Level of Contamination by Metallic Trace Elements and Organic Molecules in the Seagrass Beds of Guadeloupe Island

KEY WORDS: Seagrass, contamination, trace elements, hydrocarbonates, pesticides

Nivel de Contaminación de Las Praderas de Phanerogamas Marinas de Guadeloupe por Metales Trasa, Hidrocarburos Aromáticos y Pesticidas

PALABRAS CLAVE: Praderas de phanerogamas marinas, hidrocarburos aromáticos, pesticidas

Niveau de Contamination des Herbiers de Phanérogames Marines de Guadeloupe par des Éléments Trace, Hydrocarbures Aromatiques et Pesticides

MOTS CLÉS: Herbiers de phanérogames marines, hydrocarbures aromatiques, pesticides

CLAUDE BOUCHON[1]*, SOAZIG LEMOINE[2], DANA WETZEL[3], JOHN REYNOLDS[3], YOLANDE BOUCHON-NAVARO[1], SÉBASTIEN CORDONNIER[1], and MAX LOUIS[1]

*[1]Universite des Antilles et de la Guyane Laboratoire Biologie Marine DYNECAR EA 926 BP 592 POINTE-a-Pitre cedex, Guadeloupe 97159 Guadeloupe (FRANCE) *claude.bouchon@univ-ag.fr*

[2]Université Antilles-Guyane campus de Fouillole, BP 592 DYNECAR Pointe-à-Pitre Guadeloupe 97159 France

[3]Mote Marine Laboratory 1500 Ken Thompson Parkway Sarasota, Florida 34236 USA.

ABSTRACT

In terms of area of extent, seagrass beds represent the main marine coastal ecosystem in the French West Indies. They also constitute nurseries for many invertebrates and fishes harvested by local fisheries. In Guadeloupe, coastal fish stocks are declining; concurrently, some agricultural areas, rivers, and mangroves areas have been shown to be heavily contaminated by pollutants. Moreover, the National Park of Guadeloupe plans to re-introduce West Indian manatees in the Grand Cul-de-Sac Marin Bay (GCSM), from which they disappeared at the beginning of the last century. Considering these facts, a study of contamination of the seagrass beds (8,000 ha) of GCSM was conducted on both sediments and marine phanerogams (*Thalassia testudinum* and *Syringodium filiforme*). The analyses concerned 6 metals (Cd, Cu, Hg, Pb, V, Zn), tributyltin, 18 polycyclic aromatic hydrocarbons (PAHs), 8 polybrominated diphenyl ethers (PBDEs), 38 polychlorobiphenyls (PCBs), dithiocarbamates (CS2 residues) and 225 pesticide molecules. In general, the level of contamination of the seagrass beds was low for both sediments and phanerogams. Metallic trace elements were the main pollutants, but their locations remained coastal and their distribution can be explained by proximity to river mouths and current patterns. The level of contamination was lower in plants than in sediments; however, the level of contamination between these two compartments was significantly correlated. In conclusion, the level of contamination of the GCSM seagrass beds is low and does not appear to be a risk factor for fish and shellfish nurseries or grazing manatees.

Mapping Hard Bottom Reef Fisheries Habitat off Northwest Florida – Needs, Methods, and Status

KEY WORDS: Reef fish, hard bottom, habitat mapping

Cartografía del Hábitat de las Pesquerías de Arrecife de Fondo Duro en el Noroeste de Florida- Necesidades, Métodos y Estado

PALABRAS CLAVE: Pesquerías de Arrecife, fondo duro, cartografía del hábitat

Cartographie de l'Habitat des Pêcheries de Récif de Fond dur au Nord-Ouest de Floride- Besoins, Méthodes et État

MOTS CLÉS: Pêcheries de récif, fond dur, cartographie de l'habitat

CHRIS GARDNER[1]*, DOUG DEVRIES[1], DAVID NAAR[2], and BRIAN DONAHUE [2]

*NOAA Fisheries, 3500 Delwood Beach Road, Panama City, Florida 32408 USA. *chris.gardner@noaa.gov.*

[2]University of South Florida, 4202 E Fowler Avenue, Tampa, Florida 33620-9951USA.

ABSTRACT

The west Florida shelf (WFS) supports some of the most valuable reef fish fisheries in the U.S. Gulf of Mexico.

However, very little of its area has been mapped with enough resolution to accurately locate and quantify the hard/live bottom habitat these fisheries are so strongly tied to. Such maps are essential for designing an efficient fishery independent survey of reef fishes, enabling pre-stratification by habitat, and thereby minimizing variance and optimizing survey resources. Accurate habitat maps will also be critical for ecosystem based fisheries management and marine spatial planning. In support of a recently expanded fishery independent reef fish survey, the Panama City NMFS lab began mapping cross-shelf transects on the northern WFS using multibeam and side scan sonar. Two transects ~ 1.5-2.5 X 30 nm were mapped with a 300 kHz multibeam sonar and seventeen single swath cross-shelf transects ~20-30 nm X 150 m were mapped using a 600 kHz side scan sonar. An inexpensive live video drop camera and occasionally an ROV were used for visual ground truthing. Although the multibeam provided bathymetry and backscatter data at very high resolution, the side scan hardware and software was much more user friendly and provided data on which hard/live bottom habitat could, after a very short learning curve, be easily identified. Given the scale of most interest for fisheries-related needs, the 600 kHz side scan sonar may be the most cost-effective tool for our purposes.

Seasonal Changes in a Sublittoral Desert: Progreso Blanket, Yucatán México

KEY WORDS: Seascapes, variability, change, benthos, fish

Cambios Temporales en un Desierto Sublitoral: El Manto Progreso, Yucatán, México

PALABRAS CLAVE: Desierto sublitoral, cambios temporales, Yucatán, México

Changement Temporaries du Désert Infra-Littoral: Le Manteau Progreso, Yucatan, Mexique

MOTS CLÉS: Désert infra-littoral, changement temporaries, Yucatan, Mexique

JOAQUIN RODRIGO GARZA-PEREZ*, DOMINIQUE PAMELA, and ORVAÑANOS-DONIS
*UMDI-Sisal, UNAM, Puerto de Abrigo S/N Sisal, Yucatan 97355 Mexico. *rgarza@ciencias.unam.mx.*

ABSTRACT

A thin layer of medium to coarse calcareous sediments, termed Progreso Blanket sedimentary unit, characterizes the bottom of the sublittoral zone of Yucatán. This extensive sand bottom is the predominant feature of the inner shelf of the Campeche Bank. A very active and productive artisan fishing fleet operates in this area, exploiting populations of groupers, snappers, octopus, and sea cucumber (in terms of catch volume and economic importance). A relatively small area (1,240 km^2) within this blanket in the northwestern zone of the Yucatán Peninsula was characterized and monitored during one year employing remote sensed imagery and direct field sampling with SCUBA. A multivariate statistics approach defined six different seascapes in the area, and their variability through the climatic seasons (dry, rainy, north-winds) was determined along with the variability of fish communities and their association to the seascapes. Significant differences in benthic covers were found between dry and rainy seasons with north-winds season, but not between dry and rainy seasons. And fish communities fluctuated in an ascending gradient from the north-winds season up to the rainy season. The term sublittoral desert is appropriate for this area because of the resemblance of the sandy plains to land deserts, and because of the low fish biomass and species richness recorded. This ecological trait has important fisheries management implications: the necessity of an increased fishing effort to have a positive economic benefit, and the inherent fragility of the communities due to their low biodiversity and abundance.

Future of Reefs in a Changing Environment (Force)

KEY WORDS: Caribbean, coral reefs, climate change

Projectel Proyecto el Futuro de Los Arrecifes en un Ambiente Cambiante (Force)

PALABRAS CLAVE: Caribeno, arrecifes, ambiente cambiante

Avenir des Récifs dans un Environnement en Évolution (AREE)

MOTS CLÉS: Caraïbe, récifs, environnement

ROSANNA GRIFFITH-MUMBY
FORCE Project University of Exeter Hatherly Building Prince of Wales Road Exeter, Devon EX4 1PS United Kingdom.
R.E.Griffith-Mumby@exeter.ac.uk

ABSTRACT

FORCE takes an ecosystem approach, linking social and ecological aspects, towards managing Caribbean coral reefs in

the face of climate change. It brings together scientists from 20 organizations from the Caribbean, Europe, USA and Australia. The overall objective is to identify the most appropriate management interventions for coral reefs and the governance structures needed for their implementation. FORCE will determine the effects of climate change, overfishing, pollution, and poor governance on the health of Caribbean reefs. The team will then assemble and refine a toolbox of management measures that can be used to improve the health and wise use of coral reefs. Not all management measures are equally effective, so the project will use ecological models and novel social science methods to assess the efficacy of each tool and the governance constraints to its implementation. A series of natural and social science case studies will be undertaken in five countries. New field investigations will quantify the effects of changing reef health on biodiversity, seek ways of improving fisheries management, and allow the effects of ocean acidification and coral bleaching to be modeled more accurately. The empirical studies will be integrated with global climate models.

A Mesophilic Thaumarchaeal Species of the Mangrove Swamp of Guadeloupe (F.W.I.) Contains Eukaryotic Type of Chlorophyll

KEY WORDS: Archaea, mangrove, chlorophyll a, microbiology

Una Thaumarchaea Mesophila Del Manglare de Guadeloupe (F.W.I.) Contiene Clorofila Eucaryotica

PALABRAS CLAVE: Thaumarchaea mesophila, manglare, clorofila, Guadeloupe

Une Thaumarchaea Mésophile de la Mangrove de Guadeloupe (F.W.I.) Contient de la Chlorophylle Eucaryotique

MOTS CLÉS: Thaumarchaea mésophile, mangrove, chlorophylle, Guadeloupe

MAITENA JEAN[1]*, AUDREY SAULDUBOIS[2], JEAN-LOUIS MANSOT[2], and OLIVIER GROS[1]

*[1]UMR-CNRS-MNHN-UPMC 7138, "SAE," équipe, Biologie Université des Antilles et de la Guyane, UFR SEN, BP 250 Pointe à Pitre cedex, 97159 Guadeloupe. *maitena.jean@univ-ag.fr. [2]Groupe de Technologie des Surfaces et Interfaces, (GTSI EA 2432) Université des Antilles et de la Guyane, UFR SEN BP 250 Pointe à Pitre cedex 97157 Guadeloupe.*

ABSTRACT

Large white mats of prokaryotic organisms (Archaea and Bacteria) have been recently discovered in the mangrove swamp of Guadeloupe (French West Indies). Here, we report evidence of two eukaryotic photosynthetic pigments in a giant multicellular Thaumarchaeota, Candidatus *Photothauma chlorophyllense* (Muller *et al*. 2010). Microfluorescence spectrometry in combination with thin layer chromatography points out the presence of chlorophyll a and pheophytin a after ethanol extraction. These two pigments were identical to those obtained from plants represented in this experiment by *Leucaena leucocephala*. In order to identify the structures were chlorophyll could be stocked into the Archaea, we also studied the filament structure by electronic microscopy. In ESEM, the analysis showed that each filament was composed by numerous archaeal cells covered by a thick membrane which can be removed by critical point treatment. In TEM sections, more electron dense structures were observed. They can be associated in the Archaea movement or be structures implicated in photosynthesis. For the first time, chlorophyll gene expression in Archeae is reported here, and could catalyze light-driven proton transfer across the cell membrane, although the gene has already been observed from clone bank of Pearl River, China. Thus, this discovery could reconsider the implication of Archaea in the establishment of photosynthesis and permit a better understanding of its evolution on earth. Furthermore, this study shows that mangrove shelters a wide diversity of microorganisms, thereby it is essential to study and protect its exceptional, but harvested, biodiversity proved here by the presence of Candidatus, *Photothauma chlorophyllense*.

Primary Production Dynamics of *Thalassia testudinum* (Konig) Seagrass Beds in Guadeloupe Island, FWI

KEY WORDS: *Thallassia testudinum*, seagrass, primary production, Guadeloupe

Dinamica de la Produccion Primaria de los Pastos Marinos de *Thalassia testudinum* (Konig) en la Isla de Guadeloupe

PALABRAS CLAVE: *Thallassia testudinum,* pastos marinos, produccion primaria, Guadeloupe

Dynamique de la Production Primaire des Herbiers de Phanérogames Marines à *Thalassia testudinum* (Konig) en Guadeloupe (Antilles Françaises)

MOTS CLÉS: *Thallassia testudinum*, herbiers de phanérogames marines, production primaire, Guadeloupe

SOPHIE LACAS, YOLANDE BOUCHON-NAVARO, SÉBASTIEN CORDONNIER, and CLAUDE BOUCHON
Universite des Antilles et de la Guyane Laboratoire Biologie Marine DYNECAR EA 926 BP 592 POINTE-a-Pitre cedex, Guadeloupe 97159 France.

ABSTRACT

The present work was realized in the framework of the project of the National Park of Guadeloupe of reintroduction of the manatee (*Trichechus manatus*). The aim was to study the dynamics of the leaf primary production, the associated litter and its micro-fauna in *Thalassia testudinum* seagrass beds in order to evaluate the potential grazing impact of manatees. According to sites, the leaf primary production fluctuated between 2.6 ± 0.4 g to 4.0 ± 0.7 g of dry weight/m^2/day in the absence of grazing and between 0.9 ± 0.3 g and 1.4 ± 0.4 g of dry weight/m^2/day when cutting the leaves to simulate manatees "grazing". Moreover, areas 50 cm x 50 cm were completely denuded from leaves and rhizomes to simulate the "rooting" by manatees. These areas have not recovered after three months. The average mass of leaf litter fluctuates between 36.12 ± 7.5 g dry weight/m^2 and 6.2 ± 0.9 g dry weight/m^2. According to sites, the decay of litter reached 82 % and 69.6 % in three months. The fauna associated with litter consisted mainly of polychaetes, crustaceans, plathelminths and nematodes, which constitute an important link in the seagrass food web. Results from this study show that manatees grazing might disturb the primary productivity of seagrass beds. It will be necessary to be careful in the choice of areas of acclimation in terms of surface and duration of use, and in the choice of the number of manatees that can be reintroduced in the seagrass habitats.

Definition of Benthic Seascapes and their Temporal Characterization in Sisal Yucatán Mexico

KEY WORDS: Benthic cover, temporal variability, multivariate analysis, marine habitats

Definición de Paisajes Bentónicos y su Caracterización Temporal en Sisal, Yucatán México

PALABRAS CLAVE: Paisajes bentónicos, caracterización temporal, Yucatán México

Determination du Paysages Benthiques et Caractérisation Temporaire sur Sisal Yucatán Mexique

MOTS CLÉS: Paysages benthiques, caractérisation temporaire, Yucatán Mexique

DOMINIQUE PAMELA ORVAÑANOS-DONIS* and JOAQUIN RODRIGO GARZA-PEREZ
*UMDI-Sisal, UNAM Puerto de Abrigo S/N Sisal, Yucatan 97355 Mexico *dominique_pam@hotmail.com.*

ABSTRACT

Ecological information on the seascapes on the northern coast of the Yucatan Peninsula is scarce at best. Given the local focus on fisheries associated to bottom characteristics (i.e. groupers, octopus), this information is needed towards the future implementation of enhanced fisheries management policies. A relatively small area of 1,240 km^2 in the north-western portion of Yucatan was selected because of its importance as local fishing grounds. Its seascapes were defined and characterized through three climatic seasons (dry, rainy, northerly-winds) from 2009 to 2010 using SCUBA and videotran-sect methodology. Significant differences in benthic covers were found between seasons using ANOSIM, and a classifica-tion scheme of six constant seascapes was obtained using hierarchical clustering. SIMPER analysis highlighted similitude and differences between seascapes on each season. The relationship between different benthic cover types and the substrates was explored using CCA and MDS analyses. The main driving factors to the benthic composition of the

seascapes are depth and the substrata proportions (sand, mud, limestone). The main drivers of the variability of benthic categories appear to be waves and currents.

Enhancing Condado Lagoon's Essential Fish Habitat with an Artificial 'Taíno' Reef Trail

KEY WORDS: Artificial-reef, habitat, coral, reef-fish, Puerto Rico

Mejorando el Hábitat Esencial para Peces en la Laguna del Condado con la Vereda 'Taína' de Arrecifes Artificiales

PALABRAS CLAVE: Arrecifes artificiales, hábitat esencial, Puerto Rico

Amélioration de Condado Lagoon l'Habitat du Poisson Essentielles d'un Parcours Artificiel 'Taíno'

MOTS CLÉS: Parcours artificiel, habitat essentielles, Puerto Rico

MICHELLE SCHÄRER-UMPIERRE[1]*, MICHAEL NEMETH[2], and HECTOR RUIZ[3]

[1]Sea Grant College Program, University of Puerto Rico, P. O. Box 9000, Mayagüez, Puerto Rico 00681 Puerto Rico. m_scharer@hotmail.com. [2]Department of Marine Science, University of Puerto Rico, P. O. Box 9000, Mayagüez, Puerto Rico 00681 USA. [3]HJR Reefscaping, P.O. Box 1126, Hormigueros, Puerto Rico 00660 USA.

