74th Gulf and Caribbean Fisheries Institute
POSTER ABSTRACTS

Elemental composition of holopelagic Sargassum along Jamaica's coast

Composición elemental del sargazo holopelágico a lo largo de la costa de Jamaica

Composition élémentaire de Sargassum holopeélagique le long de la coôte de la Jamaïïque

JHÉNELLE WILLIAMS[1], JOHANN ANTOINE[1]
[1]International Centre for Environmental and Nuclear Sciences (ICENS), 2 Anguilla Close, UWI Mona Campus, Kingston 7, Kingston, Jamaica
jhenelle.williams@uwimona.edu.jm

ABSTRACT

The influx of large masses of the macroalgae Sargassum has impacted coastal activities regionally, including Jamaica. To address these nuisance blooms, including the possible valorization of the algae, studies including elemental investigations have been undertaken. One hundred and five fresh Sargassum samples were collected from across six sites along Jamaicaâ€™s coast inclusive of the species *S. fluitans* III and *S. natans* (morphotypes I & VIII). Neutron activation analysis was used to analyse the samples for the elements, Al, As, Br, Ca, Cl, Co, Cs, Eu, Fe, K, La, Mg, Rb, Sb, Sc, Sm, Sr, & Zn. The Direct Mercury Analyzer (DMA-80) was used to analyse for Hg. Statistical analysis, including factor analysis, Kruskal-Wallis ANOVA and agglomerative hierarchal clustering (AHC), were used to discern patterns in the holopelagic species collected for this study. The results of the elemental analysis indicated high levels of the potentially toxic metalloid arsenic and relatively low concentrations of the potentially toxic metal mercury in all species. The results of the statistical analysis indicated that there are significant differences in the levels of some elements (Al, Cl, Co, Fe, Hg, K, La, Mg, Rb, & Sm) in *S. fluitans* III, *S. natans* I and *S. natans* VIII and that that location and by extension residence time in coastal waters before collection may influence elemental content. The study also suggested more similarity between *S. fluitans* III and *S. natans* VIII compared to *S. natans* I. The study fills the gap in knowledge on species composition needed for valorization interests.

KEYWORDS: *Sargassum fluitans, Sargassum natans*, Elemental Analysis, Jamaica, Multivariate Analysis

Perception of artisanal fishermen on the invasion, control and affectation of lionfish in the Mexican Caribbean.

Percepción de los pescadores artesanales sobre la invasión, control y afectación del pez león en el Caribe Mexicano.

Perception des pêcheurs artisanaux sur l'invasion, le contrôle et l'affectation du poisson-lion dans les Caraïbes Mexicaines.

MIGUEL MATEO SABIDO ITZÁ[1], MARTHA BEATRIZ HERNÁNDEZ MILLÁN[2], SÉBASTIEN PROUST[3], SHEILA DOMIÍNGUEZ GUZMÁN[2], MELISSA PALMA MOO[2], HORACIO RICÓN BELTRÁN[2]
1Instituto de Biodiversidad y Áreas Naturales Protegidas, Hidroeléctrica de Mal Paso # 389, Chetumal, Quintana Roo, México, 2Tecnoloógico Nacional de México campus Chetumal, Quintana Roo, México 3Programa de Pequerías Donaciones del FMAM, calle 17b, por 18 y 14, Num 98H, Mérida, Yucataán, México
mateosabido@gmail.com

ABSTRACT

Durante la última década, la investigación sobre las percepciones públicas del ambiente marino ha crecido de manera significativa y se ha convertido en una herramienta útil para los encargados de formular políticas públicas, manejadores, conservacionistas, científicos y educadores. En este sentido el conocimiento tradicional de los pescadores puede proporcionar información única que deben ser integrados en los aspectos ecológicos, económicos, sociales e institucionales para un mejor manejo de los ecosistemas acuáticos y sus amenazas como lo son las especies invasoras. En la región del Caribe y Mediterráneo, se han realizado estudios de percepción social para conocer el conocimiento general sobre la invasión del pez león, destacando que la población tiene un conocimiento general sobre las afectaciones del pez león, por ello el presente estudio presenta los primeros resultados sobre la percepción y conocimiento del sector pesquero sobre la invasión del pez león, su control, aprovechamiento y afectaciones a diversos sectores como el ambiental y socioeconómico en la Reserva de la Biosfera Banco Chinchorro y Parque Nacional Arrecifes de Xcalak en el Caribe Mexicano. Entre los principales resultados destaca que a 11 años de invasión el 100% de los pescadores conocen y han capturado al pez león, sin embargo, actualmente solo el 83% continúan realizando capturas frecuentemente y lo utilizan para autoconsumo debido a su excelente sabor. Los pescadores artesanales observan la invasión del pez león como una amenaza a los ecosistemas costeros y en menor medida a la economía pesquera y salud personal, por último los pescadores observan en la actualidad mayores amenazas a los ecosistemas y economía como el cambio climático, el sargazo y contaminación marina.

KEYWORDS: Pez león, percepción, especie invasora, Caribe Mexicano, Banco Chinchorro

Community response to the threat of stony coral tissue loss disease in Utila,Honduras

Respuesta comunitaria ante la amenaza de la enfermedad de perdida de tejido en corales duros en Utila, Honduras

Réponse de la communauté à la menace de la maladie de la perte de tissus des coraux durs à Utila, au Honduras

ELY AUGUSTINUS[1], ANDREA IZAGUIRRE[1], DANIELA MEJIA[1], JOHN BODDEN[1], PAMELA ORTEGA[1], CAITLIN CHOCK[1]

[1]*Bay Islands Conservation Association, Chapter Utila, Utila, Islas de la Bahía*

ely.augustinus@bicainc.org

ABSTRACT

La enfermedad de pérdida de tejido en corales duros o SCTLD por sus siglas en inglés, es una nueva enfermedad letal que afecta a más de 22 especies de corales duros y se ha extendido a lo largo de 16 países. En Honduras se detectó por primera vez en la isla de Roatán en septiembre del 2020, esto dio paso a la conformación del Grupo de Respuesta de SCTLD para Utila, grupo conformado por 3 organizaciones y voluntarios los cuales desde diciembre del 2020 realizan monitoreo mensual en 10 sitios alrededor de la isla, levantando información de línea base utilizando la metodología "Rover Diver" a manera de encuesta rápida para la identificación temprana de la enfermedad. Desafortunadamente, en junio del 2021 se identificaron las primeras colonias con presencia de SCTLD al norte de Utila, dando comienzo así a la etapa de intervención y capacitación a la comunidad para que puedan integrarse en las actividades que se tienen identificadas dentro del plan de intervención y monitoreo que se está desarrollando. Los próximos pasos están enfocados en una campaña de concientización con la comunidad, centros de buceo, pescadores y tomadores de decisiones, así como el establecimiento de un centro de conservación de corales.

KEYWORDS: SCTLD, Honduras, Área Marina Protegida

The removal and reintroduction of Symbiodiniaceae in *Montipora capricornis*

La eliminación y reintroducción de Symbiodiniaceae en *Montipora capricornis*

L'élimination et la réintroduction des Symbiodiniaceae dans *Montipora capricornis*

COURTNEY COLLINS[1], ANTHONY ALBERDA[1], JANE CAFFREY[1], ALEXIS JANOSIK[1]
[1]The University of West Florida, 11000 University Pkwy, Pensacola, FL, United States,
crc70@students.uwf.edu

ABSTRACT

Coral reefs are a critical habitat in tropical ecosystems. They create a barrier that reduces storm surge, provide medicines, and are estimated to affect 25% of the fish in the ocean. Unfortunately, coral reefs around the world are dying at an alarming rate. Corals survive by having a symbiotic relationship with Symbiodiniaceae, a photosynthetic dinoflagellate that lives within the tissue of corals. Symbiodiniaceae uses photosynthesis to turn sunlight into glucose, glycerol and amino acids for its holobiont (coral host). Understanding the role that temperature plays in this relationship is crucial to understanding how to help corals survive mass bleaching events. This experiment tests the ability of the coral *Montipora capricornis* to expel its Symbiodiniaceae and gain a different species of Symbiodiniaceae. *M. capricornis* naturally has one of the most abundant species of Symbiodiniaceae from the genus Cladocopium (C15h). The *Cladocopium* sp. was purposefully expelled from the *M. capricornis* by increasing the water temperature of the tank, simulating rising temperatures in the ocean, to allow for the reintroduction of *Symbiodinium trenchii*, a *Durusdinium* sp. with a greater resistance to temperature change. The *S. trenchii* were cultured, and once the *M. capricornis* was successfully bleached, the *S. trenchii* was introduced. We sampled coral tissue to determine if the *S. trenchii* successfully replaced the original zooxanthellae, DNA and Chlorophyll A. In addition, oxygen concentrations in the coral boundary layer were measured in light and dark before, during, and after the bleaching to test the differences in oxygen production.

