

Ballantine, D.L., Aponte, N.E., Holmquist, J.G., Dept. of Marine Sciences, University of Puerto Rico, Mayagüez, Puerto Rico 00681; **Multi-species Algal Balls from Los Roques Archipelago, Venezuela**

Unattached algae which form balls are normally reported as being composed of a single species. We report both monospecific algal balls and multi-species assemblages with up to four species providing major structural components from the Caribbean at Los Roques Archipelago, Venezuela. Many of the multi-species balls possessed a cavity surrounded by thick walls of sediment-impregnated, algal filaments. Cavity volume was positively related to the length of algal balls. The hollow algal balls were remarkable in that they often contained, and likely imprisoned, a variety of invertebrates, including several species of polychaetes, sipunculans, molluscs, and crustaceans. Faunal associates, if in fact imprisoned, are likely to benefit from reduced predation but may be subject to limited food supply, crowding, oxygen deprivation, and limited reproductive opportunities.

Bowie, W., and L. Jarecki, H. Lavity Stoutt Community College, P.O. Box 3097, Road Town, Tortola, B.V.I. **SCIENTIFIC ACTIVITIES AT THE H. LAVITY STOUTT COMMUNITY COLLEGE, TORTOLA.**

This poster presentation describes scientific activities at the recently-established (1993) Science Department of the H.L.S. Community College on Tortola, BVI, as follows.

1. Facilitation and cooperation in research with:

a) University College, London, Peter Drewett: "A Field Survey of Prehistoric Tortola..."; b) Amherst College, Massachusetts, Edward Belt: Beach erosion and water quality surveys; c) University of California, Santa Barbara, Graham Forrester: "Strong density-dependent survival...", *Oecologia*, in press; d) University of New Hampshire, David Carlon: "The importance of larval processes in ..."

2. Research at HLSCC:

a) Synecology of hypersaline ponds. (see abstract)
b) Mangrove zonation patterns.

3. Scientific awareness:

a) Annual research symposia: "Research Reports from Guana Island Wildlife Sanctuary"; b) Public lecture series: "Nature and Our Environment"

4. Intensive specialty courses, open enrollment:

a) 1994 (5 weeks, USAID-funded): Natural Resources Management Training; b) 1994 (1 week): Coral Reef Ecology and Management; c) 1995 (1 week): Ornithology

• **COMPARATIVE BIOCHEMISTRY OF TUNICATES. UPTAKE OF RADIOACTIVE VANADIUM AS VANADATE AND PRESENCE OF SULFURIC ACID OR BISULFATE.** Leon S. Ciereszko, Department of Chemistry and Biochemistry, The University of Oklahoma, Norman, Oklahoma 73019

My interest in the comparative biochemistry of tunicates and other marine organisms was aroused by a laboratory assignment in organic chemistry given me by Professor Werner Bergmann to isolate and identify the sterol in a tunicate he had collected in the Caribbean. My curiosity led me to find out what was known about the chemistry of tunicates. I found in one paragraph in Gortner's textbook of biochemistry three interesting pieces of information. Tunicates had cellulose in their tunics, some species contained vanadium and sulfuric acid. My studies of marine organisms began in 1951 through a Lalor Fellowship at the Marine Biological Laboratory in Woods Hole. I found that the content of vanadium and of sulfuric acid varied with the classification of the species. The acidity of the blood cells containing vanadium is as high as 1 Normal. The ability to concentrate vanadium also varies as indicated by studying the radioactivity of organisms exposed to trace amounts of radioactive vanadate. This research was made possible by access to marine laboratories at Bermuda and Woods Hole.