ABSTRACT

The Condado Lagoon is an important part of the San Juan Bay Estuary as it holds a link between the marine waters of the Atlantic Ocean and the estuary. The lagoon is important both in ecological function and economic potential to local tourism enterprises. As part of a fish habitat enhancement program a submarine snorkeling trail with artificial reef modules was created. In addition to providing habitat for coral reef and estuarine fishes the area provides an attraction that can be used to reduce intensive human impacts on nearby reefs. Forty-four artificial 'Taíno' reef modules deployed in near-shore sandy habitats have been colonized by a variety of corals, motile invertebrates and fishes. This study compares the fish community over time by conducting stationary underwater visual surveys (point counts) before modules were deployed and quarterly during a year afterwards. Fishes were numerated to the lowest possible taxonomic level and length was estimated to the nearest cm. The number of species increased throughout the study period with a triplication after deployment and at least 40 that were previously undetected. Grunts and surgeon fishes showed a consistent increase in the size distribution towards the end of the study period. The enhancement of fish habitat is a step towards the conservation of coral reef species affected by environmental degradation. The Condado Lagoon Taíno Reef Trail provides a useful tool for enhancing fish habitat while providing a recreational attraction.

Estado de Salud de las Lagunas Costeras de Yucatán, México: Índice de Integridad Biótica

PALABRAS CLAVE: Ictiofauna, áreas protegida, sistemas lagunares, costa Yucatán, Mexico

Health Status among Coastal Lagoons of Yucatan, Mexico: Index of Biotic Integrity

KEY WORDS: Icthyofauna, coastal lagoons, biotic integrity, Yucatan, Mexico

L'État de Santé des Lagunes Côtières du Yucatan, Mexique: Indice d'Intégrité Biotique

MOTS CLÉS: Lagunes côtières, d'intégrité biotique, Yucatan, Mexique

MA. EUGENIA VEGA[1]* and MIRELLA HERNÁNDEZ DE SANTILLANA[2]

*[1]CINVESTAV, IPN, Unidad Mérida km. 6 Antig. Carr. Progreso Mérida, Yucatan 97310 México. *maruvega@mda.cinvestav. [2]Centro de Investigación y de Estudios Avanzados del IPN Mérida Yucatán 97310 México.*

RESUMEN

En los sistemas lagunares de la costa de Yucatán, se realizan diversas actividades generadas por su productividad pesquera y biodiversidad. No obstante su carácter de reservas de la mayoría de ellas, se desconoce su estado de salud. Se integra la información ictiofaunística obtenida de varios años de estudio en localidades de Celestún, Chelem, Bocas de Dzilam y Ría Lagartos con el objetivo de proveer una medida de integración de la información de los atributos biológicos (métricas) que reflejen su condición y permita utilizar a los peces como indicadores ambientales. Las métricas seleccionadas se clasificaron en medidas de riqueza, abundancia, composición, espectro trófico, condición y tolerancia. Se observó un

patrón ambiental con las condiciones de mayor perturbación en Chelem y zona interna de Río Lagartos (Cuyo), con la presencia y alta abundancia de varias especies oportunistas o tolerantes (*Floridichthys polyommus* y *Cyprinodon artifrons*). Por el contrario, se registró un incremento consistente en la abundancia de especies marino-eurihalinas en Celestún (*Eucinostomus* spp. *Sphoeroides testudineus*), Bocas de Dzilam y zona marina de Río Lagartos con los valores más altos del índice. Las clases de integridad biológica obtenidas coincidieron con el grado de alteración antropogénica/natural que presentan los sistemas lagunares en su conjunto.

PaV1 Detection by the Caribbean Spiny Lobster (*Panulirus argus*) and its Effect on Population Spatial Structure

KEY WORDS: Spiny lobster, PaV1, disease, bottleneck

Detección de PaV1 por el Caribe Langosta (*Panulirus argus*) y su Efecto sobre la Estructura Espacial de la Población

PALABRAS CLAVE: Caribe langosta, PaV1, estructura espacial

Détection de PaV1 par la Langouste des Caraïbes (*Panulirus argus*) et de ses Effets sur la Population de Structure Spatiale

MOTS CLÉS: Langouste des Caraïbes, PaV1, structure spatiale

JOSH ANDERSON* and DONALD BEHRINGER
*University of Florida, 7922 NW 71st Street, Gainesville, Florida 32653 USA. *andersonja.05@gmail.com*

ABSTRACT

Panulirus argus virus 1 (PaV1) is a contact-transmitted pathogen that causes mortality in the gregarious Caribbean spiny lobsters (*Panulirus argus*). However, studies have shown that *P. argus* has the ability to detect and avoid shelters inhabited by infected conspecifics, thereby reducing infection risk but also causing increased mortality due to a lack of available (disease-free) shelters. Ultimately, disease avoidance and shelter limitations could have population wide affects through increased PaV1 transmission or increased predation. Based on its role in many other aspects of lobster ecology, olfaction is the most likely mode of PaV1 detection. To test the role of olfaction and determine the source of the olfactory cue in the PaV1 detection, we are using y-maze experiments. We are also exploring the effect of diseased lobsters on population spatial structure in nature and the effect flow has on this structure. Preliminary results show that diseased lobster avoidance is driven by olfaction, and moreover, the olfactory cue alone was equivalent in effectiveness to having a diseased lobster present and visible thereby causing shelter avoidance. Juvenile shelter avoidance in a shelter limited environment (sponge die-offs) could result in a population bottleneck that would affect the adult demographics along with the entire Caribbean spiny lobster fishery. This research is ongoing and additional results will be available by the time of the GCFI meeting.

Observing Queen Conch Density and Behaviour in Barbados

KEY WORDS: Queen conch, density, behavior, Barbados

Observando la Densidad y el Comportamiento del Caracol en Barbados

PALABRAS CLAVE: Caracol, densidad, comportamiento, Barbados

Observation de la Densité et du Comportement de la Lambi à la Barbade

MOTS CLÉS: Lambi, densité, comportement, Barbade

CAROLINE BISSADA-GOODING* and HAZEL OXENFORD
*CERMES, University of the West Indies, Cave Hill, St Michael, Barbados. *caroline.gooding@gmail.com.*

ABSTRACT

Queen conch, *Strombus gigas*, a slow moving marine gastropod, is vulnerable to depressed reproductive activity resulting from density dependent mechanisms such as the Allee effect. Now heavily exploited throughout most of its range, the density of remaining conch populations has become a matter of concern for conservation and recovery of depressed

populations, and for management of viable stock densities. In this study we observed individual behaviours and density of neighbours in a Barbados conch population, to determine any patterns and/or ranges in conch densities at which particular behaviours occur. Tagged conch were observed by SCUBA divers biweekly for one year from May 2009 through May 2010. On each occasion the individual's behaviour (quiescent, buried, feeding, pairing or spawning), water depth and temperature were recorded, together with the number of neighbours within a 20 m radius. Pairing and spawning were only observed at medium (3 - 6 conch per circle or 25 - 50/ha) and high (≥ 7 conch per circle or ≥ 58/ha) densities. Feeding was only observed at high densities, whilst quiescent and burying behaviour was observed predominantly at low densities. These results corroborate previous findings of a minimum density threshold for conch spawning and confirm the importance of protecting spawning aggregations.

Seawall Construction Activities Cause a Localized Mass Mortality of Threatened Elkhorn Coral (*Acropora palmata*) at Vega Baja, Puerto Rico

KEY WORDS: *Acropora palmata*, mass mortality, patchy necrosis, seawall construction, turbidity

La Construcción de un Malecón Causa una Mortandad Masiva Localizada del Coral Amenazado Cuerno de Alce (*Acropora palmata*) en Vega Baja, Puerto Rico

PALABRAS CLAVE: *Acropora palmata*, mortandad masiva, coral amenazado

Les Activités de Construction de Digue Causent une Mortalité Massive Localisée du Corail Corne d'élan (*Acropora palmata*), Espèce Menacée, à Vega Baja, Puerto Rico

MOTS CLÉS: *Acropora palmata*, mortalité massive, digue, corail corne

EDWIN A. HERNANDEZ-DELGADO[1]*, ALEJANDRA ALVARADO[1], RICARDO LAUREANO[2], KATIE FLYNN[3], and SEAN GRIFFIN[4]

*[1]University of Puerto Rico Center for Applied Tropical Ecology and Conservation, Coral Reef Research Group, P.O. Box 23360, San Juan, Puerto Rico 00931-3360. *coral_giac@yahoo.com. [2]Vegabajeños Impulsando Desarrollo Ambiental Sustentable, PMB 304 Ave. Alejandrino 3071, Guaynabo Puerto Rico 00969. [3]University of Puerto Rico, Department of Marine Sciences, Call Box 9000, Mayaguez, Puerto Rico 00681-9000. [4]National Oceanic and Atmospheric Administration Restoration Center, Aguadilla, Puerto Rico*

ABSTRACT

Improper implementation of sedimentation controls at a seawall construction site at Vega Baja beach, Puerto Rico, resulted in significant high turbidity followed by localized mass mortality of threatened Elkhorn coral (*Acropora palmata*) populations along a east-west gradient during August 13 - 20, 2010. A total of 63 tagged coral colonies along eight permanent transects (0.5 to 2.2 km downstream of the construction site) were unblemished before the event. Those located below 0.9 km away showed an increase in % frequency infections (22 - 78% with decreasing distance). None of the corals located farther away were impacted. Fifty more corals were tagged after the incident along two transects at 0.6 (east) and 0.8 km away (middle). A total of 90% of the corals were partially killed by patchy necrosis (PN) at each site, with 75% still showing active infections at the east and 50% at the middle site. Also, 45% of the colonies showed 26 - 50% recent tissue loss at the east, while 23% of those from the middle showed only 6 - 25% tissue loss. Live % coral cover was significantly lower at the east site (44%) than at the middle (66%). Recent mortality was higher at the east site (37%) in comparison to the middle (20%). Frequency of large lesions was significant at the east site. This event was more devastating than a previous one during the winter of 2008. Sea surface temperature anomaly was +2.0°C during this event, suggesting that the combined stress of high turbidity and warm temperature could have triggered such an impact.

High Larval Settlement of the Long-Spined Black Sea Urchin, *Diadema antillarum,* in the United States Virgin Islands

KEY WORDS: Settlement, keystone herbivore, Allee effect, source-sink dynamics

Un Solución Alto para Larvas de Larga Maculiventris Negro Erizo de Mar, *Diadema Antillarum,* en las Islas Vírgenes de los Estados Unidos

PALABRAS CLAVE: Solución alto, maculiventris negro erizo de mar,

Importante Colonie de Larves de l'Oursin Noir à Longue Épines, *Diadema antillarum*, dans les Iles Vierges Americaines

MOTS CLÉS: Importante colonie, oursin noir à longue épines

STEPHEN MCCAULEY[1]*, EDWARD PARISH[1], TERESA TURNER[1], and LINDA WALTERS[2]
[1]*University of the Virgin Islands Center for Marine and Environmental Studies, Box 305 #2, John Brewer's Bay, Saint Thomas, United States Virgin Islands 00802. *stephen.a.mccauley@gmail.com.*
[2]*University of Central Florida, 4000 Central Florida Boulevard, Orlando, Florida 32816 USA.*

ABSTRACT

Larval abundance is suggested to be a limiting factor for populations of the long black spiny sea urchin *Diadema antillarum* recovering from the 1983 - 1984 Caribbean-wide die-off, yet such data are scarce. Coral reef recovery may well depend on this keystone herbivore as well. Using methods comparable to similar previous studies in the Caribbean, this study is the first to quantify larval settlement rates on shallow water (< 7 m) coral reefs within the United States Virgin Islands. In January 2010, larval traps were deployed in two areas of low ($0.21/m^2 \pm 0.09$ SE) and high ($2.75/m^2 \pm 0.44$ SE) densities of adults in Brewer's Bay, St. Thomas. Monthly settlement rates of juvenile *Diadema* to date are high (max. ~17/ m^2) compared to previous studies of settlement in nearshore reefs in Puerto Rico (max. ~$0.3/m^2$) and the Florida Keys (max. $1.9/m^2$). Larval settlement appears to be seasonal, with all of the juveniles appearing between May - July 2010. Surprisingly, fewer juveniles settled in the area with the highest adult density, suggesting that post-settlement mortality is important. Quantifying larval settlement patterns allows managers to better understand factors affecting coral reef recovery.

Variación Temporal del Contenido de Metales Trazas en el Molusco *Arca zebra*, Agua y Sedimentos Superficiales, Extraidos del Banco Natural Coche-Chacopata, Estado Sucre, Venezuela

PALABRAS CLAVE: *Arca zebra*, bioacumulacion, metales traza, bivalvos, Coche-Chacopata, Venezuela

Temporal Variation of Traces Metals Contents in Mollusc *Arca zebra*, Water and Surface Sediments, Collected from the Natural Bank Coche-Chacopata, Sucre State, Venezuela

KEY WORDS: *Arca zebra,* bioaccumulation, trace metals, bivalves, Coche-Chacopata, Venezuela

La Variation Temporelle du Contenu des Traces de Métaux dans *Arca zebra* Mollusques, l'Eau et les Sédiments de Surface, Prélevés des Ressources Naturelles de la Banque Coche-Chacopata, l'Etat De Sucre, Venezuela

MOTS CLÉS: *Arca zebra,* traces de métaux, mollusques, Coch-Chacopata, Venezuela

JOEL MONRROE[1]*, JOSÉ MATA-ACUÑA[1], GREGORIO MARTINEZ[2], and RUSELQUIS GUZMÁN[3]
[1]*Universidad de Oriente Nucleo de Sucre, Urbanizacion Romulo Gallegos Manzana 01 numero 05, Cumana, Sucre 6101 Venezuela, *joeyj17@gmail.com.* [2]Instituto Oceanográfico de Venezuela, Cumana Sucre 6101 Venezuela.*
[3]*Alimentos Polar Comercial, Cumaná SGuzucre 6101 Venezuela*

RESUMEN

Se determinaron las concentraciones de los metales pesados (Cd, Zn, Mn, Fe, Cu, Ni, Co, Pb), en el molusco *Arca zebra* (tejido blando – $mg \cdot kg^{-1}$ masa seca), agua y sedimentos superficiales, del banco Coche-Chacopata, estado Sucre, durante el período comprendido entre los meses de septiembre 2008 a febrero 2009, con el fin de monitorear el comportamiento de estos metales durante el muestreo y además constatar que estos no excedan los límites permisibles para el consumo humano de estos moluscos bivalvos según organismos internacionales (FAO/OMS), para ser incorporados a los

planes de manejo integral de la zona costera del estado Sucre. bEl análisis de los datos obtenidos permitieron establecer dos períodos, uno de lluvia (septiembre – diciembre) y otro de surgencia (diciembre – febrero). bLos metales estudiados presentaron la siguiente tendencia de bioacumulación en el molusco Feb> Zn > Cd > Cu observándose una preferencia por los metales esenciales Fe y Zn con promedios de 148,865 y 49,377 respectivamente. Estos mostraron diferencias significativas en la mayoría de los meses muestreados, observándose sus mayores valores durante febrero, correspondientes, probablemente, al establecimiento del período de surgencia. La tendencia del Cd fue una disminución de su concentración durante el muestreo, coincidiendo con la baja de los metales biodisponibles en el sedimento, durante el mismo período. El Cu obtuvo su pico más alto (4,208) en el mes de diciembre finalizando el período de lluvia. Para el agua los metales obtenidos fueron Fe (56,620) y Cu (0,595). En los sedimentos se encontró la presencia de todos los metales estudiados. También se evaluaron los parámetros fisicoquímicos del agua (temperatura, salinidad, pH, oxígeno disuelto), obteniéndose resultados dentro de los parámetros normales (T = 29,35ºC; pH = 8,37; sal = 34,91 mg/g; TOD = 3,49 mg/l).

Aspectos sobre la Ecología y a Pesquería Recreativa de *Donax striatus* (Bivalvia, Donacidae) en Playa Las Balsas, Gibara, Cuba

PALABRAS CLAVE: *Donax striatus*, bivalvos, ecologia, playa, pesquería, Cuba

Aspects of the Ecology and Recreational Fishery of *Donax striatus* (Bivalvia, Donacidae) in Las Balsas Beach, Gibara, Cuba

KEY WORDS: *Donax striatus,* bivalves, ecology, beach, fishery, Cuba

Aspects au Sujet de l'Ecologie et Pêche de *Donax striatus* (Bivalvia, Donacidae) dans la Plage Las Balsas, Gibara, Cuba

MOTS CLÉS: *Donax striatus,* ecologie, pêche, Cuba

FRANK A. OCAÑA* and ALEJANDRO FERNÁNDEZ
*CISAT Universidad de Oriente, 18 s/n esq. Maceo. Rpto. El Llano, Avenida de Las Américas s/n. Holguín, Holguín 80100 Cuba. *franko@cisat.cu*

RESUMEN

Una población de *Donax striatus* fue muestreada mensualmente desde febrero de 2008 a enero de 2009 en playa Las Balsas, Gibara, Cuba. La población mostró fluctuaciones estacionales de la densidad presentándose los mayores valores en los meses de mayo y octubre de 2008 y enero de 2009. Se observan tres picos de reclutamiento: abril - mayo, agosto de 2008 y enero de 2009. Se observó una distribución estratificada por grupos de tallas: los reclutas fueron encontrados en los estratos superiores de la playa y los adultos fundamentalmente en los estratos bajos. La mayor abundancia se encontró en el estrato intermedio. No hubocorrelación entre los cambios mensuales de densidad con las temperaturas, ni con las precipitaciones, sin embargo parece que los cambios en el régimen habitual del oleaje y la elevación del nivel medio del mar tienen influencia sobre el comportamiento de la abundancia de esta especie. La mayor talla reportada fue de 28.24 mm y la relación entre las variables morfométricas es altamente significativa, presentando un crecimiento alométrico positivo. La estabilización del crecimiento ocurrió a los 15.48 mm, indicando indirectamente que esta es la primera talla de madurez sexual. La pesquería es una actividad poco lucrativa en la que solo el 23% de los pescadores venden la captura. Las colectas se realizan manualmente, existiendo una selección de los individuos. La CPUE alcanzó un valor promedio de 2.5 kg/hombres-día y no existe asociación entre los niveles de captura y la estacionalidad. Esta pesquería recreativa puede considerarse como una actividad sostenible.