KEYWORDS: Symbiodiniaceae, Montipora, Bleaching, Chlorophyll A, Coral

The impacts of *Halophila stipulacea* on growth and survival of economically important *Ocyurus chrysurus*

El impacto de *Halophila stipulacea* en el crecimiento y la supervivencia del económicamente importante *Ocyurus chrysurus*

Les impacts de *Halophila stipulacea* sur la croissance et la survie *d'Ocyurus chrysurus* d'importance économique

SOPHIA COSTA[1], SENNAI HABTES[2], DEMIAN WILLETTE[3], RICHARD NEMETH[1]
[1]University of the Virgin Islands, 8168 Crown Bay Marina, STE 505 491, St Thomas, US Virgin Islands, Virgin Islands, U.S., [2]USVI Department of Planning and Natural Resources,
[3]Loyola Marymount University
sophia.costa@students.uvi.edu

ABSTRACT

As anthropogenic impacts increase, it is critical to understand how the consequences will affect commercially important fisheries species. Many of these species, like yellowtail snapper (*Ocyurus chrysurus*), depend on seagrass beds as critical nursery habitat. Since 2002, a non-native seagrass, *Halophila stipulacea*, has become widespread throughout the Caribbean, arriving in St. Thomas in 2013. The impacts of *H. stipulacea* on juvenile yellowtail snapper habitat is not well understood, yet, has the potential to disrupt essential fish habitats and reduce important fishery resources. Previous studies have demonstrated that *H. stipulacea* can reduce juvenile fish abundance, species diversity, and condition factor, suggesting that *H. stipulacea* may have a strong negative affect on growth and survival of juvenile reef fishes. In this study we analyzed the impacts of *H. stipulacea* on the settlement, mortality, and health of juvenile yellowtail snapper. Preliminary results suggest that there is a higher settlement frequency in *H. stipulacea* seagrass beds than in *Syringodium filiforme* seagrass habitats, however not than *Thalassia testudinum* seagrass habitats. Additionally, individuals caught in *H. stipulacea* seagrass habitats had a significantly higher condition factor, measurement of health, than individuals caught in native *S. filiforme*, but no significant difference than individuals caught in native *T. testudinum*. These data can be used in ecosystem-based fisheries management to better understand the best management practices for *H. stipulacea* in order to properly allocate resources for a more sustainable future for Caribbean reef fishes.

KEYWORDS: *Ocyurus chrysurus, Halophila stipulacea*, USVI, Impacts, Fisheries Management

Age and Growth of Gray Snapper (*Lutjanus griseus*) in the Northern Coast of The Yucatan Peninsula

Edad y Crecimiento del Pargo Prieto (*Lutjanus griseus*) en la Costa Norte de la Peninsula de Yucatan

Âge et croissance du vivaneau gris (*Lutjanus griseus*) dans la côte nord de la péninsule du Yucatan

ANDY MANUEL ESCALANTE-DOMINGUEZ[1], XIMENA RENAN[1], THIERRY BRULÉ[1]
[1]*CINVESTAV IPN Unidad Mérida, Antigua Carretera a Progreso KM 6, Mérida, Yucatan, Mexico*
andy.escalante@cinvestav.mx

ABSTRACT

En el sur del Golfo de México, los meros (Epinephelidae, Epinephelinae) son el principal componente de la pesquería del estado de Yucatán, México. Debido a que esta pesquería está en fase de declive, el esfuerzo pesquero ha sido redirigido hacia especies de la familia Lutjanidae como el pargo prieto *Lutjanus griseus* (Linnaeus, 1758). La información sobre la biología de este pargo en Yucatán es escasa, lo cual perjudica el manejo sustentable de su pesquería.

Un total de 837 especímenes de pargo prieto (rango: 8.0 a 65.5 cm LT; 8 a 3,876 g PT) fueron colectados mensualmente a lo largo de la costa de Yucatán, seleccionándose una sub-muestra de 357 individuos (12.3- 65.5 cm LT; 756- 3,876 g PT) para el análisis de sus otolitos (sagittae). A partir de micro-cortes de otolitos se analizaron los anillos de crecimiento para determinar la edad de los individuos después de una validación por un análisis del incremento marginal (IM). El crecimiento de la especie fue evaluado mediante el modelo de von Bertalanffy.

El análisis del IM confirmó la formación anual de los anuli en los otolitos. La edad de los individuos fluctuó entre 0+ y 10 años, siendo los de 4 (n= 76), 3 (n= 66) y 5 años (n= 53) los más abundantes en la sub-muestra analizada y los 0+ (n= 3) y 10 años (n= 4), los más escasos. Los parámetros del modelo de crecimiento de von Bertalanffy para la población de pargo prieto de Yucatán fueron: $L\infty$= 68.54; k= 0.16, t0= -0.2346 y Ø'= 2.876. Los resultados obtenidos en el presente estudio fueron comparados con los de otras regiones de distribución de la especie.

KEYWORDS: Edad, Crecimiento, Pargos, *Lutjanus griseus*, Yucatán

Development of a policy analysis and comparison tool to support decision making and coherence in the context of marine debris management

Desarrollo de una herramienta de análisis y comparación de políticas para apoyar la toma de decisiones y la coherencia en el contexto de la gestión de desechos marinos

Élaboration d'un outil d'analyse et de comparaison des politiques pour appuyer la prise de décisions et la cohérence dans le contexte de la gestion des débris marins

ROXANNE GRAHAM[1]
[1]*World Maritime University, Paddock, St. George, Grenada*
w2005412@wmu.se

ABSTRACT

The increasing abundance and impact of marine debris globally and its associated problematic transboundary nature, have created the need for harmonization and coherence of marine debris management strategies among regions. In this context, a number of policies also referred to as action plans are promoted at a local and regional level and more recently, inter-regional collaboration has increased. These policies seem to share common strategies which also reflects the categorizations of marine debris management measures developed by Chen (2015) and Williams and Rangel-Buitrago (2019) including knowledge, preventive, mitigating, removing and behavior-changing Therefore, they constitute the framework within which marine debris reduction can be approached and monitored. This paper provides a proactive methodology for the development of a decision making tool based on seven (7) derived categories which aligns with the aforementioned categorizations of marine debris management measures. The method also includes a scoring evaluation against the categories and was applied to two regions within the Atlantic Basin that has recently agreed to inter-regional collaboration for tackling marine debris, including the North-East Atlantic (NEA) via the OSPAR Commission and the Wider Caribbean Region (WCR) via the Cartagena Convention. The results highlight the need for improvement in prevention in NEA and removal in WCR, a proposed conceptual coherence model and subsequent opportunities for inter-regional cooperation. The tool can be adapted in other cases providing an opportunity for comparative analysis, highlighting similarities and differences among regions, lessons learnt and a list of prioritized interventions in the context of marine debris management.

KEYWORDS: Wider Caribbean Region, North-East Atlantic, Marine debris, action plan, coherence

Assessing the effectiveness of topical antibiotics in treating corals affected by Stony Coral Tissue Loss Disease in Roatan, Honduras.

Evaluación de la efectividad del antibiotico como tratamiento para corales afectados por la Enfermedad de Pérdida de Tejido en Corales Duro en Roatán, Honduras.

Évaluation de l'efficacité d'antibiotiques topiques dans le traitement des coraux affectés par la maladie de perte de tissus des coraux pierreux à Roatan, au Honduras.

ZARA GUIFARRO[1]
[1]Roatan Marine Park, West End, Roatan, Islas de la Bahia, Honduras
zara.guifarro@gmail.com

ABSTRACT

Caribbean stony corals have suffered an unprecedented decline on their populations since 2014 when Stony Coral Tissue Loss Disease (SCTLD) was first observed off the coast of Florida. This disease has since then spread across the entire Caribbean, impacting already vulnerable coral reefs. SCTLD was first observed in September 2020 on the South side of the island of Roatan, Honduras. Since then, this deadly disease has spread to the majority of the island and some sites have been highly impacted, showing a decrease on pillar and maze coral populations. In order to assess the effectiveness of topical antibiotic treatment to reduce the impact of SCTLD on the corals of Roatan, a subset of 226 corals on 7 sites were treated and reassessed on a monthly basis for three months. Treatment effectiveness was studied in 20 different species selected at random. Due to the reported high success in treating SCTLD lesions in the laboratory and in the field in Florida, amoxicillin plus Base 2B were selected as the treatment used for all corals. Effectiveness was highest on brain coral species (*Pseudodiploria strigosa*, and *Colpophyllia natans*) and star coral (*Orbicella faveolata*) but pillar corals and maze corals showed the lowest success rates. Unlike the results from previous studies in Florida, *Monstrastaea cavernosa* did not show the highest success rate in our study. Although the treatment with topical antibiotic was effective, many of the corals developed new lesions and a long- term solution should be explored to preserve genetic material of highly susceptible species.

