossible to detect from space'. A year later, the Copernicus Sentinel-2 mission launched and a year later the first imagery of coastal bleaching was produced, and this is the 'secret sauce' of Reef.io. The Dutch Caribbean Nature Alliance also has a similar GIS program, of which Reef.io is keen to working with.

The team is made out of Marcel, an aerospace engineer, who is an avid fan of sharks. Yohan, an AI computer scientist and ocean enthusiast. Marijn, diver and coastal manager. And Crystle, who is a marine biologist, recorded over 400 divers and is the 4th female certified diver in Singapore.

KEYWORDS: Coral Conservation, Reef.io, Coastal Management

The current status of the marine environment of the Moriah Harbour Cay National Park: Results of the 2019 rapid ecological assessment

Estado actual del medio ambiente marino del Parque Nacional Moriah Harbour Cay: Resultados de la evalución ecológica rápida realizada en el 2019

L'état actuel du milieu marin du parc national de Moriah Harbour Cay: résultats de l'évaluation écologique rapide de 2019

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ABSTRACT

Between the 12th and 17th of September 2019, a Rapid Ecological Assessment (REA) was conducted on selected reefs and mangroves found within and surrounding the Moriah Harbour Cay National Park (MHCNP), a national park found on mainland Exuma, in the central Bahamas. Standard methods were used to assess fish and benthic communities in both habitats as well as coral community composition and health for reefs: the Atlantic & Gulf Rapid Reef Assessment (AGRRA) for the reefs and a modification of AGRRA for mangroves. The assessment was to provide information relating to the marine habitats and living marine species through mainland Exuma; information gained from the assessment will serve as baseline data feeding into the recently completed management plan and upcoming projects that will be undertaken within the park.

A total of ten (10) coral reef sites and three (3) mangrove sites were surveyed. Of those sites surveyed, fish abundance and love coral cover within the mangroves and coral reefs that were surveyed was higher than average when compared to other sites within The Bahamas that have been surveyed in the past few years. There was a difference in the relative abundance of snappers/grunts on the reefs and within the mangroves; the mangroves had significant higher representation of those families. Twenty-one (21) species of coral were observed on site with four (4) families observed as large recruits and one (1) family observed as a small recruit.

Based on the result of this rapid ecological assessment, the benthic, coral and fish communities are in relatively good conditions. Implementation of the current management plan would help to increase resilience on the systems. Restoration projects, particularly for those reef-building corals can help contribute to the overall improvement of the productivity of the system.

KEYWORDS: MPA, Coral Reefs, Mangroves

Preliminary study on nurse shark (*Ginglymostoma cirratum*) bycatch reduction in the lobster fishery on the Saba Bank

Estudio preliminar sobre la reducción de la captura incidental de tiburones nodriza (*Ginglymostoma cirratum*) en la pesquería de langosta en el banco de Saba

Étude préliminaire sur la réduction des prises accessoires de requins nourrices (*Ginglymostoma cirratum*) dans la pêche au homard sur le banc de Saba

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ABSTRACT

Previous studies estimated that within the lobster fishery 2500 nurse sharks are caught annually as bycatch on the Saba Bank. Together with fishermen, Saba Bank Management Unit, MOTE marine laboratory Florida and Dutch Elasmobranch Association an experiment was kick started to determine; the recapture rate of sharks; how an exclusion device specifically for sharks would reduce shark bycatch; and how fast sharks would enter a lobster trap in the field, and when trapped nurse sharks would attack the lobsters. Overall, this study aims to understand why nurse sharks are entering the lobster traps. The first experiment was done in a controlled environment in MOTE which indicated that the sharks are unlikely to enter traps. Within 10% of the trials shark would enter the traps. While the sharks were inside the traps, they would not attack the lobsters for the first days after entrance, despite the traps being baited and the sharks being kept hungry. Traps were equipped with an effective escape hatch for the nurse sharks to escape before damaging lobsters, it was used in up to 50% of the cases. In the field, preliminary footages showed that nurse sharks would enter the traps before the lobsters. Nurse sharks placed inside the modified experimental trap in the field showed that sharks would utilize the hatch within +/- 2-3 days. Further trialing is recommended to validate the theory that the sharks would rather leave the trap than stay there and consequently damage the lobsters and the trap while trying to escape.

KEYWORDS: nurse shark, Saba Bank, Saba

Evaluation of the settlement of sea cucumber larvae and young in artificial collectors in San Crisanto, Yucatán

Evaluación del asentamiento de larvas y juveniles de pepino de mar en colectores artificiales en San Crisanto, Yucatán

Évaluation de l'installation de larves et de jeunesse d'holothuries dans des collecteurs artificiels à San Crisanto, Yucatán

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ABSTRACT

In recent decades there has been a significant increase in the holothurian fishery, due to the great demand they have in the market. As a result, intense fishing has been generated on the Yucatan coast, causing a decrease in the abundance of sea cucumber. Given this scenario, it is necessary to evaluate population restoration techniques, an alternative is the capture of larvae and juveniles through artificial collectors in the natural environment with the aim of implementing repopulation actions in fishing refuge areas. The aim of the study is to evaluate the settlement of sea cucumber larvae and young in artificial collectors. Six artificial collectors will be placed off the Yucatan coast at two different depths. A total of 3100 individuals belonging to six Phyla were obtained (Mollusca, Arthropoda, Annelida, Porifera, Chordata and Echinodermata). Holothurians of the Euapta lappa species were collected in one season in a harvester (10 juveniles and 17 larvae). The species of fishing importance was not found in the Isostichopus badionotus region, however, given the presence of holothurians in the collectors, it is recommended to expand the spatial range and temporality of the study in order to explore a possible recruitment of commercially important holothurians.