Distribution and Aspects of the Life History of the Deepwater Geryonid Crab, *Chaceon quinquedens* in the Northern Gulf of Mexico

KEY WORDS: *Chaceon quinquedens*, life history, Gulf of Mexico

Distribucion y Aspectos de la Historia de Vida del Cangrejo Gerionide de Aguas Profundas, *Chaceon quinquedens* en el Norte Del Golfo de Mejico

Répartition Géographique et Aspects de l'Histoire de Vie du Crabe Geryonid, *Chaceon quinquedens* dans le Nord du Golfe du Mexique

HARRIET PERRY*, CHRISTINE TRIGG, and DONALD JOHNSON
*Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 E. Beach Drive, Ocean Springs, Mississippi 39564 USA. *harriet.perry@usm.edu*

ABSTRACT

Red crabs occupy a remarkably narrow band along the continental slopes of the Gulf of Mexico (GOM) at depths from 500 - 2,000 m with the majority found at around 900 m, the maximum depth of light penetration (< 1%). While widely distributed through the GOM, greatest abundance of red crabs is in the north-central Gulf off Alabama and Mississippi in close association with the recent Deep Water Horizon oil discharge. Bathymetric distribution of adult red crabs cannot be explained by any of the environmental factors collected to date. Neither sediment type, nor temperature, nor competition with other geryonid species explain observed distribution. Distribution of red crabs may be related to reproductive strategies and mechanisms of larval transport. Females brood their eggs for nine months with spawning occurring in late fall/early winter. Females carrying eggs comprise about 20% of the total population of females in the north-central GOM in spring, summer, and fall. Recruitment is poorly understood, and locations of postlarval settlement areas are unknown. Megalopae have never been captured in the wild, and only a few zoeal stages have been identified from plankton samples. Captured larvae were found in the upper 200 m of the water column where currents can disperse them far from suitable habitat. In this study we use archived nowcast/forecast numerical model data to examine dispersal and retention mechanisms. We also estimate the potential impact of the recent oil discharge on the northern Gulf population.

Processing Sea Cucumber, *Isostichopus badionatus*, Along the Coast of the Yucatán México

KEY WORDS: Sea cucumber, *Isostichopus badionatus*, processing

Proceso del Pepino de Mar, *Isostichopus Badionatus* en las Costas del Estado De Yucatán, México

PALABRAS CLAVE: Pepino de Mar, *Isostichopus badionatus, proceso*

Procedure du Beche-de-Mer, *Isostichopus baniodatus*, dans la Côte Du Yucatan, au Mexique

MOTS CLÉS: Beche-de-Mer, *Isostichopus badionatus,* procedure

CARLOS REYES-SOSA*, LUIS ALFONSO RODRIGUEZ GIL, ENRIQUE EDUARDO PERAZA GONZÁLEZ, SARA LUZ NAHUAT DZIB, and JOSÉ LUIS GIORGANA FIGUEROA*
*[1]Instituto Tecnologico de Merida Km 5 Carr. Mérida Progreso Mérida, Yucatan 97118 Mexico. * carlos.reyes.sosa@hotmail.com. [2]Instituto Tecnológico de Mérida Km 5 Carr Mérida-Progreso Mérida Yucatan 97118 México [2]Instituto Tecnológico de Mérida Km 5 Carr Mérida-Progreso Mérida Yucatán 97118 México[2]Instituto Tecnológico de Mérida Km 5 carr Mérida-Progreso Mérida Yucatán 97118 México. Instituto Tecnológico de Mérida Km 5 Carr. Mérida-Progreso MéridaYucatán 97118 México.*

ABSTRACT

The sea cucumber fishery in the state of Yucatán, México, started in 2006 with a few fishermen in order to evaluate its impact. Nevertheless, the dried sea cucumber processing is very rudimentary. A sample of 35 organisms was taken, mean initial total weight was 434.6g (s =1 56.7). After cleaning a loss of 28% was registered, the sea cucumbers were boiled in 50 l of tap water around 2 h in a metallic container using 50 kg of non-sorted by size, a 15.3% from de initial weight was registered, with a moisture content of 84.7%. After cooking, the sea cucumber are placed in salt beds to reduce the free water in the tissues and kill micro-organism during 48 h, a loss of 87.7% from initial total weight was observed with a

moisture content of 57.5%, then they are washed, rinsed and reboiled in tap water for 30 min, reaching a 8.72% from the initial weight and moisture content of 46.1%. Finally, the sea cucumbers are place on the ground and sun dry for 16 days, to achieve a final moisture content of 5% and a loss of 91.2% from the initial total weight.

The Simulation of the Interaction among Sea Fan Colony, Its Immune System, and a Potential Pathogen

KEY WORDS: Mathematical model, gorgonia ventalina, immune system

Una Simulacion de la Interaccion entre Abanicos de Mar, Su Sisteme Inmune y Un Potencial Patogeno

PALABRAS CLAVE: Simulacion de la Interaccion, abanicos de mar, sisteme immune

La Simulation de l'Interaction entre une Colonie de Gorgone, son Système Immunitaire, et un Pathogène Potentiel

MOTS CLÉS: Simulation de l'Interaction, colonie de gorgone, système immunitaire

CLAUDIA RUIZ-DIAZ*, CARLOS TOLEDO-HERNANDEZ, ALBERTO SABAT, AND MARIANO MARACANO
*University of Puerto Rico - Rio Piedras Campus, San Juan, Puerto Rico 00931, *claudiapatriciaruiz@gmail.com*

ABSTRACT

We present a mathematical model using ordinary differential equations that describe the interaction among *Gorgonia ventalina* under different immune conditions (optimal, intermediate, and immune-compromised), and a potential endo-pathogen. The model has the following assumptions: 1) The polyps are the main unit of the coral; 2) the population of polyps is homogenously distributed through the colony, and thus is considered as single and 3) the immune system is activated by a signal. When the endosymbiont exceeds a density threshold, it becomes pathogenic, decreasing the birth rate of new polyps or increasing their death rate. As a consequence, the colony emits a signal to its stem cells (immune cells) to differentiate into humoral and phagocytic cells, both of which combat the pathogen. Under the optimal immune condition the pathogen is rapidly eradicated by the immune cells and the coral polyp population returns to its equilibrium state. Under the sub-optimal immune condition, polyps and pathogen co-exist, and the maximum capacity of new polyp formation is never reached. In contrast, when coral is immunologically compromised, immune cells cannot stop the pathogen growth, and the number of polyps tend to zero.

Habitat Fragmentation and Genetic Variability in Two Populations of *Crassostrea rhizophorae* Guilding 1828, in Adjacent Regions of the Laguna de Términos, Campeche, Mexico

KEY WORDS: Oysters, *Crassostrea rizophorae*, metapopulations, genetic variability, habitat fragmentation

Fragmentación del Hábitat y Variabilidad Genética en dos Poblaciones de C*rassostrea rhizophorae* Guilding 1828 en Regiones Adyacentes a la Laguna de Términos, Campeche México

PALABRAS CLAVE: Ostion, *Crassostrea rizophorae,* varabilidad genética, fragmentación del hábitat

Fragmentation de l'Habitat et la Variabilité Génétique de Deux Populations de *Crassostrea rhizophorae* Guilding 1828 dans les Régions Voisines de la Laguna de Termines, Campeche au Mexique

MOTS CLÉS: Huitre, *Crassostrea rizophorae,* variabilité génétic, fragmentation de l'habitat

JORGE TELLO[1]*, FAUSTINO RODRIGUEZ[2], GERARDO RIVERA[1], and SARA SOLIS [1]
[1]*Instituto Tecnológico de Mérida, Av. Tecnológico S/N Mérida, Yucatán 97118 México. *74080625@itmerida.mx*
[2]*UNAM, Avenida Universidad 3000 DF Mexico 04510 Mexico.*

ABSTRACT

The impact of habitat fragmentation on the populational genetic structure was studied in two oyster populations of *Crassostrea rhizophorae* Guilding 1828 from two regions of the Laguna de Terminos, Campeche Mexico by means of the electrophoretic expression of 10 enzymatic systems of muscle. Genetic frequencies data were processed by using the

TFPGA 1.3 program. Samples of the muscle of fifty organisms of each population were used in order to characterize the genotypic expression revealed. The protein polymorphism value was 36.35% (p95) and of 90.90% (p99). The heterozygosis values ranged from 0.2491 for Idh1 to 0.01 for Pt1 with a mean value of He = 0.1044. Fis value average was 0.1574 and Fit value average 0.1727 suggested a heterozygote deficiency. The value average of Fst = 0.0181 indicates that the observed genetic differences correspond to a inter populational variation with moderate endogamy. The number of migrants obtained by the Slatkin equation was of 13.5621 for generation indicates a certain degree of variability among the populations it is consistent with the values of Nei genetic distance. It is concluded that the two populations of *Crassostrea rhizophorae* here studied reflect sensibility to the adaptive processes that take place due to the genetic discontinuity promoted by the fragmentation of the habitat but still without detriment of their levels of genetic variability and in consequence, they do not reflect at present populational fragility that exposes them to habitat fragmentation .

Consumer Awareness and Response to Grouper Mislabeling Fraud

KEYWORDS: Mislabeling , grouper, willingness to pay

El Conocimiento y la Respuesta de Consumo al Mero Etiquetando Mal Fraude

PALABRAS CLAVE: Etiquetando mal fraude, mero, repuesta de consumo

Conscience De Consommateur et Réponse au Mérou Etiquetent Mal Fraude

MOTS CLÉS: Etiquetent mal fraude, mérou, résponse de consommateur

CHARLES ADAMS*, SHERRY LARKIN, and ANDREW ROPICKI
*University of Florida, Box 110240, Gainesville, Florida 32611-0240 USA. *cmadams@ufl.edu.*

ABSTRACT

Widespread media attention has recently been directed toward the mislabeling of grouper. This form of economic fraud involves a seafood business erroneously labeling a finfish item as grouper, while substituting a cheaper species of fish. These negative reports are thought to have had an adverse impact on consumer perception of grouper products. In addition, patterns of purchasing and consumption of other types of seafood are thought to have been impacted. To assess these hypotheses, a telephone survey was conducted with 249 grouper consumers in Florida. The survey asked respondents about their grouper purchasing behavior, awareness of the reported fraud, the effect that their awareness has had on their grouper and general seafood consumption, and their willingness to pay to avoid mislabeled grouper through a labeling program that may enhance product integrity and, thus, consumer assurance. The survey found that most respondents were aware of the mislabeling issue, and that this awareness has negatively impacted grouper consumption at restaurants. The survey also revealed a willingness to pay for a labeling program, but willingness to pay was limited by cost and payment frequency. Probability-based models were estimated to identify consumer attributes and beliefs that explained willingness to pay for a labeling program. The findings from the model estimations could help in the development of a labeling program designed to address product integrity and enhance consumer assurance with regard to the identity and source of the grouper they purchase.

Studying the Historical Ethnoecology of the USVI - St.Thomas Fishing Community

KEY WORDS: Community-based management, local ecological knowledge, participatory research, qualitative methods, ethnoecology

El Estudio de la Etnoecología Histórico de las Islas Vírgenes de E.U. - St. Thomas de Pesca de la Comunidad

PALABRAS CLAVE: Pesca de la comunidad, etnoecología histórico, Islas Vírgenes de E.U.—St. Thomas

Étudier L'Ethnoécologie Historiques des Îles Vierges Américaines - Saint Thomas de Pêche Communautaire

MOTS CLÉS: Pêche communautaire, ethnoécologie historiques, Îles Vierges Américaines - Saint Thomas

KOSTAS ALEXANDRIDIS, JEREMIAH DUFFY, BENISE TAVERNIER, KETURAH MCCRAE, and LIA ORTIZ
University of the Virgin Islands 2 John Brewer`s Bay St. Thomas, VI 00802 USA. kalexan@uvi.edu

ABSTRACT

Fishing in the US Virgin Islands has been a part of island survival and culture since before Europeans and slave trade found its way into the Caribbean. However, any potential decreases in Virgin Island fisheries, is likely to directly impact the viability of the local fishing industry, and have negative consequences to the fishing communities and their fisheries-dependent livelihoods. The aim of our research is to collect, study, and analyze local ecological knowledge of fishermen and the St. Thomas fishing community and how such knowledge of the past and the present can be best used to inform future sustainable and resilient decisions in regards to USVI fisheries and its management. Our research methodologies includes community-based participatory methods, observational studies, historical archival research, and literature review to gather subjective information to be evidence-based evaluated using qualitative models and methods of analysis. Such methods include content analysis, qualitative classification, photographic interpretation, longitudinal or panel analysis, classification matrixes, and mapping of social networks. We also seek to understand the conditions and thresholds that are likely to produce a sort of "domino effect" and negative feedback mechanisms, ensuing fishery decline resulting in species extinction, coral decay, loss of jobs and food, and increased fish prices in a recession weakened tourism-based economy. We will contribute to the construction of a web-based archive, which will include our findings and digitally cataloged photos and data. This archive will provide the fishing community and future generations with easily accessible public knowledge about themselves, their history, and their environment.

Bottom-Up Community Participation in Fisheries Management: Case Studies and Future Directions

KEY WORDS: Community fisheries management, ecosystem management, social resilience, sustainable development, social learning

Participación Comunitaria en la Gestión de la Pesca: Estudios de Casos y Orientaciones Futuras

PALABRAS CLAVE: Gestión de la pesca, participación comunitaria, orientaciones futuras

Participation de la Communauté dans la Gestion des Pêches Ascendantes : Études de Cas et des Orientations Futures

MOTS CLÉS: Gestion des pêches, participation de la communauté, orientations futures

KOSTAS ALEXANDRIDIS
University of the Virgin Islands, 2 John Brewer's Bay, St. Thomas, Virgin Islands 00802 USA. kalexan@uvi.edu.

ABSTRACT

In recent years an increasing number of case studies and evidence-based science has outlined the needs, and enhanced benefits of grassroots or bottom-up community participation in sustainable and resilience ecosystem management. The fishing communities both at global, and at local levels have a key role to play as valuable collaborators and partners in the scientific understanding of changes in the ways that human societies and groups interact with their natural and marine environment. In most cases local fishing communities have multiple and critical dependences to their local marine environment, including livelihoods and employment outcomes, social and community wellbeing and happiness, the sustainability of food and other economic and social services, as well as traditional and customary responsibilities for the sustainability,

resilience and preservation of marine resources for future generations. Empowering communities to achieve adaptive, resilient, and self-organizing potential for the future has multiple benefits for the communities themselves and beyond. At the same time, such approaches are contributing to social and collective learning, promoting social cohesion, responsibility, and accountability at the community/grassroots level, and achieving alternative sustainable and resilient development outcomes that improve the flows and interactions among the natural, social, economic, financial and physical capital within and across them. We will present case studies of alternative and resilient community-based fisheries projects around the world, and will provide a case for a paradigm shift towards bottom-up community participatory ways for fisheries management. This research is funded by NSF/VI-EPSCoR, award number no 203056.

Policy Implications of Larval Dispersal Scales by Caribbean Spiny Lobster in the Bahamas

KEY WORDS: Connectivity, biophysical modeling, dispersal kernels, Caribbean spiny lobster, MPAs

Implicaciones de Política de Gestion de las Escalas de Dispersión Larvarias de Langosta Común del Caribe en the Bahamas

PALABRAS CLAVE: Dispersión larvarias, implicaciones de política gestión, langosta del Caribe, Bahamas

Implications Politiques de Gestion des Échelles de Dispersion Larvaires de la Langouste des Caraïbes dans les Bahamas

MOTS CLÉS: Dispersion larvaires, implications politiques de gestion, langouste des Caraïbes, Bahamas

KARLISA A. CALLWOOD[1]*, CLAIRE B. PARIS-LIMOZY[1], LAURENT M. CHERUBIN[1], MARK J. BUTLER[2] and KENNY BROAD[1]

*[1]Rosenstiel School of Marine and Atmospheric Science , University of Miami, 4600 Rickenbacker Causeway, Miami, Florida 33149 USA. *kcallwood@rsmas.miami.edu, [2]Old Dominion University, Norfolk Virginia 23529 USA.*

ABSTRACT

Caribbean spiny lobster (*Panulirus argus*) supports major fisheries throughout the Caribbean, especially in The Bahamas, which reports the highest catches and where lobster serves as the number one food export. *Panulirus argus* possesses a long pelagic larval duration (PLD), estimated at 5 - 7 months. The possibility for long-range dispersal increases the difficulty when determining origins of local adult populations. Additionally, larval behavior can constrain dispersal, complicating the dispersal scenario and its implications for conservation and management. We used a coupled biophysical model to explore policy implications of lobster larval dispersal in The Bahamas by simulating dispersal from scaled egg production of 47 Bahamian release locations to determine the mean dispersal kernel and identify hotspots of settlement. The model, initialized biweekly from April through September (the highest months of larvae production in The Bahamas) simulated lobster larval dispersal using a maximum PLD of 180 days, and included diel and ontogenetic changes in vertical migration that influence transport. The dispersal kernel in The Bahamas was 100 - 300 km, indicating that larvae released within its boundaries typically settled there as well. Due to the long PLD, larval particles travelled 4,000 km or more from source locations; those same larval particles still settled within The Bahamas, suggesting local retention – a finding that contradicts the common perception that lobster in The Bahamas originate elsewhere. This new knowledge has important ramifications for the conservation and management of the Bahamian *P. argus* fishery, including the implementation of MPA networks and assessment of current input and output management controls.