KEYWORDS: Stony coral tissue loss disease, Caribbean, antibiotic, susceptibility, disease treatment

An Updated Red List Assessment of Endemic Reef-Building Corals in the Caribbean

Evaluación actualizada de la Lista Roja de corales de arrecife endémicos en el Caribe

Évaluation mise à jour de la Liste rouge des coraux de récif endémiques dans les Caraïbes

LUIS GUTIERREZ[1], BETH POLIDORO[1], DAVID OBURA[3], FRAN CABADA[3], EMMA PETTERSSON[4], KRISTA KEMPPINEN[1], CHRISTI LINARDICH[5]

[1]Arizona State University, 10459 W Reade Ave, Glendale, AZ, United States [2]Coastal Oceans Research and Development - Indian Ocean (CORDIO) East Africa, [3]Zoological Society of London, [4]IUCN Species Survival Commission (SSC) [5]International Union for Conservation of Nature Marine Biodiversity Unit

lgutie16@asu.edu

ABSTRACT

Caribbean corals continue to experience extensive decline due to increased pressures related to climate change, disease, pollution, predation, and other anthropogenic stressors. To understand the impact of reef loss on the relative extinction risk of individual coral species, all 52 known Caribbean endemic corals have been reassessed for extinction risk under the Categories and Criteria of the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. This is the first comprehensive review of the changing status of corals within the region since the previous Red List assessments in 2008. Estimates of individual species declines were calculated based on modeled live coral cover loss across several Caribbean subregions over the past 30 years (1989-2019) coupled with relative species' vulnerabilities and indicators of population resilience based on species traits. Although these recently completed Red List assessments use a different dataset to estimate decline than the original assessments conducted in 2008, the proportion of threatened coral species in the Caribbean has increased from approximately 25% to nearly 50%. If these data were available to the 2008 assessment process, our results indicate that Caribbean corals would have qualified for higher extinction risk categories. Based on this, we infer that, though remaining dangerously high, the rate of Caribbean coral decline has slowed in recent decades. However, coral cover loss alone is insufficient to determine individual species decline, there remains a need for more species-specific information and the incorporation of modeled data on the onset of annual severe bleaching events.

KEYWORDS: IUCN Criteria, Red List, Reef-Building Coral, Coral Cover

Modification of a lobster trap to catch the invasive lionfish (Pterois spp.)

Modificación de una trampa langosta para capturar al pez león invasor (Pterois spp.)

Modification d'un casier à homard pour capturer le poisson-lion envahissant (Pterois spp.)

SAMANTHA HAGEDORN[1], EMILY HUTCHINSON[1], CHRISTOPHER SWEETMAN[1], THOMAS MATTHEWS[1]

[1]*Florida Fish and Wildlife Conservation Commission Research Institute, 2796 Overseas Hwy, Suite 119, Marathon, FL, United States*

sam.hagedorn@myfwc.com

ABSTRACT

In the Western Atlantic, lionfish (*Pterois volitans* and *P. miles*) are highly invasive and can have negative impacts on ecosystems. Divers have reduced lionfish abundance in waters within SCUBA diving depths; however, the depth range of lionfish greatly exceeds common diving limits. Commercial spiny lobster (*Panulirus argus*) trappers in the Florida Keys (USA) occasionally catch lionfish in their wire-basket traps when fishing at depths between 30 and 100 meters. The goal of this project was to modify lobster traps to maximize lionfish catch in these deep waters while reducing non- lionfish bycatch. Modifications of throat type, throat location, escape gap, and bait type were evaluated to determine the best trap designs with respect to bycatch reduction and lionfish catch. The preferred trap design was then fished among a commercial fisherman's traps to directly compare trap performance. Simple modifications to these lobster traps increased lionfish catch and reduced bycatch. Critical elements of a species-specific lionfish trap include narrowing the top-entrance plastic throat to preclude entry of legal-sized lobsters and large fish and adding an escape gap to reduce the retention of small lobsters and fish. Bait type did not have a strong influence on lionfish catch. We postulate that the use of lionfish-specific traps as a commercial fishery for lionfish will need to be assessed by individual fishermen. Strategic use of modified traps could be used to remove lionfish, reduce their ecological impact, and enhance commercial fisher income when used as supplemental gear alongside existing lobster traps.

KEYWORDS: Lionfish trap, Invasive species,

Connectivity of Populations and Gene Flow in Tobago's Queen Conch Resources

Conectividad de las poblaciones y el flujo de genes de Caracol Pala, *Aliger gigas*, celebrada de Tobago

Connectivité des populations et flux génétique dans les ressources de lambi de Tobago

TYANN HENRY[1], REIA GUPPY[1]
[1]*The University of Trinidad and Tobago, Marine Sciences Department, Chaguaramas Campus, Western Main Road, Chaguaramas, West Indies, Trinidad and Tobago*
tyann15@hotmail.com

ABSTRACT

Tobago's queen conch fishery has seen a continued decline in productivity since the 1970's due to a lack of proper monitoring or management. With unregulated and unmonitored harvesting, Trinidad and Tobago remains unable to report on the status of the queen conch fishery, lending to the continuation of poor management.

Focusing on juvenile stages, the dispersal of local conch resources at larval stages via current flow can be a key factor in depletion, taking into consideration the magnitude of currents found in and around the Tobago coastal region. As such, it is necessary to determine the population's genetic structure, and to further identify whether there is indeed the potential for larval transport of Tobago's conch stock via existing current patterns.

This study provides an improved understanding of connectivity of queen conch populations throughout the Caribbean, specifically in relation to population structures of queen conch in Tobago and their gene flow. It examines the potential for larval transport determining genetic linkages and analysing gene flow as a means of differentiating the conch populations.

Very little research has been done regarding Trinidad and Tobago's conch population, so this study will serve as a first look into the population structures, and possibly give new insight into better approaches that facilitate more effective management of the resource. It also constitutes a first step in understanding the queen conch metapopulation structure, which will in turn, call for more local actions for the recovery and conservation of Tobago's populations.

KEYWORDS: *Aliger gigas*, queen conch, connectivity, gene flow, population genetics

From data to change: single use plastic ban in Roatan Honduras

De los datos al cambio: prohibición de plástico de un solo uso en Roatán Honduras

Des données au changement : interdiction du plastique à usage unique à Roatan Honduras

NIKITA TAKISHA JOHNSON MCBRIDE[1], MARISSA GISSELLE BRADY RAMOS[1], LAURA PALMESE HERNÁNDEZ[2], JOEL ANTONIO AMAYA GUILLEN[3]

1Bay Islands Conservation Assiciation (Roatan), Center for Community Growth Desvio Anthony's Key Resort, Sandy Bay, Roatan, Bay Islands, Honduras [3]Instituto de Derecho Ambiental de Honduras, Barrio La Plazuela Calle La Merced Casa 1201, 504 88079333, Barrio La Plazuela, Tegucigalpa, Honduras, [3]RoatanWildlife.org, Main street, Placentero, Los Fuertes, Roatan, Bay Islands, Honduras nikita.johnson@bicainc.org

ABSTRACT

There is no effective infrastructure or state governance in the handling of domestic and industrial waste on Roatan. Existing dumps have many structural and operational defects and are generally located near the sea, creeks, and mangroves without proper containment. Furthermore, littering is common and causes numerous problems including blockage of natural drainage systems resulting in flooding and the proliferation of diseases: causing illness to local inhabitants.

To understand this problem on the island of Roatan and create change within the communities, we began conducting brand audits in 2018; a citizen science initiative that involves counting and documenting the brand found on plastic waste collected during clean ups to help identify the companies responsible for plastic production.

Data collected during reef, beach and creek clean ups indicated that the top five found were Coca Cola, Pepsi, Maruchan Inc, Ajegroup and Licorera Los Angeles. 8,589 pieces of plastic were collected between 2018 and 2019; 36% bottles (PET), 17% bags and wrapping (SL), 16% bottle covers

(PP), 10% multilayered plastic (ML), 9% foam (PS), 7% others, 4% cleaning products (HDPE) and 1% construction material (PVC).

Through this data a ban on plastic bags, plastic straws, and a phase out of foam was proposed to the local municipality; the campaign consisted of collecting signatures in communities, via change.org, implementing plastic bag diets (consisted of exchanging a reusable bag for a plastic bag in supermarkets and communities), a race to promote a plastic free Roatan and other meetings with local government to advocate for change. In 2019, the proposed ban as well as plastic bottles was approved by the municipality.