KEYWORDS: Holothurian, Fishery, Sea cucumber

Modeling of biometric relationships of *Callinectes sapidus* of the northeastern sector of the Ciénaga Grande de Santa Marta, Colombian Caribbean

Modelamiento de las relaciones biométricas de *Callinectes sapidus* del sector nororiental de la Ciénaga Grande de Santa Marta, Caribe Colombiano

Modélisation des relations biométriques de *Callinectes sapidus* LE secteur nord-est de la Ciénaga Grande de Santa Marta, Caraïbes Colombiennes

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ABSTRACT

In the Colombian Caribbean, commercial fishing for crab, *Callinectes sapidus* is carried out mainly in the Ciénaga Grande de Santa Marta (CGSM) and its fishery has important social and economic implications, because despite being small-scale fishing, its process is of industrial type and the market objective is mainly export. In order to provide biological-fisheries information for the purposes of fisheries management and sustainable use of the natural resource, the biometric relationships of the species were established through the analysis of 2,785 specimens of *C. sapidus*, carried out between July and December 2018, following the Protocol for the capture of biological, fishing and socioeconomic information in Colombia (Opening of the Base of the Lateral Spines - Abel, Length of the Cephalothorax - Lca, Total Weight Pt (gr), Sex and Sexual Maturity by external observation). The results indicate that the Abel intervals ranged from 12.7 - 6.27 cm, those of Lca intervals between 7.22 cm - 3.65 cm and the total weight between 275.0 g - 26.0 g and the proportion of males: females was 1: 6. Regarding the catch size, 66.4% of the specimens were over 8.5 cm. de Abel, minimum legal size established by the fishing authority for the Colombian Caribbean.

KEYWORDS: *Callinectes sapidus*, CGSM, Caribe colombiano

The classification of nearshore habitats and organisms around Chacachacare Bay, Chacachacare Island, Trinidad and Tobago using a drop camera video system.

La clasificación de los hábitats y organismos cercanos a la costa alrededor de la Bahía Chacachacare, Isla Chacachacare, Trinidad y Tobago utilizando un sistema de video de cámara de caída.

La classification des habitats et des organismes côtiers autour de la baie de Chacachacare, sur l'île de Chacachacare, à Trinité-et-Tobago à l'aide d'un système vidéo à caméra de descente.

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ABSTRACT

Due to a paucity of information regarding the impact of threats faced by coastal ecosystems throughout the world, it is difficult to effectively plan and implement strategies to prevent the decline of these ecosystems. The detailed mapping of coastal areas to identify and locate habitats and ecosystems is an essential first step in creating resources management plans. A coastal classification scheme was developed for Trinidad and Tobago in 1983 by the Institute of Marine Affairs, however, this classification scheme lacks the components necessary to facilitate detailed planning. The Coastal and Marine Ecological Classification Standard (CMECS) was developed to offer a flexible and hierarchical framework that can be applied across various scales making it an ideal system to contribute to effective coastal management planning. For this study the CMECS was applied to the nearshore marine habitats within Chacachacare Bay, Trinidad and Tobago. A drop camera video system was used as the primary data collection tool. Application of CMECS to 63 sites identified 27 rocky, 15 sandy and 21 coral reef habitats throughout the study area which appeared to have experienced a recent phase shift from Porites porites to dominated by macro-algae. The 63 sites surveyed comprised of 4 significantly different biotic groups: branching coral reef, diverse colonizers, leathery/leafy algal bed and turf algal bed. The CMECS method of generating coastal habitat information proved to be a relatively inexpensive yet rapid means of filling gaps in our knowledge of tropical coastal ecosystems.

KEYWORDS: Tropical coastal ecosystems, Coastal classification, CMECS

The fish ecology of thermal springs in Jamaica

La ecología de los peces de las aguas termales en Jamaica

L'écologie des poissons des sources thermales en Jamaïque

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ABSTRACT

Jamaica has over 30 springs. There is a lack of information on tropical springs. Springs that discharge water above the mean annual air temperature (MAAT), which is 24.91°C in Jamaica, are referred to as thermal springs. There are two types of thermal springs- warm and hot springs. Warm springs' temperatures range from 1-2°C higher than the MAAT up to 37°C. Hot springs have a temperature higher than 37°C. In this study both warm and hot springs have been investigated. Fish species have only been identified in the warm springs. Based upon monthly samples collected over a period of 14 months the following fish families and species were observed:

Eleotridae - *Gobiomorus dormitor* (n=2),

Poecilidae - *Limia melanogaster* (n=38), *Gambusia wrayi* (n=75) and *Xiphophorus maculatus* (n=5),

Cichlidae - *Parachromis managuensis* (n=105),

Mugilidae - *Agonostomus monticola* (n=20) and

Gobiidae - *Awaous banana* (n=12)

Of the species captured at the warm spring, X. maculatus and P. managuensis are Jamaican introduced species, making up 43% of the entire fish population. P. managuensis was the most abundant fish species and they constituted 95% of the introduced species population.

Gut-content analyses provided data on the feeding habits of the species. *P. managuensis, G. wrayi* and *G. dormitor* mainly fed on invertebrates. *X. maculatus* and *L. melanogaster* mainly fed on diatoms while A. monticola and A. banana mainly fed on filamentous algae. Pianka's Index was used to identify the percentage overlap for the invertebrates recorded during the gut analyses. This was highest between *P. managuensis* and *A. monticola* (76%). Therefore, they might be in competition for food. This is currently being investigated.