Chanas, B. & J.R. Pawlik, Biological Sciences, University of North Carolina at Wilmington, Wilmington, NC 28403-3297. **PHYSICAL AND CHEMICAL DEFENSES OF CARIBBEAN SPONGES**

Sponges are conspicuous members of the Caribbean marine ecosystem, but are preyed upon by a very select group of predators. Like other sessile reef invertebrates such as ascidians and octocorals, sponges may possess physical and chemical defenses to deter predation by browsing fish. Sponges are soft-bodied and seem to lack an obvious physical defense, such as a mineralized shell. However, the tissues of most sponges often contain sharp siliceous spicules. Spicules serve as important structural components by increasing tissue rigidity and could potentially act as a physical defense but field and aquarium assays of sponge spicules employing predatory reef fish did not support a defensive function. In assessing the chemical defense of Caribbean sponges, 69% of the species studied possessed organic extracts unpalatable to a generalist predatory reef fish. Surprisingly, the undefended sponge species are abundant but are only eaten by specialist reef fish. Sponges lacking a chemical defense may be protected by having low nutritional value. Protein, carbohydrate, lipid, ash, and caloric content were measured to investigate the relationship between level of chemical defense and nutritional value. Except for lipid content, no significant differences were found between defended and undefended species. Sponges lacking a chemical defense may rely on a tactic other than a "nutritional" defense, such as faster growth rates than chemically defended species.

Debrot, A. O., and I. A. Nagelkerken., Carmabi Foundation, Curaçao, Netherlands Antilles; **AN UNUSUAL RECRUITMENT SWARM OF THE BALLOONFISH (*DIODON HOLOCANTHUS* L.) IN THE LEEWARD DUTCH ANTILLES, 1994.**

Sport divers noted massive numbers of juvenile balloonfish (*Diodon holocanthus* L.) on the reefs of Curaçao, beginning Jan. 1994. Population densities of the species were measured in shallow reef areas by means of daytime visual censuses at a total of 27 sites (400 m² each) in Aruba, Bonaire and Curaçao, Sept. 1994 - Jan. 1995. Population size-structures were practically unimodal and mean size (SL of inflated fish) was 7.7 ± 1.3 cm (1 SD). Mean balloonfish abundances per site were highest in Curaçao (21.9 ± 16.4), intermediate in Bonaire (5.3 ± 4.9) and lowest in Aruba (1.7 ± 2.6). In Curaçao and Bonaire densities were consistently much higher than reported in the literature, indicating a major and apparently unusual recruitment event. Highest densities in Curaçao and Bonaire were documented from areas of coastal urbanization and high artisanal fishing pressure.

Clavijo, I. E., D. G. Lindquist, M. E. Whittaker, and F. Hernandez; Department of Biological Sciences and Center for Marine Science Research, University of North Carolina, Wilmington, N. C. 28403-3297; **COMPARISON OF ZOOPLANKTON FROM A MANGROVE LAGOON AND A CORAL REEF: PRELIMINARY RESULTS FROM LIGHT TRAPS.**

Light traps have been used successfully by researchers to sample late stages of ichthyoplankton. These sampling devices target positively phototactic fish larvae and presettlement stages, and also attract large numbers of invertebrates. A study designed to test two light trap models off Key Largo, Florida, provided an opportunity to study invertebrate larvae and adults at two localities. We compared hourly samples from two sites, a mangrove lagoon (N=12) and a coral reef (N=9) on two different nights in May 1994. Crustaceans were the most abundant invertebrates collected at both sites. Stomatopod larvae and harpacticoid copepods numerically dominated the mangrove lagoon samples while amphipods and calanoid copepods were more numerous in reef samples. Chaetognaths were more abundant in reef samples. Polychaetes were present at both sites, but their numbers were underestimated due to a light trap sampling bias.

DeMartini, E.E., F.A. Parrish and J.D. Parrish, National Marine Fisheries Service Honolulu Laboratory and Hawaii Cooperative Fishery Research Unit (National Biological Service), Honolulu, Hawaii, USA 96822: **LONG-TERM CHANGES IN SIZE AND STRUCTURE OF REEF FISH ASSEMBLAGES**

Fish assemblages in shallow, pristine, coral reef habitats at two atolls in the remote Northwestern Hawaiian Islands were compared by identical underwater visual censuses made more than a decade apart. Analysis of the fish counts was stratified by type of habitat (barrier reef and patch reef) and based on differences between matched pairs of censuses (before-after for each individual reef). Within habitat type, species presence-absence and relative abundance in the assemblage differed little between sampling periods at either atoll. However, densities generally declined by about one-third for a number of numerically dominant species and for taxa pooled into functional categories (trophic levels, feeding guilds). These changes occurred over a period during which other studies suggested lower oceanic productivity in the region. Analysis of the power of statistical tests for reef fishes with high temporal fluctuations in abundance indicated that very large sample sizes are required to detect moderate changes in density, particularly for analysis at low taxonomic levels.