KEYWORDS: Single-use plastic, Ordinance, Citizen science, Brand audits, Data

Spatial Patterns of Trawling Vessels around Louisiana's Artificial Reefing Zones

Patrones espaciales de los barcos de arrastre dentro de las zonas de arrecifes artificiales de Louisiana

Schémas spatiaux des chalutiers dans les zones de récifs artificiels de la Louisiane

SARAH JOHNSTON[1], AMINDA EVERETT[1], JESSICA PATTERSON[1]
1University of North Georgia, Health & Natural Science Building 159 Sunset Drive, , Dahlonega, Georgia, United States,
skjohn6578@ung.edu

ABSTRACT

The Gulf of Mexico has the most extensive Rigs-to-Reefs (RtR) programs in the world with over 500 platforms adopted into state artificial reefing programs. Other regions of the world have struggled to establish their own RtR programs due in part to opposition of commercial fisheries utilizing trawling gear for harvest. Therefore, it is critical that regulators identify space-use patterns of trawling vessels before establishing reefing areas designated for RtR conversions. To better understand how trawlers operate within the same space as artificial reefs, we analyzed a dataset of satellite-based trawling activity within Louisiana's artificial reefing zones from January 2016 - December 2020. The Louisiana Artificial Reef Program (LARP) is comprised of nine reefing zones containing artificial reefs created from over 120 decommissioned oil and gas platforms and thereby serves as a model case study for trawler - reef interactions. Trawling effort inside reefing areas greatly increased from 2016 to 2020. On average, trawling vessels detected inside of the reefing zones maintained approximately four km from artificial reefs, likely to avoid gear loss from entanglement. Therefore, reefed platforms may establish a de facto non-trawl zone for up to 23 km^2 around a reef. As the world moves away from offshore oil and gas production and towards offshore renewable energy, numerous oil and gas platforms will be proposed as reefing candidates. Therefore, prior to reefing, regulators must consider the spatial implications that a reef may have on all members within the Blue Economy operating within the same finite space.

KEYWORDS: Rigs-to-Reefs, Artificial Reefs, Trawling

Seascape attributes driving mangrove-associated fish assemblages in South Biscayne Bay

Atributos del paisaje marino que impulsan los conjuntos de peces asociados a los manglares en el sur de la Bahía de Biscayne

Attributs du paysage marin à l'origine des assemblages de poissons associés à la mangrove dans le sud de la baie de Biscayne

ELLERY LENNON[1], KATHLEEN SEALEY[1]
[1]*University of Miami, 6890 Sw 44th St, Apt 201, Miami, Fl, United States*
e.lennon@umiami.edu

ABSTRACT

Coastal ecosystems are heterogeneous and made up of a mosaic of different communities. Mangrove-associated fish assemblages are responding to a variety of environmental factors, including seascape attributes, like mangrove area, seagrass coverage, and proximity to adjacent habitat patches. Different fish species and life history stages do not respond universally to the same seascape attributes or at the same spatial scale, so multiple scales should be considered when looking at seascape drivers of assemblage composition. IBBEAM has been conducting fish surveys along mangrove shorelines in Southern Biscayne Bay, providing years of fish assemblage data. Seascape attributes were quantified for buffer zones around survey sites of different radii ranging from 50 m to 600 m. Fish assemblages and seascape attributes were analyzed to determine at what spatial scale different seascape attributes had the largest influence on fish assemblage composition.

KEYWORDS: Seascape, Fish Assemblage, Mangrove

Overview of Spiny Lobster *Panulirus argus* Puerto Rico's Commercial Fishery Carapace Length Data 1990-2019.

Resumen de los Datos de Longitud de Carapacho en la Pesca Comercial de Langosta Espinosa *Panulirus argus* de Puerto Rico, 1990-2019.

Aperçu des données de longueur de carapace de la pêche commerciale de la langouste *Panulirus argus* à Porto Rico 1990-2019

DANIEL MATOS-CARABALLO[1], LUIS A. RIVERA-PADILLA[1], JESÚS LEÓN-FERNANDEZ[1], WILSON SANTIAGO-SOLER[1], MARTHA RICAURTE-CHICA[1], ASTRID ALVAREZ-DE LA CRUZ[1]

[1]PRDNER, P.O. Box 3665, Mayaguez, PR, United States

matos_daniel@hotmail.com

ABSTRACT

Puerto Rico's Commercial Fishery is artisanal, multispecies and multigear. Spiny lobster *Panulirus argus* is one of the three species most landed in pounds in Puerto Rico since the 1980's. This species has been caught by fish traps, lobster traps and through Scuba Diving. The Commercial Fisheries Statistics Program (CFSP) of the Department of Natural and Environmental Resources (DNER) has been collecting landings data since 1969 and bio-statistical data since 1985. The spiny lobster had been protected by DNER with a minimum legal size of 89mm carapace length since 1985. This paper will show the trends in lobster carapace length from commercial landings since 1990-99; 2000-2009 and 2010-2019. A total of 9,690 lobsters where carapace length measured by CFSP port samplers during 1990-99; 15,464 during 2000-2009; and 27,790 were measured during 2010-2019. The average carapace length for 1990-2009 was 95.7 mm; during 2000-2009 it was 101.5 mm; and for 2010-19 it was 103.1 mm. T test has shown extremely significant differences occurred among every data set. The paper will mention differences in the lobster fishery methods and the observations of the port sampler in this fishery for the last 30 years.

KEYWORDS: Spiny Lobster, Fisheries Statistics, Commercial Fisheries, Puerto Rico, Commercial Landings

Puerto Rico's Commercial Fishery Census 2019: The fishing industry in the two years after Hurricane María

Censo de pesca comercial de Puerto Rico 2019: la industria pesquera en los dos años posteriores al huracán María

Recensement de la pêche commerciale de Porto Rico 2019 : l'industrie de la pêche dans les deux années qui ont suivi l'ouragan María

DANIEL MATOS-CARABALLO[1], MANOJ SHIVLANI[2], JUAN AGAR[3], LUIS A. RIVERA PADILLA[1], JESÚS LEÓN-FENÁNDEZ[1], WILSON SANTIAGO-SOLER[1], MARTHA RICAURTE-CHICA[1]
1PRDNER, P.O. Box 3365, Mayaguez, PR, United States, [2]Coastal & Marine Research, Corp. Miami, FL, United States, [3]NOAA Fisheries, Miami, FL, United States
matos_daniel@hotmail.com

ABSTRACT

Puerto Rico's fishery usually has approximately 800-1,000 active commercial fishers. On September 20th, 2021, the entire island was impacted by Hurricane María, which made landfall on the southeast corner of Puerto Rico and wreaked havoc for approximately 24 hours with strong winds, surges, and flooding. In its wake, the hurricane left behind a heavily damaged electrical grid and weakened and destroyed infrastructure, and it resulted in thousands of deaths. Within the fishery sector, the storm caused the widespread destruction of fishing villages, docks, ramps, fishing vessels, fishing gear, fish houses, and homes. Over 2019, personnel of the Department of Natural and Environmental Resources (DNER) interviewed commercial fishers to collect data as part of a census study for completion of a total of 686 commercial fisher interviews, which represented the active fishery component in all coastal municipalities.

KEYWORDS: Fishery Census, Puerto Rico, Hurricane Impact, Resilience, Socioeconomic

Methodological Direction and Support to the Management and Environmental Planning of the Colombian Coastal Zone

Direccionamiento Metodológico y Apoyo a la Gestión y el Ordenamiento Ambiental de la Zona Costera Colombiana

Orientation Methodologique et Soutien a la Gestion et la Planification Environnementale de la Zone Cotiere Colombienne

LEONARDO OSPINO-SEPULVEDA[1], CAROLINA GARCIA-VALENCIA[1], ANNNY ZAMORA[1], MILENA HERNANDEZ[1], PAULA CRISTINA SIERRA-CORREA[1]
[1]Instituto de Investigaciones Marinas y Costeras INVEMAR, Calle 25 No. 2-55, Playa Salguero, El Rodadero, Magdalena, Colombia leonardo.ospino@invemar.org.co

ABSTRACT

La zona costera colombiana, se encuentra inmersa en diversos procesos de desarrollo económico y social que la hacen un territorio en constante cambio el cual demanda una adecuada planificación, para prevenir poner en riesgo la estabilidad de los ecosistemas marinos y costeros sin desfavorecer el desarrollo sostenible. Bajo este precedente y con el fin de apoyar la gestión y el ordenamiento ambiental de la zona costera Caribe y del Pacífico colombiano, el equipo técnico del INVEMAR, ha desarrollado una base metodológica a partir de experiencias en distintos procesos que se han llevado a cabo en el transcurso de 25 años, constituyéndose en la base para el marco normativo nacional. Esta base metodológica está compuesta por 3 fases: levantamiento de información (primaria o secundaria) de las áreas de estudio, caracterización y diagnostico por componente, y análisis de información a partir de un diagnostico integrado o una evaluación ambiental integral. El desarrollo de esta base metodológica ha generado importantes resultados, resaltándose aquí para los últimos seis años aportes técnicos a procesos de zonificación ambiental de la zona costera, aportes técnicos a la elaboración de planes de manejo de unidades ambientales costeras, actualización del plan de manejo para un área marina protegida y un sitio Ramsar, así como la generación de insumos técnicos para el desarrollo de estrategias de conservación, de uso sostenible o para el análisis de selección de categorías de manejo de áreas protegidas. De estas últimas acciones, se destacan el diseño e implementación del Subsistema de Áreas Marinas Protegidas en Colombia y el desarrollo de ejercicios metodológicos enmarcados en planificación espacial marina con aportes al manejo en seis zonas marinas en Colombia.