KEYWORDS: springs, fish ecology, fish composition

ddRADseq reveals a genetic break in the South Caribbean: the case of West Indian "whelk" *Cittarium pica* (Gastropoda: Trochidae)

ddRADseq revela un quiebre genético en el Caribe de Colombia: el caso del Burgao *Cittarium pica* (Gastropoda: Trochidae)

ddRADseq révèle une rupture génétique dans les Caraïbes colombiennes: le cas du Burgo *Cittarium pica* (Gastropoda: Trochidae)

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ABSTRACT

The West Indian top shell (*Cittarium pica*) is a key fishery resource in many Caribbean areas. This mollusk lives in intertidal and shallow subtidal conditions on rocky shores and has a short-lived larval phase (<5 days). On the other hand, it is overexploited in a large part of its distribution and listed in the red books of threatened species. Despite its well-recognized conservation importance, there is a lack of molecular resources currently available. For this reason, we used the double digest restriction site-associated DNA sequencing (ddRad-seq) to evaluate the population genomic structure across the Colombian Caribbean. 65 samples were collected in five locations (Cabo de la Vela=12; Santa Marta=15; Cartagena=8; Isla Fuerte=15; Capurganá=15) between 2017 and 2018. A total of 55,112 SNPs were identified, with 35,594 of them being on average polymorphic. Several analyses about the genetic structure performed with AMOVA (Fst=0.224; $p<0.05$), PCoA, Structure (K=3), and an ML tree (3 clusters) indicated that *C. pica* presents three populations (pop 1: Cabo de la Vela; pop 2: Santa Marta; pop 3: Cartagena+Isla Fuerte+Capurganá). Interestingly, all the analyses showed a genetic break between Cabo de la Vela and Santa Marta (Fst=0.175; $p<0.05$) due to the absence of rocky shore habitats along the 300 km of coastline. We discuss that *C. pica* is a good biological model to explain how the southern Caribbean biogeographic barrier operates for those marine organisms that live on rocky intertidal habitats and exhibit a short-lived larval phase or lack it completely. Consequently, these findings open a new debate about the importance of evaluating the effects of the barrier on other aspects of these marine organisms. Finally, the results will improve the management and conservation strategies proposed for *C. pica* in Colombia.

KEYWORDS: Population genomics, Biogeographic barrier, Colombian Caribbean

CNFO Regional Code of Conduct for Caribbean Fisheries

CNFO Código de conducta regional para la pesca del Caribe

CNFO Code de conduite régional pour la pêche des Caraïbes

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ABSTRACT

In order to advance Ecosystem Approach to Fisheries (EAF) management in the Caribbean, there is the need for a Code of Conduct which articulates a shared understanding of what EAF entails at regional and national levels. The Caribbean Network of Fisherfolk Organisations (CNFO) has taken the lead in developing a Regional Code of Conduct for Caribbean Fisheries. This Code was formulated by and for persons in the fishing industry to enhance ecosystem stewardship for fisheries sustainability. The ten Articles of the Code were heavily influenced by FAO Code of Conduct for Responsible Fisheries (CCRF), the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), the Caribbean Community Common Fisheries Policy and its associated Protocols, and the Sustainable Development Goals (SDGs). The Code was accepted by stakeholders on the 30th July 2020 and will be formally endorsed and adopted at the CNFO General Assembly in November. The development of the regional Code is an activity delivered under the 'Developing Organisational Capacity for Ecosystem Stewardship and Livelihoods in Caribbean Small-Scale Fisheries (StewardFish) project'. This project aims to promote EAF application by empowering fisherfolk to engage in resource management and decision making. This poster will illustrate an iterative social learning process which emphasizes industry engagement, formal endorsement, implementation and participatory monitoring and evaluation. Next steps and recommendations suggest actions to inform the implementation of the regional Code and adaptation to the national contexts of seven StewardFish project countries.

KEYWORDS: SSF Guidelines, EAF, fisheries management

Stony Coral Tissue Loss Disease in Belize, a multi-pronged approach to its control and management

Estado de la enfermedad de pérdida de tejido en Belice, un enfoque múltiple para su control y manejo

La maladie de la perte de tissu corallien au Belize, une approche à plusieurs volets pour son contrôle et sa gestion

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ABSTRACT

Stony Coral Tissue Loss Disease (SCTLD) was first confirmed in Belize by the Belize Fisheries Department in June of 2019 inside the Bacalar Chico Marine Reserve and World Heritage Site. Since its detection, SCTLD has spread to over 55km of reef starting from the first confirmed site. In September 2020, it was confirmed offshore in the most eastern of Belize's Atolls– Lighthouse Reef. The National Coral Reef Monitoring Network has been on high alert working closely with its partners. A task force was established that has been assessing spread of the disease as well as conducting trials with possible treatment options. The main species of corals affected included *Dichocoenia stokesi, Meandrina meandrites, Dendrogyra cylindrus, Pseudodiploria strigosa, Eusmilia fastigiata* and *Orbicella faveolata*. Initial treatment included application of Chlorine with Cocoa butter, Chlorine with marine epoxy, Concrete and Coral Ointment Base2b. Recent treatment includes the combination of Coral Ointment Base2b and amoxicillin which is showing positive signs. In addition, pilot trials of in situ nurseries for Dendrogyra cylindrus and increase restoration efforts of non-susceptible Acroporids has initiated. Preliminary results from nurseries indicate that, once there is a high prevalence of infection in the area, the colony may be infected without displaying any phenotypical evidence posing a challenge to restoration efforts since despite its healthy appearance, transferred fragments may only be possible carriers of the pathogens to other sites. The control and management of SCTLD must be a multi-pronged approach- involving a combination of treatment options and the inclusion of multisectorial and multi-institutional efforts.