Reducing the Susceptibility of Parrotfish to Fish Traps: A Meta-Analysis Identifying Feasible Management Strategies

KEY WORDS: Scaridae, vulnerability, fish traps, management strategies

Reduciendo la Susceptibilidad de los Peces Loro a las Trampas: Un Meta-Análisis que Identifica Estrategias Viables de Manejo

PALABRAS CLAVE: Scaridae, susceptibilidad, trampas, estrategias viables de manejo

En Réduisant la Susceptibilité des Poissons Perroquet aux Pièges: Une Méta-Analyse Identifiant des Stratégies Faisables de Maniement

MOTS CLÉS: Scaridae, susceptibilité, pièges, stratégies faisables de maniement

STEVE CANTY* and STEVE BOX
*Centro de Ecologia Marina de Utila, Oficina 401-403 Edificio Florencia, Bulevard Suyapa , M.D.C. Tegucigalpa Honduras. *steve_canty@utilaecology.org*

ABSTRACT

Parrotfish are essential to the health and resilience of coral reefs. As the Caribbean's main herbivores, they reduce the extent and canopy height of macroalgae, create space for coral settlement, and mediate spatial competition between corals and algae. Due to their crucial ecological function, protecting parrotfish populations is an increasing management priority across the region. Identifying and implementing realistic yet effective management strategies for areas that are subject to fishing pressure is essential, considering that 98% of Caribbean coastal waters are not under marine protection. Parrotfish may be particularly vulnerable in locations where fish traps are widely used. Their simple construction and ease of deployment, combined with their ability to capture fish not susceptible to hook-and-line, make this non-selective fishing gear advantageous to fishers. However, their sustained use has been widely blamed for the overexploitation of near shore reef fish populations including parrotfish in many areas of the Caribbean. In the current study, we collated data from the literature and combined this with results from original trap experiments conducted in Honduras to build a regression model to calculate the importance of different factors affecting the susceptibility of parrotfish species to trapping, including design, dimensions, mesh size, deployment substrate, depth, and soak times. The results suggest easily interpretable management guidelines for fish trap use to be applied in areas where banning fish traps is currently unachievable due to limited enforcement capacity, strong cultural connections to fish traps, or a large economic dependence with few available alternatives.

High Profit Pelagic Fisheries Lure Artisanal Fishers into Cycles of Debt, Risk, and Climate Vulnerability

KEY WORDS: Pelagic, artisanal, economics, fisheries

La Pesca Pelágica de Alta Rentabilidad Lleva a Pescadores Artesanales a Ciclos de Deuda, Riesgo y Variabilidad Climática

PALABRAS CLAVE: Pelágic, artesanales, económico, pesquerias

La Pêche Pélagique à Bénéfices Élevés Appâte les Pêcheurs Artisanaux dans la Faillite, Les Risques et l'Impact de la Vulnérabilité Climatique

MOTS CLÉS: Pélagique, artisanaux, pêcheurs

PETER CHAIBONGSAI[1]*, MANDY KARNAUSKAS[2], JUAN AGAR[3], and ANDREW HANSEN[3]
[1]*The Billfish Foundation, 5100 N Federal Hwy #200, Ft. Lauderdale, Florida 33308 USA.*
**peter_chaibongsai@billfish.org*. [2]*University of Miami, RSMAS, 4600 Rickenbacker Causeway, Miami, Florida 33149 USA.* [3]*NOAA Fisheries, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, Florida 33149 USA.*

ABSTRACT

Fishing is an important source of income to many who have limited employment opportunities in tropical rural areas. Typically, most descriptions of fishing practices in these areas have been restricted to reef fish fisheries, and studies that document pelagic fisheries are rare. This paper provides a socio-economic description of the artisanal pelagic fishery in San

Pedro de Macorís, Dominican Republic, where we conducted 19 in-person interviews in March 2010. We found that fishermen used extensive local knowledge on migration routes to target a variety of pelagic species including dolphin, billfishes, and tuna, which were available at varying periods during the year. The study also found high levels of dependence on fishing. Average individual income of fishermen (from fishing alone) was three times that of the average rural individual income, but these high earnings were offset by risks and vulnerability. Fishermen identified multiple threats to their livelihood and well-being, including: lack of access to safety equipment and loss of life at sea, reductions in the availability of stocks, climate-driven variability in the timing of arrival of migratory stocks, and cycles of debt incurred due to the unpredictable nature of the fishery. Despite fishers' perceived reductions in fish stocks, reducing harvesting capacity is difficult given the high earnings obtained and the severe lack of alternative income strategies. Short-term improvements in livelihoods may be attained through projects to increase fishers' access to credit, savings programs, and safety equipment. Longer-term improvements are challenging given the overexploited status of stocks upon which fishers are dependent.

Communication between Marine Science and Policy in the Eastern Caribbean

KEY WORDS: Communication, governance, local area management, policy, science, Eastern Caribbean

Comunicación entre la Ciencia de Marina y la Política en el Caribe del Este

PALABRAS CLAVE: Comunicación, política, cencia de marina, Caribe del este

Communication entre les Sciences Marines et la Politique dans les Caraïbe Orientales

MOTS CLÉS: Communication, politique, sciences marines, Caraïbe Orientales

LYN-MARIE DEANE* and PATRICK MCCONNEY
[1]*Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Cave Hill, St. Michael, Barbados.* *lyn-marie.deane@cavehill.uwi.edu

ABSTRACT

Marine science seldom "speaks for itself". Marine science, relevant to solving real problems, is still being done without any effort to inform and influence marine policy. This situation applies more to fisheries than MPAs, which often incorporate advocacy, but both are deficient. We suffer the consequences of marine policies that do not utilize research results. Research should mobilize knowledge (scientific, local, traditional) and stimulate learning to enhance future policy-making. Policies that encourage overfishing or poorly designed and operated MPAs, despite available scientific information, are witness to this deficiency. Why do these dysfunctions persist? There is insufficient attention, on both sides, to improving the communication between science and policy. Communication entails understanding people, pathways, and products in the context of its purpose or main message. Marine scientists and managers require professional assistance in this area. The Centre for Resource Management and Environmental Studies (CERMES) is seeking to investigate and address these issues and means for improving communication through its Local Area Management Project (LAMP). LAMP, in the context of governance institutions for locally managed marine areas, sought to determine communication products and pathways for influencing policy makers and other key change agents; to use policy groups in Dominica and Grenada for learning best practices and information sharing; and to develop communication strategies for marine resource governance. Lessons learned from these study sites about communication between marine science and policy are likely to be applicable to an array of marine resource governance institutions and arrangements in the Wider Caribbean.

Evaluación del Efecto de la Pesquería de Arrastre de Camarón sobre la Estructura de Tamaños de la Ictiofauna Acompañante en el Golfo De Salamanca, Caribe de Colombia

PALABRAS CLAVE: Biodiversidad, pesquería artesanal, indicadores biológicos, pesca acompañante, mar Caribe

Assessment of the Artisanal Shrimp Trawl Fishery Effects on Fish Bycatch Size Structure in the Gulf Of Salamanca, Colombian Caribbean Sea

KEY WORDS: Biodiversity, artisanal fishery, biological indicators, bycatch, Caribbean Sea

Evaluation De l'Effet de la Pêche au Chalut des Crevettes sur la Structure des Tailles de la Ictiofaune Accompagnante dans le Golfe de Salamanca, dans les Caraïbes en Colombie

MOTS CLÉS: Pêche au chalut des crevettes, ictiofaune accompagnante, structure des tailles, Caraïbes en Colombie

ROY DIAZ-VESGA*, FELIX CUELLO, RUBEN ACEVEDO, ANDRES VELEZ JOHAN RODRIGUEZ , FABIAN ESCOBAR LUIS, y ORLANDO DUARTE
*Laboratorio de Investigaciones Pesqueras Tropica Universidad del Magdalena, Carrera 32 No. 22-08, Santa Marta, Colombia. *gieep@unimagdalena.edu.co*

RESUMEN

Las pesquerías de arrastre se han caracterizado por afectar las poblaciones de especies no objetivo y los ecosistemas en que operan. En el Golfo de Salamanca se desarrolla recientemente una pesquería artesanal de arrastre de camarón, por lo que se requieren estudios que analicen los efectos ecológicos de esta actividad. Para este propósito, se efectuaron muestreos a bordo que permitieran identificar y cuantificar la pesca acompañante. Se calculo el porcentaje de tallas por encima de la talla a la madurez (L_m) y la talla optima de captura (L_{opt}). Se registraron más de 50 especies entre peces, de las cuales solo especies pequeñas y sin interés comercial o de consumo como *Stellifer chaoi*, *Symphurus caribbeanus* y *Trinectes paulistanus* presentaron tamaños que excedieron en más del 75% de los casos los indicadores biológicos evaluados. Los individuos capturados de especies medianas y grandes, con interés comercial y de consumo (e.g. *Conodon nobilis*, *Cathorops mapale*, *Scomberomorus brasiliensis*) tuvieron en todos los casos tamaños inferiores a L_m y L_{opt}. De acuerdo a los resultados, preocupan los efectos sobre la estructura de tamaño de la comunidad íctica demersal, principalmente sobre los juveniles, lo cual sugiere el papel de la zona de pesca como sitio de cría y reclutamiento. Es urgente la implementación de medidas para mitigar el impacto de la pesca de arrastre artesanal sobre las comunidades marinas y el ecosistema que promuevan la sostenibilidad de la actividad pesquera en esta región del Caribe de Colombia. Estudio auspiciado por Colciencias (Proyecto 1117-489-25529), Universidad del Magdalena.

Distribución Espacial de Indicadores Biológicos Simples en la Pesquería Artesanal del Norte del Mar Caribe de Colombia

PALABRAS CLAVE: Indicadores biológicos, pesquerías artesanales, análisis espacial, mar Caribe, Colombia

Spatial Distribution of Simple Biological Indicators in the Artisanal Fishery of the Northern Colombian Caribbean Sea

KEY WORDS: Biological indicators, artisanal fishery, spatial analysis, Caribbean Sea, Colombia

Distribution Spatiale des Indicateurs Biologiques Simples dans la Pêche Artisanale de la Mer des Caraïbes, La Colombie

MOTS CLÉS: Indicateurs biologiques, pêche artisanale, distribution spatiale, Mer des Caraïbes, Colombie

LUIS ORLANDO DUARTE*, FÉLIX CUELLO, Y ARISTIDES LÓPEZ
*Universidad del Magdalena, Laboratorio de Investigaciones Pesqueras Tropicales, Cra 32 # 22-08 Santa Marta, Magdalena 470003 Colombia. *gieep@unimagdalena.edu.co.*

RESUMEN

Las poblaciones de peces y el esfuerzo pesquero están estructurados espacialmente, por lo cual las estrategias de análisis y de manejo de los recursos requieren incorporar la dimensión espacial para responder a las consideraciones ecosistémicas que demanda la comunidad internacional. Para evaluar el estado de explotación de los recursos pesqueros se han propuesto indicadores biológicos simples basados en los tamaños individuales y en las tasas de capturas. El presente

estudio explora los patrones espaciales de las capturas de *Opisthonema oglinum*, *Caranx crysos*, *Lutjanus synagris* y *Lutjanus analis*a la luz de dichos indicadores en la pesquería artesanal del norte del mar Caribe de Colombia. Los datos empleados provienen del registro de capturas y esfuerzo realizado durante el periodo comprendido entre 1993 y 2001. Los indicadores empleados fueron longitud a la madurez, longitud óptima de captura, longitud de mega-reproductores y CPUE. Para el análisis del estado de explotación, se propuso un modelo que considera puntos de referencia múltiples basados en tamaños individuales, empleando la aproximación del semáforo. Los resultados fueron representados mediante un sistema de información geográfica. La mayor fracción de los individuos capturados tuvo longitudes inferiores a los indicadores evaluados en todas las zonas en que operó la pesquería, pero la CPUE fue variable espacialmente. Las mayores señales de sobreexplotación fueron evidenciadas en las capturas de *O. oglinum* y de *C. crysos* con red de tiro, de *L. synagris* con línea de mano y de *L. analis* con red de enmalle. El régimen de pesca artesanal observado precisa ser modificado en la región para establecer esquemas de uso responsable de los recursos. Estudio financiado por Colciencias (Proyectos 1117-335-18591, 1117-341-19398) y Universidad del Magdalena.

Programa Educativo para la Conservación de la Biodiversidad del Caribe

PALABRAS CLAVE: Educativo, programa, Caribe, biodiversidad, conservación

Out Reach Program of Caribbean Sea Biodiversity

KEY WORDS: Education, program, Caribbean, biodiversity, conservation

Programme Educative sur la Biodiversité Marine de la Caraibbe

MOTS CLÉS: Educative, programme, Caribbe, biodiversité, conservation

LILIANE FRENKIEL[1]*, DALILA ALDANA ARANDA[2], SATRA PREZ CABRERA[3], y LAURENCE ROMANA[4]
*[1] Archipel des Sciences, km 6 antigua Carretera a Progreso Guadeloupe, French West, France, *frenkiel.liliane-edith@orange.fr. [2]CINVESTAV IPN Mèrida Yucatan, Mexico. [3]Xel Ha, Tulum, Quintana Roo, Mexico. [4]Universitè des Antilles Francaises et la Guyanne, Guadeloupe, French West France*

RESUMEN

Con el objetivo de sensibilizar a la sociedad sobre el valor ecológico, económico y cultural que tiene la biodiversidad marina del Caribe, se creó el *Programa educativo* ***del Caracol rosa, del Caribe.*** Desde 2002 el Centro de Investigación CINVESTAV, el Archipiélago de las Ciencias de las Antillas francesas y el Parque de Xel-Há, han implementando sobre resultados de investigación; el desarrollo de un Paquete Educativo sobre esta especie como uno de los mecanismos utilizados para sensibilizar a la población sobre cómo a partir del conocimiento del ciclo de vida de una especie se elaboran las regulaciones pesqueras y su cultivo para su uso sostenible y responsable. Este Programa dio origen al "Programa Educativo Conservación de la biodiversidad del Mar Caribe", el cual ha elaborado exposiciones franco mexicana que han sido expuestas en diversos Museos y espacios públicos de México y Francia. El presente trabajo presenta el contenido de este programa, cómo se aplica y los resultados del mismo. Es un programa que ha sido apoyado por instituciones públicas, empresas eco turísticas como el Parque de Xel Ha y el Caribbean Fisheries Management Council. A través de estos años ha generado también la edición de libros, y actividades-juegos que pueden ser adaptados a las situaciones particulares de cada región. Este programa ha permitido también la capacitación de maestros y las experiencias con pescadores, restaurantes, empresarios, y artesanas. Se resumen algunas distinciones que ha recibido este programa educativo sobre la conservación de la biodiversidad Marina del Caribe.

Impact of Oil on Blue Crab Recruitment in Mississippi Waters

KEY WORDS: Blue crab larvae, recruitment, Mississippi, oil impacts

Impacto de Petroleo en el Reclutamiento de Jaiba Azul en Las Aguas de Mississippi

PALABRAS CLAVE: Jaiba azul, reclutamiento, Mississippi, impacto de petroleo

Effets du Pétrole sur le Recrutement de la Population de Crabe Bleu Dans les Eaux du Mississippi

MOTS CLÉS: Crabe bleu, recrutement, Mississippi, effets du pétrole

DARCIE GRAHAM*, HARRIET PERRY, DYAN GIBSON, RICHARD FULFORD and DONALD JOHNSON
*Gulf Coast Research Laboratory, The University of Southern Mississippi ,703 E. Beach Drive, Ocean Springs, Mississippi 39564 USA, *darcie.graham@usm.edu.*

ABSTRACT

Blue crab life history includes an offshore larval stage vulnerable to changes in environmental conditions in the Gulf of Mexico (GOM), particularly on the continental shelf adjacent to Mississippi and Louisiana. Blue crabs spawn from March through October in the northern Gulf of Mexico (nGOM). Hatching of eggs occurs near the barrier islands with zoeae immediately transported to surface waters of the open GOM. Toward the end of this planktotrophic phase, metamorphosis to the megalopal stage occurs and they recruit to estuaries across the nGOM. There is high spatial and temporal overlap between the occurrence of blue crab larvae offshore and the presence of oil and dispersant in offshore waters. Blue crab megalopal settlement is being measured daily using simple settlement collectors deployed in quadruplicate at six sites along the Mississippi coast. Deployment will occur from July 1 to October 31 with the collectors suspended from piers. Once each day the collectors will be removed from the water, and all blue crab megalopae and early crab stages present will be removed and preserved in ethanol for identification and enumeration. The seasonal pattern in daily counts of megalopae will be compared to similar data from previous years (1991 - 1999 and 2007). Loss of recruitment due to oil-induced larval mortality will radiate into the coastal food web, as blue crabs are a keystone species in northern Gulf estuaries. These data are critical to assessing ecosystem response to the oil spill and will provide an important baseline for measuring ecosystem recovery.