Hayes, M.L., Duke University Marine Laboratory, Beaufort, North Carolina 28516 and Department of Planning and Natural Resources, Coastal Zone Management Program, St. Thomas, U.S. Virgin Islands 00802; **PROTECTING MARINE AND COASTAL AREAS IN THE U.S. VIRGIN ISLANDS: SOCIO-POLITICAL CHALLENGES.**

Experiences in the U.S. Virgin Islands (USVI) suggest that progress in marine and coastal area protection is exclusively dependent upon local socio-political dynamics. Previous attempts to plan, designate, and implement a Territorial system of marine and coastal parks and reserves have achieved minimal success despite the existence of an active Coastal Zone Management Program since 1979. Difficulties are attributed to various factors, ranging from periodic governmental reorganization to the limited use of broad-based participatory planning procedures. As a result, the USVI have fallen short of achieving the integrated, cooperative management ideal, the effectiveness of which has been demonstrated in other parts of the Caribbean region. In the USVI, future efforts might also benefit from adopting strategies which emphasize non-governmental support networks within the local community, partnerships between the public and private sectors, and continuous and meaningful public involvement in all aspects of marine and coastal resource management.

Hernandez, F. J., D. G. Lindquist, and I. E. Clavijo, Department of Biological Sciences, University of North Carolina at Wilmington, 601 South College Road, Wilmington, NC 28403-3297; **A COMPARISON OF LIGHT TRAP DESIGNS USED TO SAMPLE PRESETTLEMENT FISHES: PRELIMINARY RESULTS FROM A MANGROVE LAGOON AND A CORAL REEF IN KEY LARGO, FLORIDA.**

Surface-towed ichthyoplankton nets are difficult to use in areas such as mangrove lagoons and coral reefs, in that they often become ensnared on roots and coral heads. Light traps, however, offer an alternative means of sampling areas with such obstructions. Two different types of light traps were utilized in May, 1994 in Key Largo, Florida in sampling presettlement fish larvae and juveniles. A three-chamber, automated design modeled after Doherty (1987, *Bull. Mar. Sci.*, 41: 423-431) was compared to a less sophisticated, two-chamber design, similar to that of Brogan (1994, *Mar. Biol.*, 118: 33-44). Both light trap designs were used for sampling three nights in a mangrove swamp and for one night above a small coral reef (Three Sister's Reef). The three-chamber model had a higher capture rate, sampling a total of 62 specimens (2 fish/trap hour) in the mangrove swamp, and 32 above the reef (3 fish/trap hour). The two-chamber model captured only 4 individuals (0.4 fish/trap hour) in the mangrove swamp, and 2 (0.4 fish/trap hour) above the reef.

Hayes, R.L., Howard University, Washington, DC 20059 and T.J. Goreau, Global Coral Reef Alliance, Chappaqua, NY 10514; **A LARGE-SCALE SURVEY OF CORAL REEF BLEACHING IN THE SOUTH CENTRAL PACIFIC.**

Massive coral reef bleaching occurred across the South Central Pacific in 1994. We conducted a retrospective survey of these reefs supported by the U.S. State Department's Coral Reef Initiative. 19 sites comprised our study, including a full range of reef types. This is the first attempt to assess effects of bleaching and compare reef vitality over such a vast area. Data were collected on percent live coral cover, on bleached, recovering and dead corals, on algal covers, and on reef stress. Bleaching was evidenced at all sites. All reefs showed site-specific stress not correlated with bleaching. Exposure to high sea surface temperatures was the only common factor noted. Corals in highly stressed lagoonal habitats near human populations appeared less subject to bleaching than on the outer reef slope. Our survey indicates the extreme vulnerability of reefs to temperature elevation. As a model for large scale regional assessment of reef health, our approach might be considered by marine scientists evaluating the impact of bleaching episodes on reef composition and vitality.