KEYWORDS: zona costera, ordenamiento ambiental, planes de manejo, zonificación ambiental, metodología

Comparative analysis of liquid fish silage fertilizer versus urea on the plant vegetative and yield performance of Pak-choi (*Brassica r*apa subsp. chinensis)

Análisis comparativo de fertilizante líquido para ensilaje de pescado versus urea en el rendimiento vegetativo y de rendimiento de la planta de Pak-choi (*Brassica rapa* subsp. Chinensis)

Analyse comparative de l'engrais liquide d'ensilage de poisson par rapport à l'urée sur les performances végétatives et de rendement de la plante de Pak-choi (*Brassica rapa* subsp. chinensis)

SHIRLENA OUDITH[1], ELROY CHARLES[2], COURTNEY BULLEN[3]
1University of Guyana, 100 La Bonne Intention, Housing Scheme, Georgetown, N/A, Guyana
shirlena.1991@gmail.com

ABSTRACT

Large quantities of Seafood Processing By-Products (SPBPs) are carelessly dumped in open rivers. SPBPs can be used as an alternative organic fertilizer in the form of liquid fish silage (LFS). The effectiveness of LFS of bangamary (*Macrodon ancylodon*) as a fertilizer was compared to urea for pak- choi production; using two different concentrations of 5% and 10% and urea at a rate of 160 kg/N ha -1. Plant vegetative (leaf length, number of edible leaves, leaf area index (LAI), pigment content) and yield performance (head weight) were assessed. After 14 days of fermentation the LFS pH value was within range of 3.4-3.6 and contained 1.85% N, 3.12% P and 0.13% K; with no heavy metals or E. coli detected. Results indicated that plants treated with 5% LFS produced the highest plant growth, yield, LAI and pigment content comparable to urea. While, tissue analysis in plants treated with 10% LFS had highest percentages of N, P, K. This study concludes, SPBPs can successfully be converted into LFS and used as a plant fertilizer; it recommends the use of 5% LFS since pak-choi production was the greatest. However, further studies are recommended to substantiate these results.

KEYWORDS: Liquid fish silage, seafood processing by-products, organic fertilizer, yield performance, pak-choi

Using fish count surveys to examine the spatial and temporal distribution of the invasive lionfish *Pterois volitans* in the Florida Keys

Uso de encuestas de conteo de peces para examinar la distribución espacial y temporal del pez león invasor *Pterois volitans* en los Cayos de Florida

Utilisation d'enquêtes sur le dénombrement des poissons pour examiner la distribution spatiale et temporelle du poisson-lion envahissant *Pterois volitans* dans les Florida Keys

WILL PATRONE[1], NICHOLAS FUNICELLI[1], RACHEL SOUFRINE[1]
1University of Florida, 1663 NW 8th St, Boca Raton, Florida, United States
willmpatrone@gmail.com

ABSTRACT

This paper presents trends in lionfish distribution in the Florida Keys from 2009 to 2020. The relative abundance and geographic expansion of the red lionfish *Pterois volitans* were tracked using the Volunteer Fish Survey Project from the Reef Environmental Education Foundation (REEF). This program uses volunteer snorkelers and SCUBA divers to record fish abundance at locations across the globe. Metrics analyzed include changes in relative abundance, number of locations observed per year, percent of surveys observed per year, and the differences in these metrics when comparing "experts"and "novices" per the classification system made by REEF. Regression analysis and significance tests were used to identify correlation over time. Although there is a positive correlation between the number of locations that have lionfish and time, the percentage of surveys conducted in the Florida Keys identifying lionfish has declined over time. We also examine the importance of citizen science in academic research, highlighting the need to continue support for organizations like REEF and others that engage in collecting and distributing data via citizen science.

KEYWORDS: lionfish, distribution, invasion, citizen science, REEF

Leadership in Caribbean fisherfolk organisations: a profile, capacities and gaps, and strengthening

Liderazgo en las organizaciones de pescadores del Caribe: un perfil, capacidades y brechas, y fortalecimiento

Leadership dans les organisations de pêcheurs des Caraïbes: profil, capacités et lacunes, et renforcement

MARIA PENA[1], SHELLENE BERRY[2], RABANI GAJNABI[3], SASHA JATTANSINGH[4], PATRICK MCCONNEY[1], NADINE NEMBHARD[5], LEISA PERCH[6], CLONESHA ROMEO[7], BERTHA SIMMONS[8]
1CERMES, The University of the West Indies, Cave Hill Campus, St. Michael, Barbados 2Monza, Greater Portmore P.O. St. Catherine, Barbados, [3]Corentyne, Berbice, [4]Gaia Sustainable Solutions Ltd., 190 Edgar Street [5]Princess Margaret Drive, Belize City, [6]SAEDI Consulting, #3 Clermont Green, St. James, [7]Ashton, Barbados, [8]Welches, Christ Church, Barbados maria.pena@cavehill.uwi.edu

ABSTRACT

Organisational leadership is one of the most important roles for both women and men in the fishing industry. Enabling fisherfolk collective action and strengthening or development of their capacity, especially in relation to leadership, is important to the successful implementation of the 2014 Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) and the realisation of sustainable fisheries and stewardship. Through the FAO-implemented Developing Organisational Capacity for Ecosystem Stewardship and Livelihoods in Caribbean Small-scale Fisheries (StewardFish) project, UWI-CERMES undertook a fisherfolk organisation leadership assessment and gender analyses in fisherfolk organisations in each of seven project countries â€“ Antigua and Barbuda, Jamaica, Saint Lucia, Barbados, St. Vincent and the Grenadines, Belize, and Guyana - to better understand gaps in leadership competencies of women, men and youth in the region. The findings of both of the analyses were used to inform leadership training specifically for women and youth.

This three-part poster sequel provides a baseline of knowledge on fisher organisation leaders and fisherfolk leadership in Caribbean Regional Fisheries Mechanism Member States. It provides a better understanding of gaps and capacities in fisherfolk leadership; examines how gender, youth and leadership intersect, influence each other and constrain equal participation in and access to decision- making; and describes strategic and targeted capacity development for fisherfolk organisation leaders. Our work confirms some already known information on fisherfolk organisations, documenting this and new information.

KEYWORDS: Leadership, Fisherfolk organisations, Profile, Gender analysis, Capacity building

Florida Fish and Wildlife's adaptive control strategies to combat invasive lionfish

Estrategias de control adaptativo de Florida Fish and Wildlife para combatir el pez león invasor

Stratégies de contrôle adaptatif de Florida Fish and Wildlife pour lutter contre le poisson-lion envahissant

SARAH PEIRCE[1]
1Florida Fish and Wildlife Conservation Commission, 1875 Orange Ave E, , Tallahassee, Florida, United States
sarah.peirce@myfwc.com

ABSTRACT

Labeled the worst marine invasion to date, lionfish and their effects on environmental resources are a priority topic for resource managers throughout the invaded range. The Florida Fish and Wildlife Conservation Commission recognizes that lionfish management requires a cooperative effort between government and stakeholders. This collaboration requires that the public understand the potential threats that can result from invasive species and what they can do to help prevent or mitigate these impacts. The FWC Lionfish Program was established in 2014 to accomplish this goal as well as encourage diver involvement, support research and the development of innovative harvest methods, and promote the commercial lionfish market. The program has several components including a traveling outreach booth, "Become the Predator" workshops, school programs, assistance for tournaments and research projects, and incentive-based removal programs. Since its inception, the FWC Lionfish Program has connected with over 58,000 attendees at its workshops, presentations, and other sponsored events. The program has also recorded nearly 240,000 lionfish harvested through its sponsored tournaments and incentive-based removal programs. Adaptive outreach, education and control strategies are necessary to keep up with the progression of the invasion. The agency will continue to identify, support, and develop innovative control mechanisms as well as opportunities for regulatory changes and incentive programs to increase participation in lionfish harvest.