Assessing Consumer Awareness of Seafood Harvesting and Consumption Issues

KEY WORDS: Consumer awareness, seafood, harvesting, consumption, marketing

Valorando el Conocimiento de Consumo de Mariscos que Cosechan y Asuntos de Consumo

PALABRAS CLAVE: Conocimiento de consumo, mariscos, cosechan y asuntos

Evaluer Conscience de Consommateur de Fruits de Mer Moissonnant et les Problèmes de Consommation

MOTS CLÉS: Conscience de consommateur, fruits de mer, moissonnant

SHERRY LARKIN*, CHARLES ADAMS, and ANDREW ROPICKI
*Department of Food and Resource Economics, University of Florida, P.O. Box 110240, Gainesville, Florida 32611-0240 USA. *slarkin@ufl.edu .*

ABSTRACT

The diverse nature of seafood species, the myriad product forms available to consumers, the many different harvesting techniques, concerns regarding the sustainability of fish stocks and habitat, and a rapidly changing global supply situation make it difficult for consumers to make informed decisions when purchasing seafood. To assess consumer awareness of seafood related issues a telephone survey of 400 seafood consumers in Florida was conducted. Respondents were asked about their awareness and concerns associated with seafood issues such as seafood safety, environmental effects of seafood harvesting techniques, and incorrect labeling of seafood. In addition, respondents were asked how important economic, environmental, or seafood safety assurances would be in developing a hypothetical seafood labeling program. The survey also sought to determine how much seafood-related information should be available on issues regarding nutrition, safety, origin, and harvesting method versus how much information respondents feel is currently available. The survey found that consumer awareness and concern is highest for issues related to seafood safety. Although respondents showed the greatest

concern for seafood safety issues, the information that would provide the most assurance in a labeling program was that the seafood was correctly labeled with respect to species. T he survey also found that respondents, in general, feel that not enough information is available regarding country of origin and harvesting method. The results of this survey provide valuable information to seafood producers and marketing organizations as efforts are directed toward developing effective future seafood marketing campaigns.

The 50 Year History of the "Other" Gulf and Caribbean Journal

KEY WORDS: Journals, Gulf and Caribbean Research, peer-review, publication history, citation history

La Historia de 50 Años de la "Otra" Revista del Golfo y Caribe

PALABRAS CLAVE: Revista, Golfo y Caribe, historia

Les 50 Ano d'Historie de "L'Autre" Journal du Golfe et des Caraïbes

MOTS CLÉS: Journal, Golfe et des Caraïbes, historie

MARK S. PETERSON[1]*, NANCY J. BROWN-PETERSON[1], JAMES S. FRANKS[2], SARA E. LECROY[3], JOYCE M. SHAW[4], and RICHARD W. HEARD[1]

*[1]University of Southern Mississippi, Department of Coastal Sciences, 703 East Beach Drive, Ocean Springs, Mississippi 39564 USA, *mark.peterson@usm.edu. [2]Center for Fisheries Research and Development, Gulf Coast Research Laboratory, 703 East Beach Drive, Ocean Springs, Mississippi 39564 USA. [3]Gulf Coast Research Laboratory, GCRL Museum, 703 East Beach Drive, Ocean Springs, Mississippi 39564 USA. [4]Gulf Coast Research Laboratory, Gunter Library, 703 East Beach Drive, Ocean Springs, Mississippi 39564 USA.*

ABSTRACT

The Gulf Coast Research Laboratory (GCRL) has a 50 year history of annual publication of the peer-reviewed journal *Gulf and Caribbean Research* (GCR, 2000-present; formerly *Gulf Research Reports* (GRR) from 1961 - 1999). Other extant journals serving the region during this time include *Contributions in Marine Science* (since 1945), *Proceedings of the Gulf and Caribbean Fisheries Institute* (since 1948), *Bulletin of Marine Science* (since 1951) *Revista de Biologica Tropical* (since 1953), and *Caribbean Journal of Science* (since 1961). In the early years of GCR publication, papers were primarily concerned with research in Mississippi and the northern Gulf of Mexico (GOM), and the majority of authors were from GCRL or the GOM region. However, in the past 15 years, studies from Mexico and the Caribbean have dramatically increased, with a concurrent increase in the geographical diversity of authors. Overall, surveys and inventories, taxonomy, and life history studies have been most common, and taxa have been dominated by fish and crustaceans. Offshore, benthic and marsh habitats have been most commonly studied during GCR's 50 year history. In general, publications during the last 15 years are more similar to each other ($\geq$ 65% similarity based on CLUSTER analysis) than to earlier publications for geography, taxon, habitat and subject areas. The journal is well cited in peer-review literature, with 72% of the papers published in GRR and 65% of those published in GCR cited at least once. GCR provides an important outlet for peer-reviewed publications from the GOM and Caribbean region.

Industrialmente, ¿Se Hace Buen Uso del Atún? Estudio de los Cambios Fisicoquímicos del Atún *Katsuwonus pelamis* Congelado, durante su Almacenamiento

PALABRAS CLAVE: *Katsuwonus pelamis*, atun, almacenamiento, refrigeracion

Industrially, Is Making Good Use Of Tuna? Study of the Physicochemical Changes of Frozen Tuna *Katsuwonus pelamis*, in Storage

KEY WORDS: *Katsuwonus pelamis,* tuna, physicochemical changes, refrigeration

Industriellement, Fait Un Bon Usage de Thon? Etude des Modifications Physico-Chimiques de *Katsuwonus pelamis* Thon Congelé, Dans Le Stockage

MOTS CLÉS: *Katsuwonus pelamis,* ton, modifications physico-chimiques, stockage

JOEL MONRROE[1]*, HAYDELBA D'ARMAS[2], and GUZMAN RUSELQUIS[3]
*[1]Universidad de Oriente - Nucleo de Sucre, Urbanizacion Romulo Gallegos, Manzana 01, numero 05 Cumana, Sucre 6101 Venezuela. *joeyj17@gmail.com . [2]Universidad de Oriente - Núcleo de Sucre, Cumana Sucre 6101 Venezuela. [3]Alimetos Polar Comercial Marigüitar, Sucre 6101 Venezuela.*

RESUMEN

Industrialmente en la actualidad, con la tecnología usada, los almacenes en frío de los puertos marítimos para la conservación de alimentos marinos, poseen temperaturas entre -10ºC y -12ºC, por debajo de las temperaturas recomendadas para el almacenaje de especies como el atún (-18ºC). Estas temperaturas producen un proceso lento de congelamiento, lo que trae como consecuencia un efecto de desecación por la liberación de agua que fluye a través de los intersticios celulares al exterior desde el centro del pescado, debido a que este centro necesita más tiempo para pasar al estado sólido. Por ello, se realizó el estudio de los cambios fisicoquímicos (humedad, pH, nitrógeno básico volátil total e histamina) que sufre la especie *Katsuwonus pelamis* de dos diferentes tamaños (+3 y +10), al inicio y al final, sometidos a condiciones de refrigeración en cavas frigoríficas del Puerto Pesquero en Cumaná, Venezuela a temperaturas entre los -15ºC y los -10ºC durante 4 meses, bajo los efectos de liberación de agua de merma. El estudio arrojó valores de un tiempo de congelamiento de 12 y 30 días, liberándose 0,91% y 3,89% de masa de agua, con un aumento de 0,51% y 0,36% en los valores de pH, un aumento de 1,65% y 0,72% en los valores de nitrógeno básico volátil total y un aumento de 6,00% y 2,50% en los valores de histamina para el *K. pelamis* +3 y el *K. pelamis* +10 respectivamente. A pesar del aumento de estos valores, los cambios ocurridos no afectan la calidad de la especie, siendo aún aptos para su ingreso a procesos de industrialización, ya que los valores se encuentran dentro de los límites permitidos para su consumo.

Estimation du Nombre de Sorties de Pêche dans le Contexte Insulaire des Petites Antilles: Comparaison de Trois Méthodes Utilisées en Guadeloupe et Martinique

MOTS CLÉS: Statistiques de pêche, effort de pêche, petites Antilles, Antilles françaises

Estimation of the Number of Fishing Trips in Insular Context of The Lesser Antilles: Comparison Between Three Methods Used in Guadeloupe and Martinique

KEY WORDS: Fisheries statistics, fishing effort, French Antilles

Estimacion del Numero de Salida de Pesca en el Contexto de las Islas de las Antillas Menores: Comparación de Tres Métodos Utilizados en Guadalupe y Martinica

PALABRAS CLAVE: Pesca, Antillas Menores

LIONEL REYNAL* and OLIVIER GUYADER
*Ifremer ,Pointe Fort, Le Robert, 97231 Martinique (FWI). *lreynal@ifremer.fr.*

RESUMÉ

Comme dans la majorité des petites Antilles, les embarcations de pêche des Antilles françaises se retrouvent sur une centaine de sites autour de chaque île. Cette situation rend difficile l'évaluation du nombre de sorties de pêche, indispensable à l'élévation à l'ensemble de la flottille des données par sortie collectées sur quelques ports par des observateurs. Trois méthodes sont utilisées simultanément en Guadeloupe et Martinique et leurs résultats comparés de façon à évaluer l'intérêt de chacune d'elle en termes de qualité des données, coût et faisabilité. La première consiste à recenser les navires d'un port et à en compter le nombre de sorties pendant une journée complète. La seconde, met en œuvre des enquêtes

téléphoniques portant sur 7 jours. La troisième, utilise des données de consommation de carburant et d'enquêtes exhaustives sur les calendriers d'activité des unités de pêche.

Recent Improvements in the Scientific SEDAR-CIE Peer Review Process For Fisheries Stock Assessments in the Gulf of Mexico and Caribbean Regions

KEY WORDS: Fishery management, Caribbean, Gulf of Mexico, South Atlantic, peer review

Recientes Mejoras en la Actividad Científica SEDAR-CIE del Proceso de Evaluación de Asesorios de Pesca en el Golfo de México y el Caribe

PALABRAS CLAVE: Gestión de la pesca, proceso de evaluación, Caribe, Golfo de México

Les Améliorations Récentes dans la Pêche Scientifique CIE Évaluation Consultation SEDAR Processus Dans le Golfe du Mexique et des Caraïbes

MOTS CLÉS: Gestion des pêches, évaluation scientifique, Caraïbes, Golfe du Mexique

MANOJ SHIVLANI[1]*, JOHN CARMICHAEL[2], and WILLIAM MICHAELS[3]

*[1]Northern Taiga Ventures, Inc. (NTVI), Center for Independent Experts, 10600 SW 131 Court, Miami, Florida 33186-3455 USA, *shivlanim@bellsouth.net. [2]South Atlantic Fishery Management Council, Southeast Data and Assessment Review (SEDAR), 4055 Faber Place Drive, Suite 201, Charleston, South Carolina 29405 USA. [3]National Marine Fisheries Service, Office of Science and Technology, 1315 East West Hwy, SSMC3, F/ST4 Silver Spring, Maryland 20910 USA.*

ABSTRACT

Under the Magnuson Stevens Act National Standard 2, the National Marine Fisheries Service (NMFS) is to incorporate the best scientific information available (BSIA) in formulating fishery management plans and other fishery management products implemented through a regional council process. Within the three councils in the southern United States – the Caribbean, Gulf of Mexico, and South Atlantic Fishery Management Councils – the Southeast Data, Assessment, and Review (SEDAR) process is charged with developing BSIA in the form of fishery assessments. Since its formation in 2002, SEDAR has utilized a three-step workshop process to complete such assessments. The Center for Independent Experts (CIE), a NMFS-wide independent peer review program, has supported the SEDAR process by providing independent experts to evaluate the BSIA presented at the SEDAR workshops and the SEDAR process through independent peer review reports. Since 2002, the CIE has provided peer review in 24 SEDAR workshop cycles, ranging from species such as queen conch, spiny lobster, and yellowtail snapper in the US Caribbean, king mackerel, red grouper, and tilefish in the Gulf of Mexico, and menhaden, red porgy, and red snapper in the South Atlantic, among many others. Most recently, the SEDAR process adopted CIE independent peer reviews in each of its three workshop series, allowing consideration of independent critiques at the data, assessment, and review steps of the process. This process is exemplified in SEDAR 24, which considered South Atlantic red snapper in 2010 and in which the CIE provided input in all steps of the process.

Fish Aggregation Devices...Not *That* Simple: Considering Various Factors for the Implementation of a FAD Network

KEY WORDS: FAD, aggregation, aggregating, factor, network

Dispositivos de Concentración de Peces ... No Es Tan Simple: Teniendo en Cuenta Diversos Factores para la Implementación de Una Red FAD

PALABRAS CLAVE: FAD, concentración de peces, factores, red

Dispositifs de Concentration de Poisson ... Pas Si Simple: Compte Tenu de Facteurs Différents pour la Mise en Ouvre d'un Réseau de FAD

MOTS CLÉS: FAD, concentration de poisson, facteurs, réseau

RALEIGH WATSON[1], PETER CHAIBONGSAI[2], and ELLEN PEEL[2]
[1]*University of Miami, The Billfish Foundation, 5750 La Luneta Avenue, Miami, Florida 33155 USA.*
**raleighwatson@gmail.com*. [2]*The Billfish Foundation, 2161 Commercial Blvd., 2FI, Fort Lauderdale, Florida 33308 USA.*

ABSTRACT

The use of Fish Aggregation Devices (FADs) has become widespread internationally, and their effectiveness has made their presence off of the Eastern Seaboard (Continental U.S.) seem inevitable. The aim of this study was to determine the most vital factors in a network of moored FADs, and analyze how those factors interact with each other. The research consisted of a thorough literature review and personal communication with various sources who have experience with FADs. Each of the twelve factors identified were broken down to determine their influence over each of the other factors. Case studies of the Mid-Atlantic region, South Florida, and the United States Virgin Islands (USVI) were explored to demonstrate how some areas are better suited for FADs than others. Successful FAD systems from Hawaii and Australia were also examined to provide a model for other governments and institutions to follow. This study demonstrated the complexity of FAD networks and their varying potential in areas with different characteristics. Certain conditions must be present for a FAD network to be successful. Otherwise, FADs may be counterproductive to a region's fisheries. Undoubtedly, a network's long-term success is dependent on an array of factors and the level of institutional or governmental support.

Using Tagging and Mapping Technologies for Effective Fisheries Conservation: Application of Acoustic Telemetry with Viewshed in Spatial Analyst

KEY WORDS: Acoustic telemetry, Viewshed, mapping, fisheries, habitat connectivity

Uso de Técnicas de Cartografía y Marcaje para el Manejo Efectivo de las Pesquerías: La Aplicación de Telemetría Acústica con "Viewshed" en "Spatial Analyst"

PALABRAS CLAVE: Telemetrïa acústica, "Viewshed", pesquerías, "spatial analyst"

L'utilisation des Techniques de Cartographie et de Marquage pour la Conservation de Pêches Efficace : L'Application de Télémétrie Acoustique avec "Viewshed" dans "Spatial Analyst"

MOTS CLÉS: Télémétrie acoustique, « Viewshed », pêches, « spatial analyst »

STEPHANIE WILLIAMS
University of Puerto Rico, P.O. Box 360, Rincon, Puerto Rico 00677. sjwilliams17@hotmail.com.

ABSTRACT

An emerging tool for the designation of Marine Reserves, Essential Fish Habitat and Effective Juvenile Habitat is the use of acoustic telemetry to interpret habitat connectivity and distribution. The present study investigated acoustic telemetry capabilities with the use of a Vemco V-7 transmitter and VR2/VR2-W receivers at 12 selected sites from a previous tracking study on white grunts (*Haemulon plumierii*) in La Parguera, southwestern Puerto Rico. Sites reflected location-type: open sand, reef-sand interface, on reef slope, and mixed habitat on reef crest. At each site, 4 transects were performed by guiding a transmitter to simulate fish movement within the 250-m radius of optimal detection range established by Vemco, Ltd.. To elucidate potential presence/absence areas, each GPS-tracking history was combined with a detailed habitat map and the output of Spatial Anaylst application, Viewshed. Using bathymetry as an input, Viewshed focuses on line-of-sight from a given point within a specified range. Data from the range testing show a strong positive correlation between the detections

within predicted visible area vs. total detections (r = 0.936), thus proving Viewshed's accuracy. Correlations were higher in open areas of sand than areas of variable reef structure, where the probability of interference is greater. Technology limitations include environmental parameters, such as current flow and turbidity, properties of sound vs. vision, and behavioral, ecological and social characteristics of tagged species. The combination of these technologies ultimately proved beneficial and may further be investigated at varying temporal and spatial scales for more effective habitat and fisheries management.

A Framework for Good Governance: Increasing the Economic Gains of Small-Scale Fishers Through Participation in Fish Marketing

KEY WORDS: Marketing , small-scale fishers , governance , market orientation , competitive advantage

Un Marco de Referencia para un buen Gobierno: Aumentando las Ganancias Económicas de los Pescadores de Pequeña Escala Atraves de la Participación en la Comercialización de los Pescado

PALABRAS CLAVE: Comercialización, pescadores de pequeña escala, gobierno, ganancias económicas

Un Cadre de Bonne Gouvernance: Accroître les Gains Économiques des Petits Pêcheurs par la Participation à la Commercialisation du Poisson

MOTS CLÉS: Commercialisation, petits pêcheurs, gouvernance, gains économiques

SARITA WILLIAMS-PETER[1]* and ANTHONY T. CHARLES [2]
*[1]Marine Affairs Program, Kenneth C. Rowe Management Building, 6100 University Avenue, Suite 2127, Halifax, Nova Scotia B3H 3J5 Canada. *sarita_williams@hotmail.com.*
[2]Saint Mary's University, Management Science/ Environmental Studies Halifax Nova Scotia B3H 3C3 Canada.

