



BBP in Brief

A NEWSLETTER OF THE BAHAMAS BIOCOMPLEXITY PROJECT

Produced by the American Museum of Natural History's Center for Biodiversity and Conservation (AMNH-CBC)

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October, 2003

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Welcome...

This is the first newsletter of the Bahamas Biocomplexity Project, or "BBP." Here you can learn about the activities and progress of the BBP team and its partners. We welcome your submissions about research progress, upcoming field plans, meetings, or any other information you feel would be of interest to project partners. Submissions for consideration in future newsletters may be made to Kate Holmes (kholmes@amnh.org) or Christine Engels (cengels@amnh.org).

Habitat and Connectivity Working Groups: In the Field in San Salvador

Jacklyn Chisholm (College of the Bahamas) and Kate Holmes (AMNH-CBC)

San Salvador's history and unique features draw scientists of all kinds. Archeologists have found clues to the Island's human history, such as Lucayan Indian artifacts and Spanish coins dating from early European exploration in the Western hemisphere. Geologists and geographers have an interest in the island's extensive saline lakes and underwater cave systems. Paleontologists and biologists come to study Storr's Lake's



Linda Hammerton looking over San Salvador maps with Jacklyn Chisholm. © K. Holmes (AMNH-CBC)

populations of living stromatolites, which were a dominant life form on Earth for two billion years, but are now found in only a few localities worldwide. Many thousands of years ago these colonial masses of photosynthesizing cyanobacteria and other microbes were responsible for forming extensive reefs, much the same way as coral does today.

It was the coral reefs of today and the many habitats that are associated with them that drew the BBP Habitat and Connectivity Working Groups to San Salvador this past July. The crew was made up of people from the Caribbean Marine Research Center, the College of The Bahamas (COB), the University of Exeter, Stanford University, and the American Museum of Natural History's Center for Biodiversity and Conservation (AMNH-CBC). We conducted detailed species surveys using SCUBA and underwater video, spot-surveyed near-shore habitats, and collected tissue samples from some target species. The Gerace Research Center (GRC) of COB served as the research base and helped us host a community meeting which was attended by more than 40 people. We discussed marine resources and then described our research. This was followed by a lively discussion about conservation on the island, fueled by the passionate contribution of Mr. Jordan Ritchie, San Salvador's Local Member of Parliament at the time.

Summer Internship Linda Hammerton (COB Student)

This summer, I joined the BBP project to do marine fieldwork in San Salvador. This was my first trip of this nature and it was a wonderful experience. I was truly excited to meet and work with this group of researchers on their project. Mainly, I aided in ground-truthing, nursery and habitat identification, and data entry. All of these tasks have helped me develop a better appreciation for the sea and for marine life. I am now also quite proficient in algae identification! In addition, I was able to become acquainted with assorted field equipment such as GPS units, underwater cameras, and depth sensors. The internship has opened many doors in my life, educationally as well as job-wise. I thoroughly enjoyed my experience and I look forward to working with this group or other research groups in the future.

Social Science Working Group: Exumas Fieldwork

Rich Stoffle (University of Arizona)

A team of twelve social science researchers from the University of Arizona and five from the COB conducted interviews in the Exumas in July. This fieldwork was part of a study of attitudes toward marine protected areas in six settlements, selected for their geographic distribution throughout the Exumas and the range of responses that would be collected. In this most recent trip, visits were made to the final two settlements, William's Town and The Ferry.

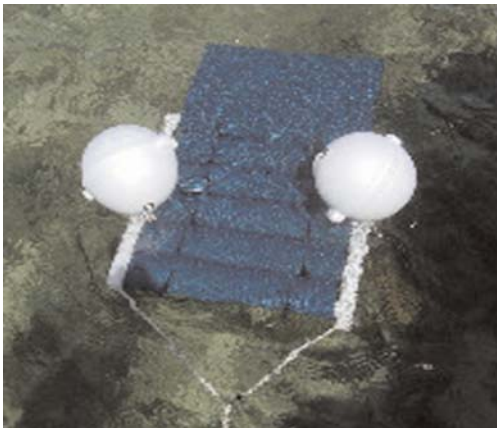
In each settlement, we were well received by the local government and church representatives, and by the participants themselves. Interest in the study was widespread, and we found that by using both formal and informal interviews we were able to gather a wealth of information, including collective and individual oral histories. These data are being coded into a master database, and will be analyzed for trends relating to the perspectives of the people of the Exumas about marine protected areas proposals.