KEYWORDS: lionfish

Stony Coral Tissue Loss Disease (SCTLD) spread in an artificial coral community: from coral susceptibility to management suggestions

Propagación de la enfermedad de pérdida de tejido en corales duros en una comunidad de coral artificial: de susceptibilidad en los corales a sugerencias de manejo

Stony Coral Tissue Loss Disease (SCTLD) propagé dans une communauté de coraux artificiels : de la sensibilité des coraux aux suggestions de gestion

VALERIA PIZARRO[1], MEGHYN FOUNTAIN[1], WILL GREENE[1], CRAIG DAHLGREN[1]
1Perry Institute for Marine Science, Love Beach Colony East, Nassau, New Providence, Bahamas,
vpizarro@perryinstitute.org

ABSTRACT

Stony Coral Tissue Loss Disease (SCTLD) is a severe threat to Caribbean reefs. Its impact on coral populations results in rapid reef deterioration, and we are still working to understand the disease and how to stop the spread. Between November 2020 and February 2021, about 1900 coral colonies from 24 species were relocated from the Nassau cruise port to the Lighthouse Harbour preceding the commencement of nearby construction. Prior to relocation, corals in the port area exhibited good health and no SCTLD. Conversely, SCTLD was present at the Lighthouse Harbour. This relocation project was an opportunity to study the spread of SCTLD within a coral community, and to better understand species susceptibility. Monthly monitoring of individually tagged corals (n=50) began in November 2020. In February 2021, monitoring was expanded to include photomosaic plots (n=14), such that most of the relocated corals were observed. Two weeks after relocation, SCTLD affected all colonies of *Meandrina meandrites* and 70% of *Eusmilia fastigiata*. After four weeks, an additional 5 species were infected, which increased to 8 after 12 weeks, and 14 in 6 months. During the monitoring period, a total of 3 species become locally extinct and 4 species near local extinction. The exoskeletons of certain species, degraded within weeks of reaching total mortality, and most colonies were no longer identifiable without tag or photomosaic evidence. This shows that baseline data is critical for obtaining local extinction data. Additionally, our study shows that it may be possible to use species-specific infection rates and mortality to estimate the arrival of SCTLD to an area. This information can be used to better understand the interspecies and intraspecies spread, track the edge of the disease as it and to prioritize treatment areas to slow the spread

KEYWORDS: Stony Coral Tissue Loss Disease, The Bahamas, Disease spread, Coral species susceptibility

Atlantic Sailfish (*Istiophorus albicans*) Distribution off the East Coast of Florida from 2003 to 2018 in Response to Sea Surface Temperature

Distribución del pez vela del Atlántico (*Istiophorus albicans*) f rente a la costa este de Florida de 2003 a 2018 en respuesta a la temperatura de la superficie del mar

Répartition du voilier de l'Atlantique (*Istiophorus albicans*) au large de la côte est de la Floride de 2003 à 2018 en réponse à la température de surface de la mer

MEREDITH PRATT[1], PETER CHAIBONGSAI[2], FAITH BENNER[2], JOSHUA FEINGOLD[1]
1Nova Southeastern University, 6607 63rd Terrace East, Bradenton, Florida, United States, 2The Billfish Foundation, 5100 N Federal Hwy # 200, Fort Lauderdale, Florida, United States, meredith-mae101@yahoo.com

ABSTRACT

The Atlantic sailfish (*Istiophorus albicans*) ranges from 40°N to 40°S in the Western Atlantic Ocean and has great economic and recreational value for sport fishers. Off the east coast of Florida, recreational fishing boats often target this species due to its size, speed, and strength. This project aimed to determine the relationship between sea surface temperature (SST) and the distribution of Atlantic sailfish caught and released over a fifteen-year period (2003 to 2018). Tagging information was collected from The Billfish Foundation and NOAA who have the most extensive programs for billfish. Using the time and location of each reported sailfish, a satellite-derived SST value was obtained for each point. The purpose of this study was to determine if sea surface warming was associated with changes in sailfish distribution. On average, sailfish were caught at 26.16 ± 1.70°C ($\bar{x}$ ± s.d.) over the fifteen-year period. The most sailfish catches occurred at temperatures ranging from 25.2°C to 25.5°C. Over the fifteen-year period sailfish catches decreased at lower temperatures (23°C and 24°C) and at 31°C. At 25°C and 30°C there was no change in catch numbers of sailfish. From 26°C to 29°C there was an increase in the number of sailfish. Based on these results, increasing ocean temperatures will have an impact on distribution and habitat utilization of sailfish. Warming sea surface temperatures create a need for more policy and regulation to protect the Atlantic sailfish and related highly migratory billfish species.

KEYWORDS: sailfish, billfish, sea surface temperature, climate change, recreational fishing

Variation on barrier reefs compositions and implications for wave attenuation ecosystem service at San Andrés Island, Seaflower Biosphere Reserve, Colombian oceanic Western Caribbean

Variaciones en la salud barreras arrecifales e implicaciones para el servicio ecosistémico de protección costera en la isla San Andrés, Reserva de la Biosfera Seaflower, Caribe Occidental oceánico colombiano

Variation de la composition des récifs-barrières et implications pour le service écosystémique d'atténuation des vagues sur l'île de San Andrés, réserve de biosphère de Seaflower, océanique colombien des Caraïbes occidentales

JULIAN PRATO-VALDERRAMA[1], PETER W SCHUHMANN[2], ADRIANA SANTOS MARTINEZ[1], JUAN CARLOS MEJÍA, DIANA CASTAÑO, MATTHIAS WOLFF

1Universidad Nacional de Colombia Sede Caribe, Ginnie Bay 62 39 Int. 50, N/A, San Andres Isla, Archipielago de San Andres, Providencia y Santa Catalina, Colombia, [2]University of North Carolina Wilmington

jprato@unal.edu.co

ABSTRACT

Coral barrier reefs protect coasts, people and economies at Caribbean insular territories that are exposed yearly to waves and cyclones, but these ecosystems have been affected by climate change and bad decision making about management of coastal areas. Improvement on consciousness about the importance of these ecosystems for people wellbeing, business, and nature itself might enforce better management and decision making for sustainability and Ecosystem Based Adaptation (EBA). To do that, we evaluated coastal protection ecosystem service at two different areas at San Andrés Island as a case of study, to better show decision makers about the importance of healthy reef barriers for wellbeing. For that, we registered field wave height attenuation (January to March 2021) and evaluated reef barrier condition using aerial and subaquatic surveys. Our results showed differences on wave attenuation between both sites (up to 89% an up to 79%). Waves at forereef reached up to 3.2 m (10.5 feet) height (Hs), were reduced up to 20 cm (0.7 feet) due to barrier reef, we found differences between reef species composition and other attributes between sites, showing insights of degradation on the less wave attenuating reef that presented severe coastal erosion on its beach. These dumping on coastal protection service bring to economic and wellbeing losses. Our results are being included on a communication strategy with economic, social, and environmental perspectives to encourage decision makers at Caribbean to invest on a better management and protection strategy to improve coral barrier reefs health as Nature Based Solutions-NBS for sustainability.

KEYWORDS: Management, Coastal Protection, Sustainability, Climate Change, Ecosystem Services

Building Capacity for Sustainable Fisheries Management in the U.S. Caribbean: Age and growth of blackfin snapper from Caribbean waters.

Creando capacitación para el manejo sustentable de las pesquerías en las aguas del Caribe de E.E.U.U.: Edad y crecimiento del pargo aleta negra de las aguas del Caribe.

Crèation d'une formation pour la gestion durable des pêches dans les eaux de la Caraïbe des États-Unis : Âge et croissance du vivaneau à nageoires noires des eaux de la Caraïbe.

WILSON SANTIAGO SOLER[1], JESÚS RIVERA HERNÁNDEZ[2], VIRGINIA SHERVETTE[2]
1Puerto Rico Department of Natural and Environmental Resources, Route 102, Cabo Rojo, PR, United States,
[2]FishCon Lab, University of South Carolina, United States
shervette@gmail.com

ABSTRACT

Little peer-reviewed published research exists on life history for Caribbean deepwater snapper species (queen, blackfin, cardinal, wenchman, vermilion, silk), yet these species combined support the most important fishery throughout much of the US Caribbean. Starting in 2013, we have worked collaboratively with local fishers to fill in these critical gaps for all of these species. We continue to try and leverage our expertise, efforts, and preliminary collections to obtain federal funding to support this extensive work. Blackfin snapper is a medium-sized snapper species and occurs in the western Atlantic from waters of North Carolina in the Southeastern U.S., Bermuda, Gulf of Mexico, throughout the Caribbean and as far south as northeastern Brazil. Our research objectives are: 1) Investigate age, growth, and mortality of blackfin snapper across the US Caribbean Island-based management platforms; 2) Document reproductive biology for blackfin snapper, including size- and age-at-sexual maturity, reproductive seasonality, and reproductive potential/output. To-date, we have collected and processed for life history research 713 blackfin snapper samples across the U.S. Caribbean from fisheries-dependent (FD) and -independent (FI) sources ranging in size from 35 - 527 mm FL. We have estimated ages for 200 of the samples. Ages range from 0-47 y, expanding longevity for this species by 20 y. A first step in our efforts was to establish a radiocarbon chronology for the northern Caribbean, then we validated age estimates for 10 blackfin snapper, including the one that was 47 y. Our preliminary findings on blackfin snapper highlight that the current understanding of this species age and growth parameters derived mainly from fish collected the southeastern U.S. do not accurately reflect the U.S. Caribbean population.