ABSTRACT

Small-scale fisheries are essential to maintaining the socio-economic security of fishers and fishery-dependent communities, but they are the most vulnerable to the changing dynamics of the market due to their low competitive advantage, low bargaining power and limited political power to influence decisions. Many countries have a mandate to assist fishers to compete in fisheries, but often this does not extend to marketing aspects, and does not include fishers in decision making. This paper will introduce and apply a framework for assessing and evaluating the administrations of the State in providing assistance to small-scale fishers in marketing, as a measure of good governance. In particular, this requires evolving from a production-oriented approach in fisheries towards contemporary marketing approaches – market-oriented and relationship marketing.

Spatial Distribution and Abundance of Young Kingfish (*Menticirrhus* spp.) Species in Coastal Waters of the Northern Gulf of Mexico

KEY WORDS: *Menticirrhus,* spatial distribution, abundance, northern Gulf of Mexico

Distribución Espacial y Abundancia de Juveniles de Lambe (*Menticirrhus* spp.) en las Aguas Costeras del Norte del Golfo de Mejíco

PALABRAS CLAVE: *Menticirrhus,* distribución especial, abundancia, norte del Golfo de Mejíco

Répartition Géographique et Abondance des Juveníles de Bourrugue (*Menticirrhus* spp.) dans les Eaux Côtières du Nord du Golfe du Mexíque

MOTS CLÉS: *Menticirrhus,* répartition géographique, abundance, nord du Golfe du Mexíque

JOHN ANDERSON*, BRUCE COMYNS, and HARRIET PERRY
Gulf Coast Research Laboratory, 703 East Beach Drive, Ocean Springs, Mississippi 39564 USA.
**evan.anderson@usm.edu.*

ABSTRACT

The southern kingfish (*Menticirrhus americanus*), the northern kingfish (*M. saxatilis*) and the gulf kingfish (*M. littoralis*) are members of the drum family (Scianidae) and are found in the northern Gulf of Mexico (GOM). Studies of

distribution and abundance have been conducted for the early life-stages of many sciaenids, but little is known about the early life history of young *Menticirrhus* species. The purpose of this study is to determine the spatial distribution and abundance of young *Menticirrhus* species in coastal Mississippi. Specific habitats included barrier island surf zones and grass beds, and mainland marsh-edges and sandy shorelines. Five hundred sixty-seven *Menticirrhus* were collected during this study, with over 85% of the specimens collected in 2006. Densities of both *M. americanus* and *M. littoralis* peaked during summer, while densities of *M. saxatilis* peaked in spring. All three kingfish species co-occurred within surf zone and sandy shoreline habitats, but *M. americanus* were the dominant kingfish along protected sandy shorelines, and *M. littoralis* were the dominant kingfish along open surf zones. Only *M. americanus* was collected from marsh-edges, and all three species were absent from grass beds. Length-frequency distributions of all three kingfish indicated accelerated growth with increasing size and warmer water temperatures.

The Effect of Seascape Structure on the Spatial Distribution of Juvenile Fish within Benner Bay Mangrove Lagoon, St. Thomas, United States Virgin Islands (USVI)

KEY WORDS: Seascape structure, mangroves, seagrass, spatial scale, Caribbean

El Efecto de la Estructura de Marina Sobre la Distribución Espacial de Juveniles dentro de Benner Laguna Mangrove Bay, St. Thomas, Islas Vírgenes De Los Estados Unidos (Islas Vírgenes)

PALABRAS CLAVE: Estructura de marina, mangrove, distribución espacial, Caribbe

L'Effet de la Structure Seascape sur la Répartition Spatiale des Juvéniles à 'Intérieur de la Lagune de la Baie Benner Mangrove, St. Thomas, Iles Vierges Américaines (Îles Vierges Américaines)

MOTS CLÉS: Structure seascape, mangliers, répartition spatiale, Caraïbe

CHRISTINA COLLETTI[1]*, SIMON PITTMAN[2], NASSEER IDRISI1[1], AND RICHARD NEMETH[1]
[3]*University of the Virgin Islands, 2 John Brewers Bay, MB 313, St Thomas, US Virgin Islands 00802 USA.*
**cmc819@aol.com*. [2]*National Oceanographic Atmospheric Association.*

ABSTRACT

Coastal mangroves in the Caribbean are typically connected to adjacent habitat types through the movements of fish. Understanding the distribution of fish in mangroves therefore requires consideration of the surrounding seascape. This research adopts a multiscale seascape approach to examine the spatial distribution of juvenile fish in a mangrove lined bay in the U.S. Virgin Islands. We sampled fish from the mangrove fringe using fish traps at 12 random locations. The seascape was mapped for the entire bay from high resolution aerial photography and field validation. Seascape composition was quantified from the habitat map at a range of scales surrounding each sample location using geographical information system tools. Within the bay, the site-to-site differences in the amount of mangrove were insignificant. Instead, structurally heterogeneous seascapes containing mangroves with adjacent dense seagrass and macroalgae in close proximity to coral reefs had significantly higher fish species richness and abundance of juvenile fish. Lowest richness and abundance were characteristic of mangroves with low seagrass cover in adjacent areas and high cyanobacterial cover associated with the inner bay. Similarly, juvenile *Haemulon flavolineatum* (French grunt), *Ocyurus chrysurus*(yellowtail snapper) and *Lutjanus apodus* (schoolmaster snapper) were most abundant at mangrove fringe with a high percent cover of macroalgae (~40%) and seagrass (~10%) proximal to coral reefs than in seascapes dominated by cyanobacteria. In contrast, *Eucinostomus melanopterus* (flagfin mojarra) and *Spheroides testudineus (checkered puffe*r)were more abundant in seascapes with high cyanobacteria cover and low macroalgal and seagrass cover, farthest from coral reef.

Early Life History of Dolphinfishes in the Northern Gulf of Mexico

KEY WORDS: Coryphaena, dolphinfish, fish larvae, distribution, Gulf of Mexico

Historia de Vida Temprana de Dorados en el Norte del Golfo de México

PALABRAS CLAVE: Coryphaena, dorado, larvas, Golfo de México

Histoire des Premiers Stades de Vie de Coryphènes Communes au Nord du Golfe de Mexique

MOTS CLÉS: Coryphaena, coryphènes, Golfe de Mexique

LARISSA PODSIM* and JAY ROOKER
*Texas A&M University, 200 Seawolf Parkway, OCSB Room 212, Galveston, Texas 77553 USA. *l.podsim@tamu.edu.*

ABSTRACT

Common dolphinfish (*Coryphaena hippurus*) and pompano dolphinfish (*Coryphaena equiselis*) are economically and ecologically valuable pelagic fish found in tropical and subtropical oceans worldwide. Although they support both commercial and recreational fisheries, knowledge of their habitat use and ecology during early life is limited. Dolphinfish-larvae were collected during ichthyoplankton surveys of surface waters in the northern Gulf of Mexico (Gulf) in waters off of Texas and Louisiana (27 – 28° N 87 - 93° W) during June and July of 2007 and 2008. Dolphinfish larvae were relatively common in our sampling area (frequency of occurrence 63.2% and 55.3% in 2007 and 2008, respectively), and more than 700 larvae were collected during this two year study. Mean density (larvae/1000 m^2) of dolphinfishes was higher in frontal zones (1.5) and anticyclones (1.0) compared to the open ocean (0.7) and cyclones (0.5), suggesting that these features may represent important habitats for dolphinfish larvae. Mean standard length varied between seasons with smaller larvae observed in June (7.5 mm) compared to July (15.4 mm). A published age-length key was used to calculate hatch-date distributions, which suggested that spawning times of larvae collected in our surveys ranged from late May to late July with the majority of larvae from June spawning events (54%). Results of this study indicate that dolphinfish larvae are abundant throughout the northern Gulf and that this region may represent important spawning/nursery grounds for these species.

Biologia Pesquera del "Bonito" *Thunnus atlanticus* (Lesson, 1831) en San Andres Isla, Caribe Colombiano

PALABRAS CLAVE: *Thunnus atlanticus*, bonito, biologia, San Andres Islas, Colombia

Fishery Biological of the "Bonito" *Thunnus atlanticus* (Lesson, 1831) in San Andres Island, Colombia Caribbean

KEY WORDS: *Thunnus atlanticus,* bonito, biology, San Andres Island, Colombia

Biologie de la Pêche du "Bonito" *Thunnus atlanticus* (Lesson, 1831) sur l'Île San Andres, Caraïbes Colombienne

MOTS CLÉS: *Thunnus atlanticus,* bonito, biologie, l'Íle San Andres, Colombienne

ANTHONY ROJAS* and CLINTON POMARE
*Secretaría de Agricultura y Pesca, Avenida Francisco Newball, Edificio Coral Palace, San Andres Islas., San Andres, Colombia. *antroojasa@gmail.com.*

RESUMEN

En el Archipiélago de San Andrés, Providencia y Santa Catalina el "Bonito" *Thunnus atlanticus* es la especie de mayor desembarco por parte de los pescadores artesanales. Esta especie constituye la principal carnada para la captura de otras especies y a la vez es de gran importancia comercial en la región. Con el fin de determinar algunos aspectos biológicos pesquero de éste recurso, se analizaron datos de 1260 individuos obtenidos de embarcaciones artesanales de la isla de San Andrés, muestreados entre mayo a noviembre de 2009 y febrero a mayo de 2010. El rango de talla osciló entre 21,0 y 72,0 cm de longitud total (Lt) con una talla media de captura de de 44.5 cm (± 2.9). La relación talla arrojó un crecimiento alométrico positivo (b = 3.06), manteniendo esta tendencia por sexo. Los mayores porcentajes de individuos con gónadas maduras se presentaron entre los meses de junio y agosto. El factor de condición oscilo entre 0.91 y 1.03, no encontrando diferencias significativas a lo largo de los meses de muestro. La relación entre las hembras y los machos fue de 1:1. La talla media de madurez sexual (Lm) fue de 40 cm de Lt. En el año 2009 la captura reportada fue de 79934 kg la cual

corresponde al 25.7% de la captura total de la isla. Su captura se hace mediante el trolling (troleo) utilizando nylon entre 80 y 150 libras de presión y dos anzuelos No. 6.

Prey Detection by Grey Snapper *Lutjanus griseus* and a Novel Means of Predator Avoidance

KEY WORDS: Grey snapper, chemical crypsis, toadfish, urea, predator avoidance

Detección de la Presa por el Pargo del Manglar *Lutjanus griseus* un Medio Innovador para Evitar a los Predadores

PALABRAS CLAVE: Pargo del manglar, evitar a los pradadores

Détection de Proie par le Vivaneau Gris *Lutjanus griseus* et un Nouveau Moyen d'Évitement des Prédateurs

MOTS CLÉS: Vivaneau gris, détection de proie, moyen d'évitement

JOHN BARIMO
University of the Virgin Islands, Department of Biology, #2 John Brewers Bay St Thomas, US Virgin Islands 00802 USA. jbarimo@uvi.edu.

ABSTRACT

Studies of prey detection by olfaction in teleost fishes have focused largely on amino acids as odorants, while studies with respect to nitrogenous waste are few by comparison. Although threshold sensitivities for amino acids are often in the nano-molar range, gill and renal membranes are thought to be less permeable to amino acids than lower molecular weight compounds such as ammonia or urea. Furthermore, amino acids are generally conserved for protein synthesis and are a minor constituent of excreta. This study examined detection of ammonia, urea, and amino acids by *Lutjanus griseus* (gray snapper). *Opsanus beta* is a preferred prey item of *L. griseus*. *O. beta* is unique among teleosts in that adults can facultatively shift between ammonia and urea excretion. Experiments were conducted in 8,000 L outdoor mesocosms with flow-through seawater and a sediment/seagrass substrate to simulate natural habitat. Odorants were injected into small experimental shelters designed to mimic toadfish burrows. Shelters were equipped with low-light video cameras to remotely monitor snapper behaviours. Results indicate that *L. griseus* are more responsive to ammonia than either urea or an ammonia/urea mix with threshold sensitivities below 5 μM. Additionally, *L. griseus* are more responsive to an amino acid/ ammonia mix than either an amino acid/urea mix or amino acids without waste-N. These results suggest that urea masks the aroma of ammonia but not those of amino acids.

The Richness and Abundance of Reef Fish of Serranilla, Alicia, and Bajo Nuevo, Seaflower Biosphere Reserve - San Andrés, Providencia and Santa Catalina, Colombia

KEY WORDS: Reef fish abundance, Seaflower Biosphere Preserve, Providencia and Santa Catalina, Colombia

Riqueza y Abundancia Íctica de los Complejos Arrecifales de Serranilla, Bajo Alicia y Bajo Nuevo, Reserva de Biosfera Seaflower - Archipiélago de San Andrés, Providencia y Santa Catalina- Colombia

PALABRAS CLAVE: Riqueza íctica, peces con interés ecológico y económico, Reserva de Biosfera Seaflower-Archipiéla

La Richesse Et l'Abondance des Poissons de Récif de Serranilla, Bajo Alicia, et Bajo Nuevo, Seaflower Réserve de la Biosphère - San Andrés, Providencia et Santa Catalina, Colombia

MOTS CLÉS: Richesse et l'abondance des poissons, Seaflower Réserve de la Biosphère

NACOR BOLAÑOS[1]*, HOOKER BENT[1], ALFREDO ABRIL[1] , CAMILA SANCHEZ[1], NICASIO HOWARD[2], and ELIZABETH TAYLOR[1]
[1]*CORALINA, Km 26 via San Luis, San Andres Isla , Colombia. *nacorwbc@yahoo.com.*
[2]*CORALINA, Providencia Isla, Colombia.*

ABSTRACT

In April 2010, there was a scientific expedition to collect biological data to remote areas to the north of the Archipelago

of San Andrés, Providencia and Santa Catalina Seaflower Biosphere Reserve, which by its very condition of isolation don't have bio- ecological basic information. Data were collected from the fish community (richness and abundance of reef fish with important ecological and economic), macro-invertebrates, coral communities, turtles and other species of the region's biodiversity. We used different methodologies (Atlantic and Gulf Rapid Reef Assessment AGRRA, Reef Environmental Education Foundation REEF, Reef Rapid Assessments ERA, among others). Eighty-two stations were sampled: 26 in Serranilla, 14 in Alicia Shoal and 42 in Nuevo Shoal, results showed a total of 154 species of reef fishes. Nuevo Shoal was observed 126 species, followed by Serranilla with 106 species, and 74 species in Alice Shoal. The ten most common species between stations visited were *Acanthurus coeruleus, Chromis cyanea*, *Balistes vetula*, *Holocentrus rufus*, *Halichoeres garnoti*, *H. maculipinna*, *Stegastes partitus*, *Sparisoma aurofrenatum*, *A. bahianus*, and *Thalassoma bifasciatum respectively*. In all stations, the five most abundant species were *H. garnoti, C. cyanea, A. bahianus, S. partitus and T. bifasciatum*. In contrast to some of the uncommon or rare species, there appears to be new records for the Archipelago (N. B-C et al. Unpubl. data). Monitoring abundance, showed for example that *S. partitus, Haemulon album, H. melanurum, Scarus vetula, S. taeniopterus, Caranx ruber, B. vetula, Sphyraena barracuda, A. coeruleus, Mellichthys niger*, and *Gynglimostoma cirratum* are very abundant in these areas.

Long Term Decline of a Keystone Fish Species *(Stegastes planifrons)* on the Coral Reefs of Guadeloupe Island

KEY WORDS: *Stagastes planifrons,* Guadaloupe, time series, coral reef health

Disminución a Largo Plazo de una Especie de Peces Clave *(Stegastes planifrons)* en los Arrecifes de la isla De Guadeloupe

PALABRAS CLAVE: *Stagastes planifrons,* Guadeloupe, peces de arrecifes

Déclin d'une Espèce-Clé de Poisson *(Stegastes planifrons)* des Récifs Coralliens de Guadeloupe

MOTS CLÉS: *Stagastes planifrons, Guadeloupe, poisson des récifs coralliens*

YOLANDE BOUCHON-NAVARO*, CHARLOTTE DROMARD, DOROTHÉE KOPP, SÉBASTIEN CORDONNIER, and CLAUDE BOUCHON

*Université Antilles-Guyane, Laboratoire de Biologie Marine Equipe DYNECAR, BP 592 Pointe-à-Pitre, Guadeloupe 97159 France. *yolande.bouchon@univ-ag.fr.*

ABSTRACT

The health of Caribbean coral reefs has significantly declined for the last 30 years. This phenomenon is characterized by a shift from benthic communities dominated by corals to macroalgae communities. Several causes, such as herbivorous fish overfishing, eutrophication of coastal waters, *Diadema* urchins epizooty, among others have been evoked. A long term monitoring study of *Stegastes planifrons* on a reef of Guadeloupe Island shows a significant decrease of the abundance of that species between 1988 to 2010. The density of *Stegastes* decreased from 28.6 ± 1.2 individuals for 300 m^2 of reef surface, in 1988, to 1.89 ± 1.2 individual for 300 m^2 between 2005 to 2010. Main negative turn points in the tendency correspond to the year 1989 (hurricane Hugo) and 1995 (hurricanes Luis and Marylin). These phenomena were the cause of important architectural destructuring of the reef habitat. Field observations of the territories of *Stegastes planifrons* led to an estimate on the average size of a territory of 1.26 ± m^2. Cross-calculation between these data shows that the reef surface controlled by *Stegastes planifrons* decreased from an estimate of 8% to 0.8% over a period of 22 years. *Stegastes planifrons* is known to significantly control algal communities. On their territories, the algal diversity is higher than outside and above all macro-algae are replaced by turf. The strong decline of *Stegastes planifrons* on the reefs of the French Antilles might have played a significant role in the shift between corals to macroalgae observed these last decades in the reef communities.