Jarecki, L., H. Lavity Stoutt Community College, P.O. Box 3097, Road Town, Tortola, British Virgin Islands; **SEASONAL CHANGES IN HYPERSALINE POND FAUNA IN THE BRITISH VIRGIN ISLANDS.**

In the British Virgin Islands, hypersaline ponds are the most frequently-occurring closed bodies of water. A number of wading birds, including the recently-re-introduced Caribbean flamingo, are restricted to these habitats and depend on water-column and near-shore arthropods for food.

Hypersaline pond salinity fluctuates seasonally by 150 to 200 ppt (parts per thousand) in response to wet or dry conditions. Arthropod species show seasonal cycles following salinity changes. Below 60 ppt, mosquito larvae and ostracods occur. Fiddler crabs (*Uca* sp.) produce planktonic larvae when salinity is below 90 ppt. Corixids occur at salinities less than 130 ppt, while copepods are found at salinities between 60 ppt and 130 ppt. *Artemia* have been found in water as salty as 320 ppt, but they do not occur naturally below 130 ppt.

Whether bird use of hypersaline ponds follows these changes in water column fauna is being investigated. Other areas of investigation include: 1) the particular genera of copepods occurring at different salinities; 2) conditions for reproduction in various arthropod species; 3) Composition of benthic bacterial mats; and 4) seasonality of bird species occurrences and nesting at hypersaline ponds.

Lirman, D., MBF Division, Rosenstiel School of Marine and Atmospheric Science. 4600 Rickenbacker Cswy., Miami, FL 33149; THE EFFECTS OF HURRICANE ANDREW AND TROPICAL STORM GORDON ON FLORIDA REEFS.

The passage of two major storms, Hurricane Andrew (24 August 1992) and Tropical Storm Gordon (14 November 1994), within a short period of time provided an excellent opportunity to study the effects of multiple natural disturbances on coral reefs of the northern Florida Reef Tract. The damage and recovery patterns of two populations of elkhorn coral (*Acropora palmata*) on reefs that experienced different degrees of initial damage were documented. Whereas extensive colony fragmentation of this coral was observed in a shallow reef (Elkhorn Reef; 1-2 m in depth), only minor damage was observed in a deeper, nearby reef (Ball Buoy Reef; 2-5 m) after Hurricane Andrew. This damage patterns were reversed after Gordon. In this case, it was the deeper site that experienced significant fragmentation, while the previously disturbed shallow site suffered only minor additional damage. I hypothesize that Hurricane Andrew removed the most susceptible elkhorn colonies at Elkhorn Reef, rendering the remaining population less susceptible to subsequent disturbances. This supports the idea that the disturbance history of a system plays an important role in the outcome of future disturbances.

Nagelkerken, W.P., Institute of Archaeology and Anthropology of the Netherlands Antilles, Joh. van Walbeekplein 59, Curacao, Netherlands Antilles

UNDERWATER ARCHAEOLOGICAL RESEARCH OF THE HISTORICAL REFUSE DUMP SITE IN CURACAO, NETHERLANDS ANTILLES

In connection with the renovation of the quay wall of the Handelskade in Curacao, the bottom area along the old quay wall was cleaned out by a dredging machine. During this dredging work, numerous historical artifacts, which were probably dumped into the St. Anna by people living nearby as refuse in centuries past, were found. In 1993 underwater archaeological research was carried out. A total of 2,230 different artifacts were found. A great majority of these (74%) consisted of lead-glazed earthenware used mostly as kitchenware. Further tin-glazed earthenware, creamware, pearlware, Chinese porcelain, pipes, wine bottles and case bottles and German stoneware as mineral water bottles. The other material consisted mainly of dispensing and perfume bottles, candlesticks, combs, buttons and other objects of use. Their origin was classified as follows: 58% England, 26% Holland and 16% diverse countries.

The finds indicate that in the past the local population used this site as a refuse dump, inasmuch as Punda (downtown) was not developed until after the arrival of the Dutch in 1634, the first artifacts date from the 2nd half of the 17th c.

Long, C. D., and R. Zottoli, The Buffum Group, Salem, MA 01970 and Fitchburg State College, Fitchburg, MA 01420; METHODS OF IDENTIFYING JUVENILE *Nereis riisei* GRUBE, 1857 (POLYCHAETA: NEREIDIDAE) TAKEN IN ECOLOGICAL SURVEYS.