KEYWORDS: ageing validation

Population genomics and acoustic telemetry of Nassau grouper reveal fine-scale population structure and origins of aggregators

La genómica de la población y la telemetría acústica del mero de Nassau revelan la estructura de la población a escala fina y los orígenes de los agregadores

La génomique de la population et la télémétrie acoustique du mérou de Nassau révèlent la structure de la population à petite échelle et les origines des agrégateurs

KRISTA SHERMAN[1], JOSEPHINE PARIS[2], ANDREW R. KING[2], KAREN MOORE[2], CRAIG DAHLGREN[1], LINDY KNOWLES[3], KRISTINE STUMP[3], CHARLES TYLER[2], JAMIE STEVENS[2]

1Perry Institute for Marine Science, 5356 Main Street, Route 100, Suite 1, Waitsfield, Vermont, United States, [2]University of Exeter, Biosciences, Stocker Road, Exeter, Devon, United Kingdom, [3]Bahamas National Trust, Science & Policy, Nassau, New Providence, Bahamas, [4]Shedd Aquarium, 1200 S Lake Shore Drive, Chicago, United States,

krista.sherman@perryinstitute.org

ABSTRACT

Nassau grouper are globally critically endangered and a key fishery species in The Bahamas and parts of the Caribbean, with an urgent need for better management. Within The Bahamas, restriction-site-associated DNA sequencing (RAD-seq) and acoustic telemetry were used to establish demographic structure, diversity and connectivity, and identify the origins of Nassau grouper using an active fish spawning aggregation (FSA). RAD-seq analysis of 94 Nassau grouper sampled from nine locations generated 13,241 single nucleotide polymorphisms (SNPs). Discriminate analysis of principal components and analyses of molecular variance provided evidence in support of population sub- structuring across The Bahamas. Environmental association tests were used to explore relationships between potential loci under selection, and the gene ontology for these SNPs were identified following alignment against the available genome for red spotted grouper. Data suggest that for Nassau grouper, some environmentally-linked loci are under positive selection. Associated acoustic telemetry data suggest the likely origins of five individuals, which travelled one-way distances of up to 176 km from the FSA in the central Bahamas to two sites within the Exuma Cays Land and Sea Park - a no-take marine protected area. Analyses of high-resolution SNPs (including candidate loci under selection) revealed patterns of spatial structure and genetic connectivity not reflected by telemetry data alone. Nassau grouper from Exuma and Long Island appear to have genetic signatures that differ from other islands and from the Hail Mary FSA. Collectively, these findings provide novel information on the intraspecific population dynamics of Nassau grouper within The Bahamas.

KEYWORDS: FSAs, population genetics, selection, SNPs, telemetry

Caribbean hogfish population demographics

Demografía de la población de pez cerdo del Caribe

Démographie de la population de hogfish des Caraïbes

VIRGINIA SHERVETTE[1], NOEMI PEÑA ALVARADO[2], WILSON SANTIAGO SOLER[2], DELANEY DRAKE[3], JESÚS RIVERA HERNÁNDEZ[1]
1Fish/Fisheries Conservation Lab, University of South Carolina, 471 University Pkwy Rm 201, Science Bldg Rm 201, Aiken, South Carolina, United States, [2]Puerto Rico Department of Natural and Environmental Resources, [3]College of Charleston
shervette@gmail.com

ABSTRACT

The effective and sustainable management of fisheries species requires a detailed understanding of their life history strategies. Wrasse species occur in temperate and tropical regions and support productive fisheries across the globe. Hogfish *Lachnolaimus maximus* is a popular recreational and commercial wrasse species throughout its range in the northern hemisphere of the western Atlantic, Gulf of Mexico, the Caribbean. In the U.S. Caribbean, hogfish ranks in the top 10 most important commercial reef fish fisheries species and is highly prized by recreational anglers. Despite its popularity and value to local fisheries, a lack of published information exists on hogfish age, growth, and reproductive biology for Caribbean populations. This study is the first to comprehensively describe age, growth, and reproductive biology for hogfish in the U.S. Caribbean and the first to utilize the 14C chronometer to directly validate the accuracy of ageing hogfish by counting opaque zones on sagittal otolith sections. Fisheries-dependent samples provided insights into the fished population. Our study supports previous research documenting hogfish is a monandric protogynous hermaphrodite species, characterized by a low male to female sex ratio, is moderately long-lived with a maximum age of 20+ y, and sexually matures within the first few years of life. Hogfish females appear to have a protracted spawning season encompassing at least 11 months of the year. Future life history research on U.S. Caribbean hogfish should target fishery-independent samples caught with a variety of gear types to better understand the population as a whole. Going forward, continued monitoring of hogfish life history parameters in this region is essential.

KEYWORDS: ageing validation

Microbiome Characterization of Healthy and Diseased *Meandrina meandrites* and the Impact of Antibiotics on the Microbiome

Caracterización del microbioma de *Meandrina meandrites* sanas y enfermas y el impacto de los antibióticos en el microbioma

Caractérisation du microbiome des *Meandrina meandrites* saines et malades et impact des antibiotiques sur le microbiome

JESSICA TITTL[1], BLAKE USHIJIMA[2], VALERIE J. PAUL[3], GRETA AEBY[3], JULIE MEYER[4]
1School of Natural Resources and Environment, University of Florida, 2033 Mowry Rd., Gainsville, Florida, United States, [2]Department of Biology & Marine Biology, University of North Carolina Wilmington, Wilmington, NC, United States, [3]Smithsonian Marine Station, Fort Pierce, Florida, United States, [4]Soil and Water Sciences Department, University of Florida, Gainesville, Florida, United States jessicatittl@ufl.edu

ABSTRACT

Meandrina meandrites is highly susceptible to stony coral tissue loss disease (SCTLD) and is one of the first coral species to die during outbreaks. The normal microflora of *M.* meandrites is understudied, despite the potentially critical roles they play in nutrient cycling, thermal resilience, and defense against pathogens. This study characterizes the mucosal microbiomes of healthy *M. meandrites* colonies from the Florida Keys, the Cayman Islands, and Belize, using the V4 region of the 16S rRNA gene. Diseased colonies from the Florida Keys were also sampled before and after antibiotic treatment during separate ex situ SCTLD experiments in order to characterize how the resident microbiomes were impacted. Similar to other coral microbiomes, Alphaproteobacteria and Gammaproteobacteria were the most abundant bacterial classes found across all samples. The most abundant taxa across samples are from the family Terasakiellaceae, which has been previously observed in healthy *M. meandrites* samples. Both biogeography and health state shaped microbiome composition. The antibiotic treatment stopped disease progression on treated colonies and microbiomes shifted stochastically after antibiotic treatment, suggesting that each colony responds differently to this disruption. The results of this study provide a baseline characterization of the *M. meandrites* microbiome that can be used to inform coral propagation efforts as well as how antibiotic treatments affect *M. meandrites*.

KEYWORDS: stony coral tissue loss disease, *Meandrina meandrites,* microbiome, antibiotics, coral

Changes in invasive lionfish age structure following the emergence of an ulcerative skin disease

Cambios en la estructura de edad del pez león invasivo tras la aparición de una enfermedad ulcerosa de la piel

Changements dans la structure d'âge du poisson-lion envahissant suite à l'émergence d'une maladie ulcéreuse de la peau

JESSICA VALEK[1], MICHAEL NORBERG[1], ALEX FOGG[1]
1Destin - Fort Walton Beach, Okaloosa County Board of County Commissioners, 1540 Miracle Strip Pkwy SE, Fort Walton Beach, Florida, United States
jvalek@myokaloosa.com

ABSTRACT

In recent years, invasive lionfish (*Pterois volitans/miles*) populations have spread rapidly throughout the northern Gulf of Mexico (GOM). Their lack of predators and superior life history traits have allowed their populations to increase dramatically since first being detected in the GOM in 2010. An ulcerative skin disease was observed in 2017. Shortly after the outbreak, a 79% decrease in lionfish population densities and more than an 80% decline in recruitment was observed. Although the source of the disease is still unknown, a 50% decline in catch per unit effort following the outbreak suggests the disease was likely a contributing factor to lionfish population declines. The objective of this project is to evaluate how the disease and population decline affected the 2020 lionfish population structure. From May 17-23, 2020, volunteer scuba divers armed with spears, collected 365 lionfish from 26 sites. Total length and sex was determined for each lionfish prior to removing sagittal otoliths. Otoliths will be sectioned (300Âµm) and age will be estimated by enumerating annuli. Statistical analysis will be performed to evaluate differences in age structure pre- versus post-disease. Results from this study will provide a better understanding of the GOM lionfish population's response to the ulcerative skin disease, including potential year-class failure following the disease outbreak and age classes that may have been affected. This information will be an important contribution to future studies and management of invasive species.