Age-Frequency Distributions of a Protected Mutton Snapper (*Lutjanus analis*) Aggregation following 17 Years of Protection

KEY WORDS: Mutton snapper, age-frequency distributions, fish spawning aggregations, St. Croix, closed areas

Distribuciones de Frecuencia de Edades de Pargos Criollos (*Lutjanus analis*) de Agregaciones Protegidas Luego de 17 Años de Protección

PALABRAS CLAVE: Pargos criollos, distribuciones de frecuencia, agregaciones, St. Croix, protección

Distributions de Fréquence D'Ages de Vivaneaux Sobres (*Lutjanus analis*) D'Agrégations Protégées après 17 Années de Protection

MOTS CLÉS: Vivaneaux sobress, distributions de fréquence, agrégations,

LIAM CARR* and LANCE MASSEY
*Texas A&M University, Department of Geography, 810 Eller O&M Building, 3147 TAMU College Station, Texas 77843-3147 USA. *liamcarr@tamu.edu.*

ABSTRACT

Snappers have historically been an important economic stock for the U.S. Virgin Islands, annually contributing nearly 4% of total landings by weight prior to seasonal closures set in place to prevent stock collapse. Evidence of depleted mutton snapper (*Lutjanus analis*) stocks in St. Croix led the Caribbean Fisheries Management Council into developing the Mutton Snapper Seasonal Area Enclosure (MSSAE) in 1993. The MSSAE closes fishing off at a historical fish spawning aggregation (FSA) site, during the March-June mutton snapper spawning season. Between March 2009 and June 2010, 139 mutton snapper were collaboratively harvested with St. Croix fishers within the MSSAE from an anchored fishing vessel at coordinates provided by local fishers. From this sample, 61 otoliths were collected and analyzed to develop age-frequency distributions, an important tool for creating growth curves and examining population structures. This analysis is part of the first effort since the MSSAE was enacted for gauging how successful management programs have been over the past 17 years for rebuilding local mutton snapper stocks. Researchers determined that the sampled population had a mean age of 6.5 ± 1.8 yrs, with a mode of 7 yrs. Additional analyses on length-frequency and weight-frequency distributions, along with examinations of gonadal conditions, provide preliminary evidence that the MSSAE's historical FSA site remains active, although the size of the spawning population continues to be difficult to assess.

A Preliminary Assessment: Do Goliath Grouper Affect Fish Diversity on Shipwrecks?

KEY WORDS: Goliath grouper, artificial reefs, *Epinephelus itajara*, shipwrecks

Evaluacion Preliminar: Puede la Diversidad de Peces en Arrecifes Artificiales ser Afectada por la Presencia de el Mero Guasa

PALABRAS CLAVE: Mero guasa, arrecifes artificiales, *Epinephelus itajara*

Une Évaluation Préliminaire: Le Mérou de Goliath Affectent-Ils la Diversité de Poissons sur des Naufrages?

MOTS CLÉS: Mérou de Goliath, naufrages, *Epinephelus itajara, diversité de poissons*

ANGELA COLLINS
FWC—FWRI, 100 8th Avenue SE, St Petersburg, Florida 33701 USA. angela.collins@myfwc.com.

ABSTRACT

The association between goliath grouper and artificial reefs, especially shipwrecks, has been well established. Goliath grouper (*Epinephelus itajara*) have been protected from all harvest within U.S. waters since 1990, and the species is showing signs of recovery within the Gulf of Mexico and south Atlantic (U.S.). Complaints from some recreational fishermen imply that goliath grouper are affecting community composition at fishing sites. In this study, six shipwrecks were surveyed seasonally over the course of two years (2008 - 2010). The total number of goliath grouper was assessed through underwater visual surveys. Goliath grouper sizes were estimated using laser measurement and underwater video. Visual census was performed during each survey to assess the species diversity (number of species) of commercially and

recreationally important fish. Species diversity was compared to the total number of goliath grouper observed as well as to season, site size, and site depth. Community composition varied between sites and between seasons, but preliminary analyses do not suggest a negative relationship between goliath grouper abundance and the presence of other commercially or recreationally important fish species.

Factors Affecting Accuracy and Precision in a Multi-Species Reef Fish Survey: Examples from the NE Gulf of Mexico

KEY WORDS: Reef fish survey, post-stratification, Gulf of Mexico, precision, hard bottom habitat

Factores que Afectan la Exactitud y Precisión en una Prospección de Peces de Arrecife Multiespecífica: Ejemplos del Noreste del Golfo de México

PALABRAS CLAVE: Prospección de peces de arrecife multiespecífica, precisión, noreste del Golfo de México

Facteurs qui Affecten l'Exactitude et Précision d'une Prospection de Poissons de Récif Multiespecifique: Exemples du Norest du Golfe du Mexique

MOTS CLÉS: Prospection de poissons de récif multiespecifique précision, norest du Golfe du Mexique

DOUG DEVRIES*, CHRIS GARDNER, JOHN BRUSHER, PATRICK RALEY and GARY FITZHUGH
*NOAA Fisheries Service, Southeast Fisheries Science Center, Panama City Laboratory, 3500 Delwood Beach Road, Panama City, Florida 32408 USA. *doug.devries@noaa.gov.*

ABSTRACT

Incorporating stratification by habitat type in the design of a reef fish survey is an obvious way to improve efficiency, optimize survey resources, and obtain more accurate abundance estimators for a given species. The issue becomes complex, however, in a multi-species survey covering a diversity of habitats. Post-stratification of collection records -- censoring some or many depending on the species -- may be necessary. It is no secret that the heavily exploited reef fishes (mostly serranids and lutjanids) in the northeastern Gulf of Mexico are closely tied to hard/live bottom habitat most or all of their lives. Cross-shelf mapping and video surveys conducted by NOAA Fisheries Service's Panama City lab revealed that such habitat is not only widespread across the West Florida shelf, but also varies widely in relief, rugosity, morphology, density, area, and in density and composition of attached biota. Not surprisingly, these different forms of hard bottom often hold different suites and densities of reef fishes; and demographics within species may also vary. Variability related to depth, zoogeographic boundaries, species-specific patchiness, and behavior relative to survey gear is also common. All of these factors can result in species-specific effects on the precision and accuracy of survey indices; and must be considered in the design of, and analysis of data from, a multi-species reef fish survey. We present some species-habitat-location examples and compare frequency of occurrence and precision of abundance indices between trap and camera data for several species of reef fish from the NE Gulf.

Reducción de la Diversidad de Peces de los Arrecifes Coralinos a Lo Largo de un Gradiente de Contaminación en La Isla De San Andres, Caribe Colombiano

PALABRAS CLAVE: Diversidad de peces, arrecifes coralinos, contaminación, Isla de San Andres Colombiano

Coral Reef Fish Diversity Reduction along a Pollution Gradient in San Andres Island, Colombian Caribbean

KEY WORDS: Biodiversity, fishes, coral reefs, pollution, San Andres Island, Colombia

Réduction de la Diversité des Poissons de Récifs Coralliens Selon un Gradient de Pollution à l'île de San Andres, Caraïbes Colombiennes

MOTS CLÉS: Diversité, pooissons, récifs coralliens, San Andres, Caraïbes Colombiennes

GUILLERMO DUQUE[1]*, PILAR COGUA[2], y ANDRES MOLINA
*[1]Universidad Nacional de Colombia, Sede Palmira, Carrera 32 Chapinero, via candelaria Palmira, Valle, Colombia. *gduquen@gmail.com . [2]UNAL-Palmira.*

RESUMEN

Los arrecifes oceánicos de La isla de San Andrés es uno de los ecosistemas coralinos más extensos y productivos del hemisferio occidental. En la isla, se han identificado aproximadamente 57 especies de coral y 273 especies de peces que representan 54 familias, de las cuales dos son endémicas. Se realizaron censos de peces según Thomson y Schmidt (1997), en tres estaciones a lo largo de un gradiente de contaminación de aguas negras provenientes de un emisario submarino. Con los datos de los censos se calcularon los índices de riqueza de Margalef (d), uniformidad de Pielou (J´), diversidad de Shannon (H´) y Dominancia de Simpson (λ). En general, la diversidad de peces arrecifales disminuyó en las estaciones más cercanas al foco de contaminación. Los grupos de peces más abundantes fueron el de los herbívoros y coralivoros tales como los cirujanos (Acanthuridae), loros (Scaridae) y los loritos (Labridae), mientras que la mayoría de peces omnívoros y carnívoros se presentaron en baja frecuencia (Lutjanidae, Serranidae, Haemulidae). El principal indicador de los efectos contaminantes del emisario submarino fue *Gramma Loreto*, el cual disminuyo su abundancia en las estaciones cercanas al foco de contaminación. Es importante disminuir los niveles de contaminación de la isla, ejerciendo el status de reserva de la biosfera.

Distribution of Red Snapper (*Lutjanus campechanus*) and Their Spawn in the Northern Gulf Of Mexico

KEY WORDS: Red snapper, distribution, currents, oil spill, Gulf of Mexico

Distribución del Pargo Rojo (*Lutjanus campechanus*) y su Progenie en el Norte del Golfo de Méjico

PALABRAS CLAVE: Pargo rojo, distribución, Golfo de Méjico

Répartition Géographique des Vivaneaux (*Lutjanus campechanus*) et de leur Frai Dans le Nord du Golfe du Mexique

MOTS CLÉS: Vivaneaux, répartition géographique, Golfe du Mexique

DONALD JOHNSON[1]*, HARRIET PERRY[1], MARK GRACE[2], and GUILLERMO SANCHEZ[1]
*[1]Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 E. Beach Drive, Ocean Springs, Mississippi 39564 USA. *donald.r.johnson@usm.edu. [2]National Marine Fisheries Service, National Oceanic and Atmospheric Administration, P.O. Drawer 1207, Pascagoula, Mississippi 39568 USA.*

ABSTRACT

The U.S. National Marine Fisheries Service has established yearly fishery independent long-line surveys in the northern Gulf of Mexico (2001 to the present). Using the results from this survey, together with a similarly administered yearly ichthyoplankton survey (SEAMAP, 1982 to the present), we examine the distribution of red snapper together with their egg production and larvae in the northern gulf. Results indicate a remarkable westward trend in size of adult snapper but no size

trend with respect to depth. Larval spreading also shows a westward (counter clockwise) bias in larval transport around the northern Gulf. Using annual fecundity estimates according to size/age we examine the geographic distribution of egg production. The relationship of these distributions to the Deep Water Horizon oil discharge and its potential impact is examined. Our long term goal is to determine the relative contribution of highly fecund larger snapper to populations across the northern gulf.

Parrotfish as Ecosystem Engineers on U.S. Caribbean Coral Reefs

KEY WORDS: Parrotfish, herbivores, coral reefs, Caribbean, ecosystem

Los Peces Loros como los Ingenieros de los Arrecifes Coralinos en el Caribe Americano

PALABRAS CLAVE: Peces loros, arrecifes coralinos, Caribe Americano

Les Poissons Perroquets comme Ingénieurs de l'Écosystème sur les Récifs Coralliens des Caraïbes des États-Unis

MOTS CLÉS: Poissons perroquets, récifs coralliens, écosystème, Caraïbes des États-Unis

JOE KIMMEL*, WILLIAM ARNOLD, BRITNI TOKOTCH, and JASON RUETER
*NOAA Fisheries, 263 13th Avenue South, St. Petersburg, Florida 33701 USA. *joe.kimmel@noaa.gov.*

ABSTRACT

Coral reefs provide a variety of ecosystem services, but a myriad of threats act synergistically to stress reefs in U.S. Caribbean waters. We consider the contribution of parrotfish grazing to coral reef health, evaluate the spatial variation in fishing activities that impact parrotfish abundance, and discuss the trade-offs between cultural and ecological obligations that are inherent to effective management of parrotfish in the U.S. Caribbean.

Locating and Mapping Reef Fish Habitat on a Tight Budget

KEY WORDS: Habitat mapping, hardbottom, artificial reefs, Gulf of Mexico, sidescan

La Localización y Mapeo de Hábitat de Peces de Arrecife en un Presupuesto Apretado

PALABRAS CLAVE: Mapeo de hábitat, arrecife artificial, Golfo de México

La Localisation et la Cartographie des Habitats des Poissons de Récif avec un Budget Serré

MOTS CLÉS: Cartographie des habitats, poissons de récif,

KELLY KINGON
Florida State University, 3618 Highway 98, St. Teresa, Florida 32358 USA. kingon@bio.fsu.edu.

ABSTRACT

Unlike the terrestrial environment where comprehensive maps are readily available, maps of the ocean are scarce and usually lack the detail required to identify benthic habitats. A relatively inexpensive, commercially available product may help marine researchers overcome this obstacle. This system, distributed by Humminbird for fishermen, records sidescan imagery, bathymetry data, and GPS coordinates simultaneously and costs under $2000. The Humminbird system reveals geologic features and habitat types as well as schools of fishes and other large marine animals. The main advantages of this particular system are the sidescan component and the ability to record all the imagery, maps, and coordinates on to a SD card. The recorded data can be downloaded to a computer, converted into a more usable format and then incorporated into ArcGIS to create georeferenced habitat maps. Using the Humminbird, I mapped several artificial reefs and hardbottom sites in the northeastern Gulf of Mexico and verified the imagery with dive surveys. The mapping methods were improved as the study progressed and ideally consist of recording one parallel transect at a time by starting the recording at the beginning of each transect and stopping it at the end. This greatly reduces the amount of post-processing and makes the imagery easier to manage. Relatively small ledges, rocks, and reef balls can be identified and accurately mapped using this approach. The Humminbird system has great potential and should benefit future reef fish research and provide essential maps for effectively implementing ecosystem based management.

Factores Ambientales Asociados a la Distribución Espacial de Peces Demersales en el Golfo de Salamanca (Caribe Colombiano): Implicaciones para la Identificación y Manejo de Hábitats Esenciales

PALABRAS CLAVE: *Balistes capriscus*, *Lutjanus synagris*, modelos lineales generalizados, hábitas esenciales, Mar Caribe de Colombia

Environmental Factors Associated with the Spatial Distribution of Demersal Fishes in the Gulf of Salamanca (Colombian Caribbean Sea): Implications for the Identification and Management of Essential Habitats

KEY WORDS: *Balistes capriscus*, *Lutjanus synagris*, spatial distribution, Gulf of Salamanca, Colombia, essential habitats

Les Facteurs Environnementaux Associés à la Distribution Spatiale des Poissons Démersaux du Golfe de Salamanca (Caraïbes Colombiens): Implications pour l'Identification et la Gestion des Habitats Essentiels

MOTS CLÉS: *Balistes capriscus*, *Lutjanus synagris*, distribution spatial, Caraïbes Colombiens, hábitats essentiels

ARISTIDES LÓPEZ-PEÑA[1]*, LUIS ORLANDO DUARTE[1], y JOSÉ LUIS VILLA[2]
*Universidad del Magdalena, Laboratorio de Investigaciones Pesqueras Tropicales, Carrera 32 No. 22-08, Santa Marta, Magdalena, Colombia. *aristideslpz@gmail.com.*
[2]Universidad Tecnológica de Bolívar, Km 1 Vía Turbaco, Cartagena Bolívar, Colombia.

RESUMEN

Los peces demersales explotados en el Mar Caribe de Colombia han mostrado señales de sobreexplotación y los ambientes que los sostienen están siendo degradados. En consecuencia se ha observado un claro patrón de disminución en varias poblaciones. Identificar los requerimientos de hábitats de dichas especies es un requisito necesario para asegurar su viabilidad en el tiempo. En este contexto, se exploraron los patrones de distribución de la estructura de tamaños de dos peces demersales *Lutjanus synagris* y *Balistes capriscus*) y su asociación con características ambientales. Para ello se analizóinformación demográfica y ambiental obtenida por 15 cruceros científicos realizados entre diciembre de 1995 y marzo de 1998 en el Golfo de Salamanca, Caribe colombiano. Un total de 4095 tallas de captura fueron exploradas en relación con cinco variables ambientales: (i) profundidad, (ii) tipo de fondo, (iii) temperatura, (iv) salinidad y (v) distancia a los aportes de descargas continentales. La distribución espacio-temporal de la estructura de tallas fue explorada mediante un Sistema de Información Geográfico; mientras que la relación entre la estructura poblacional y el comportamiento de las variables ambientales fue evaluada utilizando Modelos Lineales Generalizados. La profundidad fue el factor que presentó mayor asociación con la estructura de tamaños, seguido por el tipo de fondo y la salinidad, aunque no se observóun patrón evidente. Para ambas especies se encontráque la proporción de individuos de mayor tamaño aumentó con la profundidad. Los resultados señalan la importancia de utilizar aproximaciones holísticas que consideren información de la historia de vida de las poblaciones y del ambiente, con el fin de identificar y manejar posibles hábitats esenciales. Estudio auspiciado por Colciencias y Universidad del Magdalena (Convenio 780-2009).