Materials from ecological surveys are usually sorted based on a morphological "gestalt". Identification is verified on a small sample using standard techniques for the species. Juveniles (and atypically small adults) may lack the characters upon which the "gestalt" is based and thus are sorted as "spp. indeterminate."

Presented are methods for identifying such specimens of *Nereis riisei* Grube, 1857, a species found in most surveys from the Caribbean and associated waters. Using these methods, "spp. indeterminate" specimens can be identified, thus increasing the size of the database. Reproductively mature specimens can be as small as 1 mm wide (compared to the expected range of 2 to 10 mm) but too small to be identified by "gestalt". If such specimens are not identified, the reproductive capacity of the population may be under estimated.

Noorhasen, D.,¹ C.A. Walters,¹ K. A. Brown,¹ W.M. Cole² and J.F. Battey¹.¹ MacLean Marine Science Center, University of the Virgin Islands, St. Thomas, U.S.V.I. 00802. ² Agricultural Experiment Station, University of the Virgin Islands, St. Croix, U.S.V.I. 00850. LIPID LEVELS AND FATTY ACID PROFILES OF THE CARIBBEAN JACK *TRACHINOTUS GOODEI* (PISCES, CARANGIDAE) RAISED IN MARICULTURE.

Trachinotus goodei is common in shallow water, sandy, nearshore marine environments in the eastern and southern Caribbean. Wild-caught *T. goodei* were stocked into 2m³ flow-through tanks (10 fish/tank) and fed four different commercially formulated pelleted diets for 16 weeks at the Agricultural Experiment Station mariculture facility on St. Croix. All diets resulted in high growth rate and efficient feed conversion. No significant differences (P>0.05) were found among treatment means for absolute and specific growth rates and feed conversion ratios. Lipids were extracted from whole fish, skinless fillets and viscera of both tank-reared and wild-caught *T. goodei* and quantified by gas-liquid chromatography. Whole tank-reared fish contained 9-18% lipid on a wet weight basis. Wild-caught fish were 1% lipid. The fillets of tank-reared fish were 6-7% lipid, wild-caught fillets contained 0.4% lipid. The viscera contained large quantities of lipid, 26-68% in tank-reared fish, 2% in wild caught fish. Overall, tank-reared fish contained much more lipid than wild-caught, and the viscera of tank-reared fish contained proportionally more lipid than the viscera of wild-caught fish. Wild-caught fish contained more polyunsaturated fatty acids than those reared on commercial diets. Wild-caught fillet contained 30% all-cis-4,7,10,13,16,19 docosahexaenoic acid (22:6W3), three times the 10% found in fillets from tank-reared fish.

Nowlis, Joshua Sladek, and Callum M. Roberts, Eastern Caribbean Center, University of the Virgin Islands, St. Thomas, VI 00802-9990; **A BIOECONOMIC ANALYSIS OF CORAL REEF FISHERY RESERVES.**

Using computer models, we examined the biological and economic consequences of marine fisheries reserves, areas in which fishing is prohibited to enhance surrounding fisheries. Our models assumed: constant size-structured life history, including rates of fecundity, natural mortality, and fishing mortality (the latter only in non-reserve areas); minimal movement of adults to and from protected areas; widespread larval dispersal; and von Bertalanffy growth. We ran these models multiple times while varying fishing mortality and reserve size, allowing us to predict optimal reserve size -- that size which maximized long-term sustainable fishery yields -- and yields. Our results suggested that: 1) fishery reserves will be effective anywhere fish stocks are over-exploited, a state currently common around the Caribbean; 2) several fisheries would benefit from reserves larger than sizes in common use; 3) the accuracy of our optimal reserve size predictions is limited by the accuracy of larval survival estimates; and 4) when managing both fishing mortality and reserve size, it is safer to err on the side of allowing over-fishing with a reserve to compensate than on the side of under-fishing without a reserve.