KEYWORDS: Stony Coral Tissue Loss Disease, Coral Disease, Belize Barrier Reef

Determination of the population structure and connectivity of the commercially important fish "Lane snapper" (*Lutjanus synagris*) and "White grunt" (*Haemulon plumierii*) as a tool for fisheries management in the Honduran Caribbean

Determinación de la estructura y conectividad poblacional de los peces de importancia comercial "Calale" (*Lutjanus synagris*) y "Ronco" (*Haemulon plumierii*) como herramientas para la gestión pesquera en el Caribe hondureño

Détermination de la structure de la population et de la connectivité des poissons commercialement importants " vivaneau de voie " (*Lutjanus synagris*) et " grognon blanc" (*Haemulon plumierii*) en tant qu'outil de gestion des pêches dans les Caraïbes honduriennes

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ABSTRACT

Artisanal fishing is an important economic activity in the Honduran Caribbean, however scientific information is required to identify the adequate management scale for these fisheries. To identify a suitable management scale, we worked with two commercially important fish species, lane snapper (*Lutjanus synagris*) and white grunt (*Haemulon plumierii*), in 4 fishing sites in the Honduran Caribbean. Variations in the body shape of both species were studied through geometric morphometry. These estimates were correlated with environmental variables, to infer the possible cause of the observed variations. In addition, population genetic studies were performed using two mitochondrial (Dloop and ND4) and one nuclear (S7-1) gene. The results of geometric morphometry allowed the identification of populations associated with the environmental conditions of each site. Furthermore, river discharge appears to be the main driving force for the differentiation of body shape for both species. The results of the genetic analysis show a high connectivity and genetic diversity, considering the lane snapper as a single genetic stock and the white grunt with different populations within the area. These results emphasize the need to carry out an integrated coastal marine management at a National level through a marine biological corridor, which can help curb the main threats to marine species such as river discharges.

KEYWORDS: Marine conservation, Fishing stocks, Body shape

The Caribbean has a data MERMAID!

¡El Caribe tiene una MERMAID de datos!

Les Caraïbes ont une MERMAID de données!

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ABSTRACT

The Marine Ecological Research Management AID (MERMAID) was conceptualised as a field-ready tool which vastly reduces the time taken for survey data to be translated into evidence-based management decisions. The need was seen for a tool which reduced the effort spent in validating and reformatting data to facilitate collaboration, communications and decision making. Data collectors log in using either a dedicated or a Google account to enter raw data directly into the platform, where it is automatically cleaned, validated, and georeferenced. MERMAID's platform allows web browsers to store data offline, uploading it to the cloud when internet connectivity is resumed. This function allows field scientists to enter their data even in remote locations with no internet access.

After the data is submitted, administrators are able to download and share a .csv containing the data and its metadata for analysis, and a map-based dashboard allows stakeholders and decision makers to see the sites that have been surveyed from any browser. The public can also see the surveying organisation, and charts describing characteristics such as benthic cover and fish species biomass and composition.

Initial development was a collaborative effort between the Wildlife Conservation Society, The World Wildlife Fund and SparkGeo, and was based on Indo-Pacific taxa. In early 2020, MERMAID launched in the Atlantic region, adding hundreds of Atlantic-specific species and support for AGRRA-compatible surveys, with Glover's Reef in Belize as its pilot site. We are in the process of ingesting legacy data from Glover's Reef into the database.

KEYWORDS: Data, Conservation, GIS

Engaging recreational fishers in Marine Spatial Planning (MSP) in Bermuda

¿Comó involucrar a los pescadores recreativos en el ordenamiento espacial marino en las Bermudas?

Comment impliquer les pêcheurs récréatifs dans la planification spatiale maritime aux Bermudes?

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ABSTRACT

The Bermuda Ocean Prosperity Programme is utilizing Marine Spatial Planning (MSP) to optimize sustainable growth across the maritime economy, based on sector-specific assessments, while managing marine resources for the future by incorporating 20% of Bermuda's EEZ within a network of fully protected areas (MPAs). The stakeholder engagement process, centered on working groups called the Ocean Village, recruits sector representatives who then reach out to their organizational members and personal networks in order to acquire wide-ranging input on the MSP objectives and the spatial distribution of particular stakeholder activities, the latter facilitated by participatory GIS. This works well for industry groups, but less efficiently for recreational activities. At present, lobster diving and spearfishing are the only recreational fishing activities that are licensed, with known participants. The Lobster Divers Association facilitates easy contact with this sector, ensuring good representation, but spearfishers are fewer in number and not formally organized beyond social media groups. Angling clubs are known stakeholders but only cover ~8% of recreational hook and line fishers, primarily those targeting pelagic species. Reef and shoreline fishers are not well represented by the clubs, and contacting these stakeholders is challenging. Facilitators therefore utilized social media and personal networks to identify potential participants for this working group. Further, while email communications were standard, some fishers preferred to communicate by phone or messaging apps. This highlights that overarching models of stakeholder engagement may not fit all sectors, especially for recreational activities, so multiple approaches are necessary, social networking is useful, and flexibility is key.

KEYWORDS: Marine Spatial Planning, recreational fishing, stakeholder engagement

Balancing the recreational spiny lobster diver fishery with the small scale commercial lobster trap fishery in Bermuda

Equilibrando la pesquería recreativa de buzo de langosta espinosa con la pesquería commercial de trampas en las Bermudas

Équilibrer la pêche récréative des plongeurs au homard avec la pêche commerciale aux casiers aux Bermudes

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ABSTRACT

In Bermuda, Caribbean spiny lobster, Panulirus argus, has traditionally been targeted by a commercial trap fishery and by recreational free-divers, with the typical conflict between commercial and recreational sectors. The Fisheries Act, 1972, legislated a fishery closure during the reproductive season and set a minimum size. The diver fishery was loosely regulated via gear restrictions and a daily bag limit, with fishing prohibited in certain inshore areas. However, amidst declining finfish catches in the 1980s, the 1984 Fisheries Management Plan sought to eliminate the diver fishery and reserve the available lobsters for the trap fishery in order to help commercial fishers. In response, an association was formed to lobby against the closure of the recreational fishery. Thus the recreational lobster diver licensing program began, facilitating tracking of diver numbers and catches. Recreational lobster divers typically caught the equivalent of 10% of the commercial catch, although ten times more fishers were involved. However, the bag limit promoted high-grading, as did tournaments. Many divers purchased licences even when they did not fish, because they feared that licences might be eliminated or capped in the future. The limits imposed by free-diving, along with prevailing autumn weather patterns, concentrate the recreational harvest close to shore, particularly off the west end of the island, fuelling conflict with commercial fishers in that area. A decline in the overall abundance of lobsters over the past 5 years has increased intersectoral conflict, and restrictions on the commercial fishery were balanced with a cap on recreational licences. The Lobster Divers' Association represented their sector in meetings with commercial fishers, and has also facilitated expanded opportunities for biological sampling.