KEYWORDS: lionfish, disease, Gulf of Mexico, population decline, population structure

Criteria for the environmental management of the Ramsar site Estuarine Delta System of the Magdalena River Ciénaga Grande de Santa Marta, Colombian Caribbean

Criterios para la gestión ambiental del sitio Ramsar Sistema Delta Estuarino del río Magdalena Ciénaga Grande de Santa Marta, Caribe colombiano

Critères pour la gestion environnementale du site Ramsar Système du delta estuarien de la rivière Magdalena Ciénaga Grande de Santa Marta, Caraïbes colombiennes

ALEJANDRA MARIA VEGA CABRERA[1], ANNY PAOLA ZAMORA BORNACHERA[2], MILENA HERNÁNDEZ ORTÍZ[3]
1INVEMAR, Calle 25 No. 2-55, Playa Salguero, Santa Marta, Colombia
Alejandra.vega@invemar.org.co

ABSTRACT

Colombia, al ser parte de la Convención internacional de humedales Ramsar, tiene como tarea la gestión de los humedales del país. El sitio Ramsar CGSM es uno de los humedales costeros más importantes de Colombia, que presenta conflictos y tensores ambientales que ponen en riesgo su sostenibilidad a largo plazo. En aras de generar insumos técnicos para su gestión ambiental se realizó un análisis espacial de 15 criterios ambientales, que permitieron identificaron nueve áreas de manejo que orientan el ordenamiento del territorio y facilita la articulación entre los diferentes instrumentos de planificación. Los criterios analizados fueron valorados y organizados espacialmente aplicando parámetros multicriterios como la presencia/ausencia, grado de perturbación y nivel de riesgo (alto, medio y bajo) y finalmente mediante herramientas de Sistema de Información Geográfica fueron superpuestos con la zonificación y ordenamiento existente para el área. Los resultados obtenidos fueron retroalimentados y validados con las diferentes entidades claves para la gestión ambiental del área y se constituyen en un insumo clave para la actualización del Plan de manejo del sitio Ramsar CGSM.

KEYWORDS: Planificación ambiental, Humedal, Zona costera y Caribe, Desarrollo sostenible

Investigating imposex and reproductive anomalies in Queen Conch, *Aliger gigas*, around Port Everglades, Florida

Investigación de anomalías reproductivas e imposexuales en el caracol rosado, *Aliger gigas*, alrededor de Port Everglades, Florida

Enquête sur l'imposex et les anomalies de la reproduction chez le strombe géant, *Aliger gigas*, autour de Port Everglades, Floride

JUSTIN VOSS[1]
1Florida Fish and Wildlife Conservation Commission, 2796 Overseas Hwy, Suite 119, Marathon, FL, United States
justin.voss@myfwc.com

ABSTRACT

In 2008, the International Maritime Organization banned the use of organotins, such as tributyltin (TBT). Organotins are released from antifouling paints and can eventually lead to reproductive failure, lower fecundity, abnormal embryonic development, and decrease larval survival. Despite the ban, organotins can persist in the environment for decades, thus still posing a threat to susceptible species. In gastropods, organotin exposure can lead to the development of a condition known as imposex (a condition where females develop male reproductive appendage) and in severe cases, the vaginal opening is blocked, resulting in sterility. In the natural environment, imposex is almost exclusively associated with organotin exposure, to the point that imposex in gastropods is used as a biomarker for TBT contamination. In 2018, we found that over 40% of female Queen Conch adjacent to an industrial seaport, Port Everglades, Florida, had imposex. The Port Everglades conch had similar gonadal health and engage in reproductive activities at the same frequency as Florida Keys aggregations without imposex; however abnormal egg masses were found and previously identified in other studies. Adult Queen Conch will be collected, marked if laying an abnormal egg mass, and sexed/imposexed at the Port Everglades aggregation. I will report any correlation between imposex females and naked egg masses and describe the incidence of imposex within the aggregation. There may be other endocrine disruptors that might be causing imposex at Port Everglades, but the overwhelming evidence from the literature suggests organotin exposure. Future studies should include sediment and tissue assays to confirm organotin presence and concentration.

KEYWORDS: imposex, queen conch, reproduction, organotin,

Yellowtail snapper age and growth in northern Caribbean waters

Edad y crecimiento de la colirrubia en aguas del norte del Caribe

Âge et croissance du vivaneau à queue jaune dans les eaux du nord des Caraïbes

SARAH ZAJOVITS[1], JESÚS RIVERA HERNÁNDEZ[2], NOEMI PEÑA ALVARADO[3], WILSON SANTIAGO SOLER[3], VIRGINIA SHERVETTE[2]

1Marine Sciences, University of South Carolina, 471 University Pkwy Rm 201, Science Bldg Rm 201, Aiken, South Carolina, United States, [2]Fish/Fisheries Conservation Lab, University of South Carolina, 471 University Pkwy Rm 201, Science Bldg Rm 201, Aiken, South Carolina, United States, [3]Puerto Rico Department of Natural and Environmental Resources, United States

shervette@gmail.com

ABSTRACT

Yellowtail snapper *Ocyurus chrysurus* is an important fisheries species in the US Caribbean; in waters of Puerto Rico, it ranks second for reef fishes in terms of annual total commercial landings. However, a paucity of information exists concerning basic life history information for Caribbean yellowtail snapper populations. This study provides the first comprehensive documentation of age, growth, and reproductive biology of yellowtail snapper from the Caribbean and is the first to directly validate age estimation in this species. Sampling of 1731 yellowtail snapper occurred in Puerto Rico and the U.S. Virgin Islands during 2013-2021 from fisheries-dependent and -independent efforts. Fish ranged in size from 68-690 mm (total length) and in age from 0-26 years. Regression equations were calculated to determine length-length and length-weight relationships using total length (TL), fork length (FL), standard length (SL), and weight. Total length and age data fit to a von Bertalanffy growth curved for all samples combined from across the U.S. Caribbean, but not including the cast net age-0 samples, yielded the following relationship: TLt = 537 [1 â€“ e-0.11(t + 3.32)]. Yellowtail snapper in the U.S. Caribbean demonstrated a male to female sex ratio of 1:1.14 and exhibited year-round spawning with a peak spawning period in April. Age validation was conducted comparing bomb radiocarbon14C measured in snapper eye lenses formed during the first year of life. Information from this study can be used by fisheries resource managers when evaluating the health of the yellowtail snapper fishery in the region.

KEYWORDS: ageing validation

Monitoring coral diseases in the Dominican Republic: an inclusive plan to understand a serious threat for Caribbean corals

Monitoreo de enfermedades de coral en la República Dominicana: un plan inclusivo para comprender una seria amenaza para los corales del Caribe

Évaluation des maladies des coraux en République Dominicaine: un plan inclusif pour comprendre une menace sérieuse pour les coraux des Caraïbes

SOMEIRA ZAMBRANO[1], DORKA YASMIN EVANGELISTA[2], SAMUEL KING[3], MARIA VILLALPANDO[4], RUBEN TORRES[5], MACARENA BLANCO[6], YIRA RODRÍGUEZ-JEREZ[7], ANA C. HERNÁNDEZ-OQUET[8], REBECCA GARCÍA[9], ALDO CROQUER[10]

1Red Arrecifal Dominicana, Ave. de Los Préceres, Diamond Mall, 1er Nivel, Local 6A, Santo Domingo, Distrito Nacional, Dominican Republic, [2]Ministerio de Medio Ambiente y Recursos Naturales, [3]Centro para la Conservación de la Bahía de Samanaá y su Entorno, [4]Fundacioón Dominicana de Estudios Marinos, [5]Reef Check Dominican Republic [6]Wave of Change Program- Iberostar Group, [7]Centro de Investigaciones de Biología Marina Idelisa Bonnelly de Calventi (CIBIMA IBC-UASD), [8]Fundación Cap Cana, [9]Fundación Grupo Puntacana [10]The Nature Conservancy

someira.zambrano@gmail.com

ABSTRACT

Coral diseases have been impacting coral reefs for decades, changing the structure and function of these ecosystems. Most recently, Stony Coral Tissue Loss Disease (SCTLD) illustrates the long-term impact an emerging disease may have on coral reefs. Affecting over 20 coral species, the disease was first described in 2014 in the Florida Keys and has since rapidly spread across the Caribbean in six years. In 2019, a series of colonies bearing signs similar to SCTLD were observed at the reef of Cayo Arena, in the Northern Dominican Republic (DR). Since the first report, various NGOs and recreational divers have reported similar conditions in the Northern Coast. In 2020, the Dominican Reef Network and its members developed a monitoring plan to assess the status of coral diseases on the island. This document focuses on three areas: (1) science: aimed at data collection on coral diseases (2) local participation: involvement of multiple stakeholders and (3) education/communication: raising awareness and developing local capacity. Local stakeholder integration fills up gaps in sensitive data collection necessary for informing managers and policymakers about the impacts of coral disease in important tourism areas, which highly depend on healthy reef ecosystems. As a result of this effort, information will be shared to contribute to the understanding of the spatial and temporal dynamics of coral diseases across the DR. In this way, we will be able to identify host ranges and susceptible species habitats while increasing local awareness about this threat to coral biodiversity in the DR.

KEYWORDS: Coral reefs, SCTLD, Disease, monitoring plan