Recalde, D.L.; Penié, I.; González, M.*; Peón, C.; Hernández, J.; Pérez, R.* Instituto de Oceanología e Instituto de Meteorología* Ministerio de Ciencia, Tecnología y Medio Ambiente. Ave. 1ra # 18406, Reparto Flores, Playa, Ciudad de la Habana. Cuba.; Telex: 51 12 90 ac dc cu; email: oceano@ceniai.cu

CARACTERIZACION HIDROQUIMICA DE LA PLATAFORMA NORTE DE ALGUNOS CAYOS DEL ARCHIPIELAGO SABANA-CAMAGÜEY, CUBA.

Se presentan los resultados obtenidos en la caracterización hidroquímica del cuerpo de agua adyacente a los cayos: Esquivel, Frágoso, Santa María, Guillermo, Coco, Paredón, Cruz y Confites, correspondientes al Archipiélago Sabana-Camagüey. El estudio incluyó las determinaciones de oxígeno, fósforo de fosfatos, silicio de silicatos y nitrógeno de nitratos más nitritos disueltos en agua de mar, en transectos perpendiculares a la línea costera y muy próximos a la barrera arrecifal. Se presentan, además, los datos meteorológicos y del estado de la marea colectados durante el crucero. La distribución de los parámetros bajo estudio muestra una débil estratificación vertical y una dependencia del régimen de circulación costera. Se encontraron concentraciones elevadas de O₂, P-PO₄ y N-NO₃+NO₂ en toda la región de estudio: 4.5-5.8mL/L; 0.1-0.6µmol/L y 0.1-0.9µmol/L, respectivamente. Los valores de Si-SiO₃ oscilaron entre 1.1 y 2.5 µmol/L, muy cercanos a los obtenidos en los estratos superficiales oceánicos.

Petrovic, C., H. Laverty Stoutt Community College, Box 3097, Road Town, Tortola, B.V.I; **DISTRIBUTION AND HIGH DENSITY AGGREGATIONS OF QUEEN CONCH IN THE BRITISH VIRGIN ISLANDS.**

Queen Conch (*Strombus gigas*) populations and movements in the BVI have been studied since 1987. Adult Queen Conch generally occur at depths of 10m to 30m, primarily on sand and algal flats. Availability of suitable algal substrates seem to determine distribution of adults. Juveniles are most often found in protected bays shallower than 10m. Preferred habitats appear to be dense seagrass beds of *Thalassia testudinum* and *Syringodium filiforme*. Juveniles (1-3 years old) often occur at densities up to 10 individuals m⁻². High-density aggregations of over 50 m⁻² have been observed in localized areas. Explanations for such behaviour include predator avoidance, increased feeding efficiency, improved habitat utilization, and mass migration to deeper water or new areas. Future research will focus on density dependant behaviour and feeding success of juveniles in dense populations.

Tagging experiments are currently in progress.

Ritchie, K.B., A. Jindal, R.L. Hayes, T.J. Goreau and G.W. Smith Univ. NC-Chapel Hill, Univ. SC-Aiken, Howard Univ., Global Coral Reef Alliance; **BACTERIAL ECOLOGY OF SELECTED CORALS FOLLOWING THE 1994 SOUTH CENTRAL PACIFIC BLEACHING EVENT.**

Syringe samples were taken from the surface of normal, bleached and necrotic corals from the South Central Pacific following the mass bleaching event which first appeared in March, 1994. Carbon source utilization patterns were determined for bacterial isolates from these samples and entered into a database from which community comparisons were made. Plate count and INT-linked dehydrogenase measurements were performed on the samples to determine overall metabolic activity. Shifts in bacterial communities, based on cluster analysis, were observed with *Acropora* and *Pocillopora* species. Bleached communities clustered together indicating a common shift in bacterial groups. In addition, an increase of 30 to 40 percent in INT-linked dehydrogenase activity was observed in bleached over normal samples in these two genera. Data observed for *Porites* was not consistent with the other genera, although fewer samples of this genus were available.