KEYWORDS: spiny lobster, recreational fishing, diver fisheries

Natural shields for Caribbean insular territories: Wave and wind attenuation by coral reef barriers and mangroves at San Andrés Island, Seaflower Biosphere Reserve, Colombian Caribbean.

Escudos naturales para territorios insulares del Caribe: Atenuación de olas y viento por barreras de arrecifes de coral y manglares en la Isla San Andrés, Reserva de la Biosfera Seaflower, Caribe Colombiano.

Boucliers naturels pour les territoires insulaires des Caraïbes: Atténuation des vagues et du vent par les barrières de corail et les mangroves sur l'île de San Andrés, Réserve de biosphère de Seaflower, Caraïbes colombiennes.

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ABSTRACT

Caribbean insular and coastal territories are exposed to strong winds, waves, storms, and hurricanes. Coral reefs and mangroves can provide coastal protection ecosystem services (ES) that become vital for human wellbeing specially under an insular context. Despite of that, these ecosystems has been deteriorated by several anthropic pressures worldwide, putting on risk the benefits we receive from them. Changes on management and decision making are needed to protect these necessary ecosystems for our survival, and for Caribbean people´s wellbeing, in our study we collected evidences from the field to better visualize the importance of coral reef barriers and mangroves at insular territories such as the San Andrés, Island, Seaflower Biosphere Reserve located at the Archipelago 180.000 km2 of Colombian oceanic waters. For that, we measured on field wave attenuation provided by barrier reefs and found wave height attenuation up to 90% under different sea conditions, waves at forereef up to 4.5 m height (Hs), were reduced to 50 cm due to barrier reefs. We also conducted wind speed field measurements during a high-speed winds season during 2020 at areas with and without mangrove trees over the windward

coastline, and found that just one single mangrove can reduce 70% of wind speed on average, our theorical projections suggest that mangroves can reduce wind speed maintaining non damaging conditions to infrastructure even under a category 2 hurricane. These results motivate us to keep on further research on these subjects and are evidences that encourage decision makers at Caribbean to invest on protection and restoration of these ecosystems as a Nature Based Solutions-NBS for coastal protection.

KEYWORDS: Coastal management, Ecosystem Services, Seaflower

Mitochondrial analysis reveals *Octopus insularis* as the common shallow-water octopus of the Colombian Caribbean

Análisis mitocondrial revela que *Octopus insularis* es el pulpo común en las aguas poco profundas del Caribe colombiano

L'analyse mitochondriale révèle *Octopus insularis* comme la pieuvre commune des eaux peu profondes des Caraïbes colombiennes

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ABSTRACT

The common octopus of the Colombian Caribbean has been considered for several years as *Octopus vulgaris*, local artisanal fisheries exploit this species of great ecological and economic importance, and however, a complete evaluation of its identity has not been made so far. In order to address its identification and its relationships with other members of the *Octopus vulgaris* species complex, 58 octopuses were sampled from five localities of the Caribbean coast (Providencia, San Andrés, Santa Marta, Cartagena and Isla Fuerte) and were genetically identified. The molecular analysis of the 16S ribosomal RNA (r16S), Cytochrome oxidase subunit III (COIII) and Cytochrome oxidase subunit I (COI) mitochondrial genes revealed the presence of *Octopus insularis* as the common shallow-water octopus of the Colombian Caribbean. The topologies generated by the three genes confirmed the monophyletic status of the specie showing individuals collected in this study and *O. insularis* from different locations, as a solid cluster supported by high values. Genetic distances of the mitochondrial genes also confirmed this finding (0.000 – 0.003). Our results allow to extend the known distribution of *O. insularis* to the southwestern Caribbean – Colombian coast, solving the identity of the common octopus in this region. We discuss our results in the context of the recent octopus species misidentifications involving members of the *O. vulgaris* species complex in Colombia and emphasize the importance of molecular studies in the delimitation and clarification of species identity, especially those that are exploited, in such a way that marine resources can be properly managed.

KEYWORDS: Mitochondrial DNA, Species delimitation, cryptic specie

Functional diversity: a need for assessing the ecological response of reef fish assemblages to a disturbance in protection strategies

Diversidad funcional: Una necesidad para evaluar las respuestas ecológicas de los ensamblajes de peces arrecifales a disturbios en estrategias de protección

Diversité fonctionnelle: nécessité d'évaluer la réponse écologique des assemblages de poissons de récif à une perturbation des stratégies de protection

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ABSTRACT

Developing and evaluating process-oriented metrics, such as functional trait diversity metrics, is a high priority to assess the ecological responses of reef fish communities to disturbances and for adaptive ecosystem-based management in marine protected areas (MPAs). We applied five functional diversity metrics (functional entities, redundancy, richness, dispersion, and evenness) to fish assemblage data from an 11-year monitoring dataset of coral reefs in the U.S. Virgin Islands to assess: 1) the spatio-temporal variance in the trophic function of fish communities before, during and after a mass coral bleaching event in 2005; and 2) the association of fish functional diversity with benthic composition, diversity, and structure of reefs inside and outside of No-Take and Multiple Use MPAs. The lack of spatial variation in fish functional diversity metrics suggested no MPA effects during the evaluated time. After the coral bleaching event in 2005, the number of fish functional entities, functional richness, and variation (dispersion) declined inside a No-Take MPA in St. Croix, failing to return to pre-disturbance values over the subsequent seven years. Reefs with high topographic complexity and hard coral species richness supported high richness and redundancy of functional roles. We concluded that functional diversity metrics based on the trophic function of fishes should be considered as tools to monitor ecological functional recovery in MPAs.