Biologia Pesquera del "Yellowtail" *Ocyurus chrysurus* (Bloch, 1791) en San Andres Isla, Caribe Colombiano

PALABRAS CLAVE: Yellowtail, *Ocyurus chrysurus*, biología, San Andrés Isla, Colombiano

Fishing Biology of the "Yellowtail" *Ocyurus chrysurus* (Bloch, 1791) on San Andres Island, the Colombian Caribbean

KEY WORDS: Yellowtail, *Ocyurus chrysurus*, biology, San Andrés Isla, Colombia

Biologie de la Pêche du "Yellowtail"*Ocyurus chrysurus* (Bloch, 1791) Sur L'Île San Andres, Caraïbes Colombienne

MOTS CLÉS: Yellowtail, *Ocyurus chrysurus,* biologie, L'Île San Andres, Caraïbes Colombienne

CLINTON POMARE[1]*, ANTHONY ROJAS[1], y ONEIDA GUARDIOLA[2]
[1]*Gobernación de San Andrés, Av. Francisco Newball, Edificio Coral Palace, Av. Las Americas Segundo Piso Almacén Agromundo San Andrés Isla, San Andrés Colombia. *clintonpomare@gmail.com. [2]Instituto Colombiano de Desarrollo Rural-INCODER, Carrera 60 No. 75-107, Calle 47 No. 21B-69, Barranquilla, Atlantico Colombia.*

RESUMEN

En la Isla de San Andrés, que forma parte del Departamento Archipiélago de San Andrés, Providencia y Santa Catalina el "Yellowtail" *Ocyurus chrysurus* es de gran importancia comercial. En la isla y en los cayos del este sur este (ESE) y sur-sur oeste (SSW), su captura es realizada exclusivamente por pescadores artesanales. Con el fin de determinar algunos aspectos biológicos pesquero de éste recurso, se analizaron datos de 1037 individuos obtenidos de embarcaciones artesanales de la isla. El rango de talla osciló entre 25,2 y 66,7 cm de longitud total (Lt) con una talla media de captura de de 42,4 cm. La relación talla peso arrojó un crecimiento alométrico (b = 2.71), manteniendo esta tendencia por sexo. Se obtuvieron individuos con gónadas maduras durante todos los mese de muestreo, presentándose los mayores porcentajes de julio a agosto. La relación entre las hembras y los machos fue de 1:1. La talla media de madurez sexual (Lm) fue de 40,8 cm de Lt. En el año 2009 la captura reportada fue de 25438. kg la cual corresponde al 8.75% de la captura total de la isla. Los individuos son desembarcados y comercializados sin vísceras. Las profundidades de pesca van desde los 30 a 100 metros de profundidad, utilizando nylon de 60 y 70 libras de presión y anzuelos Nos. 7, 8 y 9.

Testing for Genetic Isolation between Gulf of Mexico and U.S. Atlantic East Coast Gray Triggerfish using a Mitochondrial DNA Molecular Marker

ERIC SAILLANT* and NICHOLAS EMERICK
*The University of Southern Mississippi GCRL, 703 East Beach Drive, Ocean Springs,Mississippi 39564 USA. *eric.saillant@usm.edu*

ABSTRACT

The gray triggerfish (*Balistes capriscus*) is a reef fish that occurs along the Western Atlantic coast from Nova Scotia to Argentina. In the United States the species is exploited mostly by recreational fisheries in the northern Gulf of Mexico and South Atlantic regions. Recent stock assessments indicated that the species is being overfished and a rebuilding plan is in progress. The fishery is currently managed as a single stock for the southeast United States region in the absence of reliable information on stock structure. We developed a sequencing assay for a 617 base pairs fragment of the ND4 gene encoded by mitochondrial DNA. Thirty samples from South Texas (off Port Isabel) and 29 from South-East Florida (off Jupiter) were assayed and the data used to conduct a preliminary assessment of genetic variation and stock structure of gray triggerfish in the southeast United States. Results revealed that the gene surveyed was variable in the species with 14 and 17 haplotypes found in the South Texas and South- East Florida samples respectively. Analysis of molecular variance did not indicate significant genetic heterogeneity between the two geographic populations. Inference power in the study was reduced due to the small sample sizes and the use of only one genetic locus. Because of these limitations, subtle genetic differences, as is commonly observed in marine fishes, may not be revealed by the present dataset. Further study employing larger sample sizes, additional locality samples and additional loci including hypervariable-nuclear-encoded microsatellites is warranted and in progress.

KEY WORDS: *Balistes capriscus*, gray triggerfish, stock structure, conservation genetics, mitochondrial DNA

Prueba de Aislamiento Genetico del Peje Puerco del Golfo de Mejico y de la Costa Este ee Los Estadoss Unidos Usuando Un Marcador Molecular de ADN Mitocondrial

El Peje Puerco (*Balistes capriscus*) es un pez de arrecife que ocurre a lo largo de la costa occidental del Atlantico desde Nueva Escocia hasta la Argentina. Esta especie es explotada en mayor parte por los pescadores recreacionales del norte de Golfo de Mejico en los Estados Unidos y regiones del sur Atlantico. Recientes estudios del recurso pesquero indicaron que esta especie ha sido sobreexplotada y existe ahora mismo un plan para su recuperacion. La pesca de esta especie es actualmente manejada como una unica reserva pesquera en la región del suroriente de los Estados Unidos en ausencia de información confiable de la estructure de esta reserva pesquera. Nosotros desarrollamos un ensayo sequencial de un fragmento de 617 pares de bases del gen ND4 encodado en el DNA mitocondrial. Treinta muestras en el sur de Texas (en las afueras de Puerto Isabel) y 29 en el suroriente de Florida (en las afueras de Jupiter) fueron ensayadas y sus datos fueron usados para realizar una evaluación preliminar de la variación genetica y estructura del recurso pesquero del Peje Puerco en el suroriente de los Estados Unidos. Resultados revelan que el gen examinado fue variable in la especie con 14 y 17 haplotipos encontrados en las muestreas del sur de Texas y suroriente de Florida, respectivamente. Analisis de varianza molecular no indicaron una significante heterogeneidad genetica entre las dos poblaciones geograficas. El poder de inferencia en el estudio fue reducido debido al pequeno tamaño de la muestra y el uso de un solo locus genetico. Debido a estas limitaciones, diferencias geneticas sutiles, como es comunmente observado in peces marinos, no pueden ser reveladas por los datos actuales. Nuevos estudios son justificado y en progeso empleando grandes tamaños de muestras, adicional regiones muestreadas, y adicional loci incluyendo hipervariables microsatelites nucleares codificados.

PALABRAS CLAVE: *Balistes capriscus,* peje puerco, marcador molecular de ADN mitocondrial

Un Test de l'Hypothèse d'une Isolation Génétique entre les Populations de *Balistes gris* du Golf du Mexique et Celles de la Côte est des Etats Unis à l' Aide d'un Marqueur Moléculaire de l'ADN Mitochondrial

Le Baliste gris (*Balistes capriscus*) est un poisson de récif distribué le long des côtes de l'Atlantic de l'ouest, de la Nouvelle Ecosse au Nord à l'Argentine au sud. Aux Etats Unis, l'espèce est exploitée principalement par des pêcheries récréatives dans le nord du Golfe du Mexique et au sud de la cote est du territoire. Les récentes évaluations du stock on indiqué que l'espèce est surexploitée et un plan de restauration des populations est actuellement en cours. La pêcherie est gérée selon un modèle de stock unique pour la totalité de l'aire exploitée aux Etats Unis en l'absence de données fiables sur la structure des populations. Nous reportons le développement d'un protocole de séquençage d'un fragment de 617 paires de bases du gène ND4 codé par l'ADN mitochondrial. Trente échantillons collectés au sud du Texas (au large de Port Isabel) et 29 collectés au sud- est de la Floride (au large de Jupiter) ont été séquencés et les données employées pour conduire une analyse préliminaire de la variation génétique et la structure des populations de Balistes gris dans les eaux côtières du sud des Etats Unis. Les résultats obtenus révèlent que le gène étudié est variable dans l'espèce avec 14 et 17 distinct haplotypes identifiés dans les échantillons du sud du Texas et celui du sud-est de la Floride respectivement. L'analyse de la variance moléculaire (AMOVA) n'indique pas d'hétérogénéité spatiale significative entre les deux populations géographiques. La puissance statistique de l'étude est limitée du fait de la faible taille des échantillons et de l'utilisation d'un seul locus. Ainsi, de faibles niveaux de structuration génétique, comme souvent observes chez les poissons marins, ne sont peut être pas révélés par ces données. La poursuite de l'étude est en cours et nécessite l'acquisition d'échantillons de plus grande taille, la caractérisation génétique de populations d'autres localités géographiques, et l'addition d'autres marqueurs génétiques en particulier de marqueurs hypervariables de type microsatellites.

MOTS CLÉS: *Balistes capriscus,* valiste gris, isolation génétique, marqueur moléculaire de l'ADN mitocondrial

Mitochondrial DNA Evidence for a Natural Intergeneric Hybrid Between *Ocyurus chrysurus* and *Lutjanus jocu* (Perciformes: Lutjanidae)

KEY WORDS: Snapper, Lutjanidae, mtDNA, hybrid, *Ocyurus chrysurus, Lutjanus jocu*

ADN Mitocondrial como Evidencia de un Hibrido Intergenérico Natural entre *Lutjanus jocu* y *Ocyurus chrysurus* (Perciformes: Lutjanidae)

PALABRAS CLAVE: Lutjanidae, hibrido intergenérico, *Ocyurus chrysurus, Lutjanus jocu*

ADN Mitocondrial comme Preuve d'un Hybride Intergenérico Naturel entre *Lutjanus jocu* et *Ocyurus chrysurus* (Perciformes: Lutjanidae)

MOTS CLÉS: Lujanidae, hybride intergenérico, *Ocyurus chrysurus, Lutjanus jocu*

AUREA E. RODRIGUEZ[1]*, ERNEST H. WILLIAMS[1], and JUAN C. MARTINEZ-CRUZADO[2]
[1]*Department of Marine Sciences, University of Puerto Rico, Mayaguez, Puerto Rico. *auryro@gmail.com.*
[2]*Department of Biology, University of Puerto Rico, Mayaguez, Puerto Rico .*

ABSTRACT

Species from the family Lutjanidae, commonly known as snappers, represent one of the major resources for marine fisheries. This family consists of 5 subfamilies, 21 genera, and nearly 120 species. They represent most important components of the reef fisheries in tropical and subtropical latitudes. Despite the importance of the family, the high number of species and its worldwide distribution, exploration of the taxonomic identification, early life history and phylogenetic relationships of lutjanids is far from complete and continually under review. New species have been identified recently and species previously described as valid have been recognized as natural intergeneric hybrids of lutjanids. The high similarity of morphology, and crossbreeding within lutjanids increases taxonomic uncertainty. Conventionally, phylogeny, ontogenetic descriptions, and species identification of lutjanids relied on morphological features. Molecular methods, proven to be useful when morphological methods do not succeed, are becoming useful tools for taxonomic identification. We used DNA sequence data of the 12S rRNA mitochondrial gene to generate a molecular identification key for 15 species of lutjanids. DNA data from a sample of a lutjanid with morphological descriptions suggestive of a hybrid between *Lutjanus jocu* and *Ocyurus chrysurus* was compared to our molecular key. DNA from this specimen shared 100% identity with adult voucher consensus sequences for *Lutjanus jocu*. The validity of the genus *Ocyurus* has been discussed and investigated, leading some authors to propose the synonymization of *Ocyurus* with the genus *Lutjanus.* The data obtained in this study reinforce the proposal to synonymize *Ocyurus* with *Lutjanus*.

Ecological Differences Between Natural versus Artificial Reefs in the Northern Gulf of Mexico

KEY WORDS: Reef fish, community structure, ROV, stable isotopes, Gulf of Mexico

Ecológico Natural Contra las Diferencias entre los Arrecifes Artificiales en El Norte del Golfo de México Contra las Diferencias Entre los Arrecifes Artificiales en el Norte del Golfo de México

PALABRAS CLAVE: Peces de arrecifes, ecológico, ROV, Golgo de México

Différences Écologiques entre Naturelles contre des Récifs Artificiels dans le Nord du Golfe du Mexique

MOTS CLÉS: Poissons des récifs, différences Écologiques, ROV, Golfe du Mexique

JOSEPH TARNECKI* and WILLIAM PATTERSON
*University of West Florida, Department of Biology, 11000 University Parkway, Pensacola, Florida 32514 USA. *jtarneck83@gmail.com.*

ABSTRACT

We examined the community, size, and trophic structure of reef fishes at 61 reef sites in the northern Gulf of Mexico as part of an ongoing study to examine ecological differences between artificial and natural reefs. There were significant differences in fish community structure between reef types and depths (ANOSIM; $p < 0.001$), with large piscivores being

more abundant at artificial reefs while planktivores and invertivores were more abundant at natural reef sites. Species diversity was greater at natural sites, which was mostly due to the myriad small fishes present there but not on artificial reefs. Overall, fish density was an order of magnitude greater at artificial reefs, although natural reefs covered more expansive areas. There was a significant difference in fish size between reef types (ANOVA; $p < 0.001$), with some fishery species, such as red snapper, gray triggerfish, and greater amberjack, being larger at artificial reefs, and others, such as vermillion snapper, scamp, and red porgy, being larger at natural reefs. Too few stomach samples were available for most species to test diet differences between natural and artificial reefs, with an exception being red snapper ($n = 336$). Red snapper displayed a clear ontogenetic shift in feeding at higher trophic levels with increasing size, but fish in natural habitats also displayed broader diets than fish on artificial reefs. Ongoing stable isotope analysis (CNS) of muscle samples ($n = 308$ samples among 33 species) should provide greater resolution of trophic structure of reef fish trophic structure.

Investigations into the Dynamics of a Black Grouper Spawning Aggregation in Bermuda

KEY WORDS: Spawning aggregation, black grouper, *Mycteroperca bonaci*, Bermuda

Investigaciones en la Dinámica de una Agregación de Freza del Cuna Bonací en Bermudas

PALABRAS CLAVE: Agregación de freza, cuna bonaci, *Mycteroperca bonaci*, Bermudas

Recherches sur la Dynamique d'une Agrégation de Frai de Badèche Bonaci de Bermudes

MOTS CLÉS: Agrégation, badèche bonaci, *Mycteroperca bonaci,* Bermudes

TAMMY TROTT, JOANNA PITT, and BRIAN LUCKHURST

*Department of Environmental Protection, Bermuda Government, P.O. Box CR52 , Crawl CRBX Bermuda. *ttrott@gov.bm.*

ABSTRACT

In 2004, the Marine Resources Division was made aware of a possible black grouper (*Mycteroperca bonaci*) spawning aggregation located between two seasonally protected areas at the eastern end of Bermuda. Legislation was enacted the following year to afford protection to the site by incorporating it into a single, reconfigured seasonally protected area. However, it was unclear whether the closure period (May – August), which was based on the spawning season of the red hind (*Epinephelus guttatus*), encompassed the full reproductive period of the black grouper. In order to better understand the dynamics of the aggregation, an acoustical tagging program was implemented in 2008. Vemco acoustic transmitter tags were surgically implanted in the body cavities of 25 black groupers during the summers of 2008 and 2009. With the uncertainty about the spawning seasonality of black grouper, there was concern that tagged fish would be vulnerable to capture if they continued to aggregate at the site after August 31st, so the immediate area around the aggregation was closed to fishing until the end of November using a provision in the Fisheries Act 1972. Data downloaded from receivers moored in the aggregation area have confirmed that tagged black grouper are present at the site between the full and new moonsr from May through November. Activity levels were high from June through October with moderate activity observed in May and November. These results suggest that black grouper have a more protracted spawning season than that of red hind and validate the site closure.

Search For Bio-Indicators to Monitor the Evolution of Coral Reef Habitats

KEY WORDS: Corals, Caribbean, bio-indicators, monitoring, degradation

Investigación sobre los Bio-Indicadores para Monitorear Evolución de los Arrecifes Coralinos

PALABRAS CLAVE: Arrecifes coralinos, bio-indicadores, monitorear

Bio-Indicateurs pour le Suivi de l'Évolution des Communautés Coralliennes Récifales

MOTS CLÉS: Coralliennes récifales, bio-indicateurs,

LÉA URVOIX*, NICOLAS LARCHÉ , SÉBASTIEN CORDONNIER ,
PEDRO PORTILLO, YOLANDE BOUCHON-NAVARO , and CLAUDE BOUCHON
Université Antilles-Guyane, Campus de Fouillole Equipe DYNECAR,
*Pointe a Pitre, Guadeloupe 97159 France. *lurvoix@univ-ag.fr .*

ABSTRACT

Corals represent the main key species for coral reefs. Coral-built structures shelter numbers of Invertebrate and fishes representing the major part of the stock of species harvested by coastal tropical fisheries. Caribbean coral communities have presented increasing signs of decay since nearly 30 years due to a conjunction of natural and anthropogenic factors. It is urgent to develop indicators able to characterize the state of health of coral communities and to provide a tool for monitoring the dynamics of their evolution. In the present study we tested two bio-indicators on the reefs of Guadeloupe Island submitted to different levels of threat: 1) the measurement of the rate of necrosed tissues on the adult corals. This indicator is both related to the instantaneous state of health of the coral community and to the potential mortality rate of adult corals; 2) the recruitment of young corals that represents the potential of regeneration of communities. On reefs with low anthropogenic pressure, coral communities are characterized by a higher abundance of adults presenting a minimal rate of necrosis in comparison with reefs submitted to higher stress. Species richness and abundance of young corals are also higher on less threatened reefs. Necrosis affects more specifically massive reef-building species (*Montastrea faveolata, M. cavernosa, Colpophyllia natans, Diploria strigosa*). The most resistant species are r strategy (*Favia fragum, Siderastrea radians, Agaricia agaricites, Porites astreoides*…). These species tend to predominate in the coral communities of the most degraded reefs in the adult as well as in the juvenile populations.