Smith, S. M. Division of Marine Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science, 4600 Rickenbacker Causeway, Miami, Florida 33149 USA; **DEVELOPMENTAL RESPONSES OF ESTABLISHED RED MANGROVE (*RHIZOPHORA MANGLE*, L.) SEEDLINGS TO RELATIVE LEVELS OF PHOTOSYNTHETICALLY ACTIVE AND ULTRAVIOLET RADIATION.**

The red mangrove, *Rhizophora mangle* L., grows at the land-sea interface of tropical and subtropical intertidal zones of the Western hemisphere. Although *R. mangle* has presumably adapted to high levels of low-latitude irradiance, its physiological response mechanisms to specific quantities and qualities of light remain unclear, particularly during the dispersal and early settlement phases of the life cycle.

Floating and planted viviparous seedlings of *R. mangle* were subjected to conditions of ambient natural sunlight, UVb-filtered sunlight, and shade to determine the effects of UVb/PAR on early root and shoot development. Growth was generally reduced with exposure to UV, with shoot elongation exhibiting the largest treatment differences among all growth indices. Reductions in shoot growth correlated very well with decreased levels of endogenous gibberellins as detected by enzyme-linked immunosorbent assays. The results suggest that exposure to high levels of both UVb and PAR inhibit the early development of *R. mangle*, partially due to decreased gibberellin biosynthesis. Enhanced UVb penetration, as a result of stratospheric ozone reduction, may therefore have implications for recruitment in this species.

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CARACTERIZACIÓN SEDIMENTOLÓGICA DE UN ÁREA DE INTERÉS TURÍSTICO EN EL ARCHIPIÉLAGO SABANA-CAMAGÜEY, CUBA.

El trabajo consistió en la caracterización sedimentológica del acuario del archipiélago Sabana-Camagüey y el inventario de las principales playas. Como parte del programa de investigaciones que desarrolla el grupo de procesos costeros y para dar respuesta a las necesidades del proyecto de Naciones Unidas para el manejo integral de la Cayería Norte de Cuba con fines turísticos. La investigación brindó información sobre las condiciones ecológicas, la distribución y dinámica de los sedimentos actuales en dicho acuario, sentando las bases para evaluar futuros impactos producto de la acción antrópica, elaborar recomendaciones para su manejo y conservación, y la ejecución de los programas de monitoreo que incluyen además la biodiversidad marina. La evaluación de las playas considerando su configuración, origen, tipo de sedimento, extensión y su nivel de protección, permitió establecer las de mayores perspectivas para su empleo con fines turísticos.

Spudich, B.M. and A.W. Hulbert. 1995. National Undersea Research Center, University of North Carolina Wilmington, 7205 Wrightsville Ave., Wilmington, N 28403. **IN SITU FLUOROMETRY AS A NON INVASIVE, QUANTITATIVE MEASURE OF ZOOXANTHELLAE CHLOROPHYLL A DENSITY.**

Despite their environmental and economic importance, corals are increasingly threatened by human activity. Corals often respond visibly to conditions of stress by bleaching (expelling endosymbiotic algae, zooxanthellae, and/or photosynthetic pigments from remaining algae). Indirect measures of the chlorophyll content by fluorescence offer high sensitivity to even minute quantities of chlorophyll. Initial studies of zooxanthellae chl a density require non-destructive sampling. In situ fluorescence provides a non-destructive tool for monitoring changes in photosynthetic pigments. Pigment density in polyps of *Montastrrea annularis* was visually assessed using a simple 5-point scale and compared with in situ fluorescence and laboratory chl extract concentrations. Data suggest in situ fluorescence identifies only surface chl a concentrations and is not significantly more accurate than a 5-point visual bleaching scale. In situ chl a measurements may still be useful for exploring diel and seasonal light adaptation of zooxanthellae chl a densities in corals.

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DISTRIBUCIÓN DE LOS SEDIMENTOS SUPERFICIALES EN LAS BAHÍAS DE JIGUEY Y PERROS (COSTA NORTE).

Como parte del estudio integral de la región NE de Cuba dentro del Proyecto PNUD para su manejo ambiental con fines Turísticos se realizó una primera caracterización sedimentológica determinándose granulometría, origen biogénicos, información corroborada en su mayor parte por fotos aéreas, determinándose su distribución en la zona de estudio. El resultado es de gran importancia económica y social ya que servirá como base comparativa en la evaluación del impacto de los pedraplenes, de las condiciones actuales de sedimentación en estas bahías y como indicador del estado ecológico.