KEYWORDS: Functional diversity, fish assemblages, coral reefs

Community-based natural resource management in Roatan

Manejo comunitario de los recursos naturales en Roatán

Gestion communautaire des ressources naturelles à Roatan

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ABSTRACT

Community-Based Natural Resource Management (CBNRM) has been heralded as an effective governance approach to manage the commons. Nonetheless, establishing CBNRM in Latin America and the Caribbean has posed a series of challenges. The governance process in the Bay Island National Marine Park (Honduras), particularly in the island of Roatan, provides an opportunity to evaluate a successful applied example of CBNRM within a Marine Protected Area in the Caribbean. As part of the Mesoamerican Barrier Reef, most of Roatan's revenue comes from reef-related tourism. Like many protected areas in the Region, the Bay Island National Marine Park was initially governed through a conventional top-down approach. Nonetheless, in the early 2000s the system began to transition towards CBNRM. To assess the enabling conditions that led to an established CBNRM in Roatan we analyzed stakeholders' perceptions through one on one open-ended interviews with key stakeholder and structured closed-ended questionnaires. Perceptions on effectiveness of patrols and satisfaction with the management of natural resources have increased steadily in the past decade and appear to have stabilized around a 70% satisfaction rate in the past 3 years. According to stakeholders, local NGOs have been key in driving this transition. Additionally, CBNRM in Roatan has excelled in 5 governance principles: 1. Public trust and legitimacy; 2. Research and information development; 3. Monitoring, feedback and accountability; 4. Enabling environment and 5. Conflict resolution and cooperation, while still maintaining positive perceptions of the other 7 principles (37 – 49% level of agreement). The Roatan case study highlights the importance of strengthening local organizations and developing trust among stakeholders to achieve CBNRM, which can often be a long-term process.

KEYWORDS: Community-based natural resource management, Roatan, Marine Protected Area

Community participation a strategy for the monitoring and control of lionfish in the Mexican Caribbean

La participación comunitaria una estrategia para el monitoreo y control del pez león en el Caribe Mexicano

Participation communautaire: stratégie de surveillance et de contrôle du poisson-lion dans les Caraïbes mexicaines

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ABSTRACT

The invasion of the lionfish (*Pterois volitans / miles*) is considered one of the main threats to the marine biodiversity of the Caribbean and the Gulf of Mexico. Eleven years after its first confirmation in Mexico, the lionfish has managed to establish itself in different habitats and depths of the Banco Chinchorro Biosphere Reserve (RBBC) and the Arrecifes de Xcalak National Park (PNAX). Considering that its eradication is practically impossible; different sectors such as fisheries, government, civil society, among others, have implemented a strategy to address the lionfish problem. As a result, the fishing and community sectors have participated in activities like lionfish control, use, monitoring and dissemination/education. Due to the fact that between 2009-2019 more than 15,000 lionfish have been caught and registered, a groups of fishermen and young people have also been trained to carry out biological monitoring of the species. Regarding dissemination and education, coastal and influential communities have been engaged through interviews, informative talks, gastronomic tastings, children's festivals and games, with the goal being that these communities can learn about the problems of the invasion and promote its use through the commercialization of meat, crafts and local consumption. Among the main results, a strong appropriation of the fishing and community sectors regarding lionfish control actions, knowledge of population aspects of the species and finally, options for the use of lionfish have been identified that generate income to the communities. These actions help to conserve the marine ecosystems in the area and create shared responsibility between the government and the population.

KEYWORDS: Pez león, Caribe Mexicano, Banco Chinchorro

Fish structure in three reef areas with different management actions, Colombian Caribbean Seaflower Biosphere Reserve

Estructura de peces en tres áreas arrecifales con distintas acciones de manejo, Reserva de Biosfera Seaflower Caribe Colombiano

Structure des poissons dans trois zones récifales avec différentes actions de gestion, Réserve de biosphère des Seaflower des Caraïbes colombiennes

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ABSTRACT

The Caribbean region contains a high diversity of fish and a large part of them are associated with coastal ecosystems, including coral reefs, despite the loss of coverage and coral species and the lack of management, the structure of the fish community is changing. Therefore, it was proposed to assess the structure of the fish community associated with the reef areas with different management actions in the San Andrés y Providencia Archipelago - Seaflower Biosphere Reserve. Visual censuses were carried out by diving, in 15 transects of 100 m^2 band, in three areas during the year 2019, on San Andrés Bajo Bonito Island (SBB) and Providencia Island Pináculos Norte (PPN) and Pináculos Parque (PPP), this last in the MacBean National Natural Park AMP (PNNMB). The results present a spatial gradient and direct relationship from lowest to highest, according to management actions. Thus in SBB the results show the lowest figures, in abundance (1548 individuals), richness (32 species), biomass (16,553 g / 100 m2), while in PPP the highest abundance (3717 individuals), richness (136 species) and biomass (112,023 g / 100 m2). Likewise, it is highlighted that the PPP area has several species that were categorized as threatened, which in other areas are decimated or absent, such as fish of commercial interest (groupers and chernas) and ecologically (parrotfish). In San Andrés there is greater overfishing and loss of habitat, which requires more effective management and on the island of Providencia the purpose of the PNNMB to conserve ecosystems and key species is contributing to fishing productivity and environmental sustainability.

KEYWORDS: Marine protected areas, fish assemblage, ichthyofauna

MPA effects revealed by the first assessment of Puerto Rico's coral reef elasmobranchs

Primera evaluación de los elasmobranquios de los arrecifes de coral de Puerto Rico revela el efecto de Reserva Marina

Effets de l'AMP révélés par la première évaluation des élasmobranches des récifs coralliens de Porto Rico

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ABSTRACT

Understanding the role of marine predators in trophic web is important to be able to evaluate functional ecosystems. Coral reef ecosystem assessments often lack data on the abundance of elasmobranchs as they are rarely quantified in visual survey methods. MPAs with coral reef habitats can provide a reference upon which to compare the biodiversity in other areas. Sharks and rays on shallow coral reefs were sampled throughout the Puerto Rico archipelago to quantify species diversity, occurrence and relative abundances with 296 baited remote underwater video (BRUV) deployments in 2018. The two most abundant sharks were the reef shark (*Carcharhinus perezi*) and the nurse shark (*Ginglymostoma cirratum*), while the rays observed most frequently were the Southern stingray (*Hypanus americanus*) and the Spotted Eagle ray (*Aetobatus narinari*). Preliminary results of this research demonstrated significant differences in the diversity, frequency of occurrence and MaxN of the two most abundant shark species between MPA and other areas. This study provides results that can lead to prioritizing essential fish habitats of elasmobranchs throughout the Puerto Rican insular platform considering the ecosystem-based approach.

KEYWORDS: sharks, rays, Puerto Rico

Contemporary and emerging fisheries in The Bahamas— Conservation and management challenges, achievements and future directions

Pesquerías contemporáneas y emergentes en las Bahamas — Desafíos de conservación y ordenación, logros y direcciones futuras

Pêcheries contemporaines et émergentes aux Bahamas — Défis, réalisations et orientations futures en matière de conservation et de gestion

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ABSTRACT

Marine resources are culturally and economically vital to The Bahamas and other small island developing states. Species including Caribbean spiny lobster (*Panulirus argus*), queen conch (*Lobatus gigas*), Nassau grouper (*Epinephelus striatus*) along with other fish and invertebrate species are sold both locally and to international markets. Illegal, unreported and unregulated fishing coupled with inadequate regulations and enforcement are the main factors contributing to the decline of Bahamian fisheries along with other anthropogenic impacts. Using case studies of economically and ecologically important species, we highlight conservation successes, knowledge gaps and deficiencies in existing management approaches. Ultimately by enhancing conservation management strategies for traditional and emerging fisheries, biodiversity loss can be mitigated, and ecosystem services can be improved for the benefit of the people of The Bahamas.

KEYWORDS: extractive fisheries, marine protected areas, recreational fishing

Indicators of sustainability of artisanal fishing in the southern Gulf of Mexico

Indicadores de sostenibilidad de la Pesca Artesanal en el Sur del Golfo de México

Indicateurs de durabilité de la pêche artisanale dans le sud du golfe du Mexique

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ABSTRACT

The state of artisanal fisheries in the southern Gulf of Mexico is evaluated, using information from the field and from arrival notices from the ports of Carmen and Champotón. Sustainability is analyzed through the metiers approach, with a framework of 30 sustainability indicators in the Ecological, Socioeconomic, Technological and Institutional fields based on the concept of Sustainable Development and the Code of Conduct for Responsible Fisheries. The integration of the indicators and the obtaining of a sustainability index (on a scale from 0 to 100) was carried out using the traffic light approach and the weighting of the scores. Of the 7 métiers evaluated, the métiers with the lowest indices correspond to those who fish for seven baleen shrimp (25) and those who fish by spear (35), while the robaleros (57) and gareteros (54) were the metiers with the highest indices. The field with the lowest index was Institutional, while the indicators that showed the lowest scores were: the level of compliance with the legislation for quotas and seasonal / spatial closures, the type of processing that is given to the product before selling it, the efficiency in the collection of statistics, the wear or destruction of fishing gear and the overlap of the fishing season with the reproduction of the species. The study contributes to understanding the state of sustainability and the main challenges of artisanal fishing in Campeche, whose recommendations can serve to guide future fishing management strategies.

KEYWORDS: sostenibilidad, indicadores, métier

Founder effect in an invasive marine fish: the case of the lionfish *Pterois volitans* in the southwestern Caribbean

Efecto fundador en un pez marino invasor: el caso del pez león *Pterois volitans* en el suroeste del Caribe

Effet fondateur sur un poisson marin envahissant: le cas du poisson-lion *Pterois volitans* dans le sud-ouest des Caraïbes

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ABSTRACT

The lionfish *Pterois volitans* has become an invader of the greater Caribbean for more than a decade, and since then, the detailed study of its biology and attributes has become of great importance for understanding its impact on the dynamics and structure of ecosystems. In order to confirm the reduction in their genetic diversity a mitochondrial DNA analysis was carried out and 10 novel species-specific nuclear microsatellite were designed. Samples were taken from two locations in the Southwestern Caribbean: San Andrés (SA) and Santa Marta (SM), during the initial period of the invasion (2009-2012). Mitochondrial analysis of the control region included 432 sequences (155 SA and 277 SM) that initially showed the presence of three haplotypes (H1, H2 and H4) in the invasive population of Colombia, and the arrival of a fourth haplotype (H3) represented by a single individual collected in San Andres in 2010. Moreover, a spatio-temporal nuclear analysis of 364 samples (187 of SA and 177 of SM) indicated significant deviation from Hardy–Weinberg equilibrium in all the loci due to an excess of homozygotes. Observed heterozygosity values (Ho) were below the expected heterozygosity (He) and no spatial differences were found between SA and SM. Nevertheless, temporal analysis showed genetic structure in three subpopulations K = 3. These results are evidence of the arrival of genetic material from the source population in the mentioned periods, with a mixing period in 2012. Our findings clearly demonstrate the initial action of the founder effect on the invasive lionfish populations, represented in a high reduction of its genetic variability, deficit of heterozygotes, inbreeding processes and genetic drift, which constitutes a disadvantage for the success of this invasive fish.