Walters, C.A., D. Noorhasen, K. A. Brown and J.F. Battey
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Islands, St. Thomas, U.S. Virgin Islands, 00802 LIPID STORAGE
PATTERNS IN THE CARIBBEAN REEF-BUILDING CORALS
MONTASTREA FAVEOLATA AND *MONTASTREA*
ANNULARIS.

Triglycerides and wax esters are the primary energy storage compounds in reef-building corals. The eggs released by broadcast spawning corals can be up to 75% wax ester on a dry weight basis. We have monitored lipid storage for two years in colonies of *Montastrea annularis* and its sibling species *Montastrea faveolata*. Colonies of both species have been monitored monthly through both reproductive and bleaching (loss of dinoflagellate symbionts) events. The annual pattern in lipid accumulation is similar in both species, ranging from periods of low (2-3mg lipid/cm²) to high (5-7mg lipid/cm²) levels. At all times of the year, palmitic acid (16:0) is the predominant fatty acid, comprising 37-50% of the total fatty acid pool. The percentage of palmitic acid correlates positively with level of total lipid. Macroscopic examination of oocyte maturation suggest spawning occurs in St Thomas during the same late summer, early fall period reported for *Montastrea* in Puerto Rico and Curacao. We find high lipid levels during this period of oocyte maturation in both *M. annularis* and *M. faveolata*. Lipid levels suggest reproduction does not occur in all colonies every year. In August, 1994, one week before the predicted spawning event, only one of six colonies monitored accumulated large (10 mg/cm²) quantities of lipid, the other five averaging only 3mg/cm². Sampling immediately after spawning showed no change in lipid levels in the 5 low colonies. The lipid level in the one high colony decreased 50%, suggesting release of lipid rich eggs. Bleaching also decreases lipid levels. Bleached colonies have less than 1mg lipid/cm².

Young, C. and M. M. Crites. Rosenstiel School of Marine and Atmospheric Science, University of Miami. UNUSUALLY HIGH ABUNDANCES OF *Scyllarides nodifer* AND *Albunea* sp. LARVAE IN THE FLORIDA KEYS DURING INTRUSIONS OF MISSISSIPPI FLOOD WATER.

The intrusion of low salinity Mississippi flood water into the Florida Keys in 1993 provides insights into the larval recruitment strategies of the slipper lobster *Scyllarides nodifer* and the sand crab *Albunea* sp. During the SEFCAR (South East Florida and Caribbean Recruitment project) cruise of September, 1993, unusually high abundances of advanced zoeal stages (III to V) of *Albunea* sp. and intermediate stages of *S. nodifer* phyllosomata were found in shallow waters near Looe Reef, Florida Keys. Early stages of *Albunea* sp. (I and II) were found in no other SEFCAR surveys, whereas the only other instance of high *S. nodifer* larval abundance was in August, 1989, also associated with slightly lower than typical salinity. The adult populations of *S. nodifer* and *Albunea* sp. are concentrated in coastal NE Gulf of Mexico. High river flows in conjunction with anomalous winds may flush larvae eastward into the Loop Current when the latter is at high latitudinal penetration. The low salinity signature of the coastal outflow and vagrant larvae are thus conveyed to the Florida Keys. Larval recruitment of the two decapod species in the Keys may depend on these highly specific physical transport conditions.

Yoshioka, P.M., Department of Marine Sciences, University of Puerto Rico, Mayaguez, PR 00680. POSSIBLE EFFECTS OF COMPETITION FOR SUBSTRATE SPACE ON GORGONIAN MORTALITIES.

Competition for substrate space is often regarded to be a major factor in the ecology of sessile coral reef communities. The potential effects of competition on colony mortalities of shallow-water gorgonians were examined in this study using newly-developed indices of patchiness and species association. Spatial patterns of mortality were analyzed over a 10 year period (1983-1993) in 32m² transects at 2 sites near La Parguera, Puerto Rico. The analysis indicated the presence of conspecific or interspecific colonies does not affect mortality. These results indicate that competition for substrate space among gorgonians does not play a major role in the dynamics of this community.