KEYWORDS: Founder effect, Mitocondrial DNA, Microsatellite

Expansion of the invasive lionfish (*Pterois miles* and *Pterois volitans*) along the northern reef tract of Bermuda from 2014 - 2019

Expansión del pez león invasor (*Pterois miles y Pterois volitans*) a lo largo de la zona de arrecifes del norte de las Bermudas de 2014 a 2019

Expansion du poisson-lion invasif (*Pterois miles* et *Pterois volitans*) le long du récif nord des Bermudes de 2014 à 2019

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ABSTRACT

Bioinvasions have impacted Western Atlantic and Caribbean coral reef ecosystems, reducing their resilience and capacity to cope with other stressors. *Pterois miles* and *P. volitans*, originally from the Indo-Pacific and collectively known as lionfish, have now spread throughout the Western Atlantic, and pose a significant ecological threat to important native fishes and coral reef ecosystems. In 2000, Bermuda was the first jurisdiction outside of the United States to document non-native lionfish and, although they were initially uncommon, a lionfish culling program was established in 2008, and extensive surveys of lionfish densities and distribution across the Bermuda platform were carried out in 2013-14. Here we reassess the status and impact of the invasive population by repeating surveys of lionfish density, prey fish density, and prey fish biomass at five of the previously surveyed sites, across four depth zones: 10 m, 20 m, 30 m and 60 m, with a primary focus on the northern reef tract where initial lionfish densities were low and there has been little culling effort. Between 2014 and 2019, significant increases in lionfish density were found at sites along the northern reef tract at depths of 30 m and 60 m. Sites along the southern reef tract at 60 m depth with historically high lionfish densities maintained significantly greater lionfish densities than those on the northern reef tract. Prey fish diversity and biomass increased significantly at nearly all sites and depths. Notably, the XL site at 60 m experienced a significant reduction in lionfish density from 2014 to 2019, which is attributed to regular culling at that site. This reduction in lionfish density at XL coincided with a significant increase in fish biomass, highlighting the importance of active management to control lionfish populations.

KEYWORDS: bioinvasion, lionfish, prey fish

Monitoring Stony Coral Tissue Loss Disease (SCTLD) in the Cayman Islands

Monitoreo de la enfermedad de pérdida de tejido de coral pétreo (SCTLD) en las Islas Caimán

Surveillance de la maladie de la perte de tissu de corail pierreux (SCTLD) dans les îles Caïmans

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ABSTRACT

Coral reefs are considered one of the most diverse and important ecosystems on earth, but they are also one of the most fragile (Crabbe, 2009). Stony corals in the Caribbean region have significantly declined over the past four decades due to a myriad of factors, including coral disease. Stony Coral Tissue Loss Disease (SCTLD) is a novel coral disease that first emerged on Floridian coral reefs in 2014 (Precht et al., 2016). It since has spread throughout the Florida Reef Tract, to areas in the Northern Caribbean, and most recently, the Cayman Islands. SCTLD is known to affect more than 20 species of important reef-building corals (AGRRA, 2020) and coral mortality from the disease is rapid in comparison to other coral diseases in the region, both at present and historically (Coral Health and Disease, 2004). Researchers have been unable to determine the mode of transmission of SCTLD however; evidence suggests it is a bacterial pathogen that is transmitted by direct contact and water circulation (Aeby et al., 2019). The Cayman Islands Department of Environment (CIDOE) began monitoring efforts in June of 2020, immediately following an observation report at a solitary site on the North coast of Grand Cayman. Repeated measures monitoring was carried out at the infected site and at a control site 1.8 km away in anticipation of SCTLD traveling by various transmission vectors over time. These two sites were assessed using photogrammetry techniques to track the progression of the disease laterally across the benthic habitat and between species. The results from this research will aid in understanding the spread of this virulent coral disease to inform the Cayman Islands Government and the Caribbean region on immediate mitigation tactics, remediation policies, and necessary legislation to manage future coral disease outbreaks.

KEYWORDS: Coral, Disease, Monitoring

Microplastic studies in the Bay Islands, Honduras

Estudios de microplástico en Islas de la Bahía, Honduras

Études microplastiques dans les îles de la Baie, Honduras

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ABSTRACT

Approximately eight million metric tons of plastic enter the oceans every year. Microplastic in marine species have multiple effects like weight loss, reduced feeding activity, hepatic toxicity, change in behavior, endocrine alteration and even death. Plastics are associated with chemical additives which bioaccumulate and thus transfer to the rest of the food chain.

To date, there has been no studies on microplastics conducted in the Bay Islands National Marine Park (BINMP), Honduras. This study aims to determine the amount of microplastic pollution by processing the digestive tracts of varying species with potassium hydroxide (KOH). Furthermore, we will identify the organisms that these species are feeding on. Targeted species to be processed include: lionfish (*Pterois sp.),* commercial fishes and beached animal samples (Hammerhead shark (*Sphyrna lewini*), Beacked whale (*Mesoplodon europaeus*), hawksbill turtle (*Eretmochelys imbricata*) and Red footed booby (*Sula sula*)).

Results from this study will establish a baseline on microplastics in BINMP. Data will be presented to managers of the marine protected area to increase mitigation actions against marine litter.

KEYWORDS: Microplastic, Pollution, Lionfish