Exumas scene. © R. Stoffle (University of Arizona)

Cooperative Research on Lobsters and Groupers

Craig Dahlgren (Caribbean Marine Research Center)



A Witham collector deployed in Abaco. Juvenile lobsters settle underneath. Settlement can be compared between different sites, giving an indication of recruitment level.
© Lory Kenyon (Friends of the Environment)

As part of the BBP and ongoing lobster recruitment research the Caribbean Marine Research Center (CMRC) is expanding its lobster and grouper post-larval recruitment monitoring to include sites throughout the Bahamian archipelago. Sites selected for recruitment research include areas that the Habitat Working Group have identified as potentially important nursery areas, along with other key areas throughout The Bahamas. Initial study sites currently include: Lee Stocking Island, Great Exuma, Little Exuma, the Exuma Cays Land and Sea Park, Cape Eleuthera, Bimini, central Andros, Abaco, and potentially South Caicos Island. Monthly recruitment of post-larval lobsters in each site is being monitored using artificial settlement substrates, called 'Witham' collectors (see photo). These substrates are being inspected at regular intervals by CMRC staff and partnering organizations and individuals, including the Bimini Biological Field Station, The Island School, Andros Conservancy and Trust, Friends of the Environment, Basil Minns and his family, Ray Darville and volunteers at the Exuma Cays Land and Sea Park, and possibly the School for Field Studies in the Turks and Caicos Islands. Collections will target spiny lobster recruitment during the fall and Nassau grouper recruitment this coming winter. Data generated from this study will enable us to examine the relative value of nursery habitats throughout The Bahamas, and will help link connectivity studies with habitat studies.

Recruitment: The number of individuals entering a population or a fishery each year. Here it refers to the number of juvenile lobsters or groupers which survive to a certain size; this will vary from site to site depending on how close to ideal the conditions are.

Adventures in Sampling

Kate Holmes (AMNH-CBC)

As many of you already know, one aspect of The Bahamas Biocomplexity Project is a study of how the waters in The Bahamas archipelago are connected in terms of genetic similarities among animal populations. This involves collecting tissue samples from focal species from islands throughout The Bahamas and comparing their DNA. So far, we've been taking small clips from spiny lobsters, conch, and sea fans, among others. At the general meeting in January, many people suggested we add bonefish to the list. Now, I was excited by this idea: I like fishing and people rave about how great it is to bonefish. What fun it would be to fish all day and just take a little clip from a fish fin before gently releasing these shiny, beautiful fish back onto the flats. But I soon realized that the main attraction of these fish to sport fishermen - that they are incredibly difficult to catch - would prove extremely challenging for me.

I tried in San Salvador with Tomas Hanner, the undisputed "king" of Pigeon Creek, one of the few spots there known to support a few bonefish. Not a bite. I tried my hand at using a flyfishing rod - the tool of choice for the bonefishing purist - and caught some sticks.

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But I'm not going to give up. I'm also not going to leave this sampling up to my shoddy bonefishing skills. Fortunately, bonefishermen of The Bahamas are a helpful bunch and many of them are interested in lending a hand to find out more about this important sports industry fish.

So, if you know fishermen who'd like to help us learn more about bonefish distributions in The Bahamas, send me their phone numbers (at kholmes@amnh.org). And if you know one who is particularly patient, ask him if he wants a new student!



Bonefish Ebbie's Bonefish School, Bimini. © K. Holmes (AMNH-CBC)

Overview of the January 2003 BBP General Meeting

Compiled by Christine Engels and Sarah Wise (AMNH-CBC)

The second annual general BBP meeting, held in January in Miami, gave working groups the opportunity to reconnect, brainstorm on new project ideas, and evaluate the year's accomplishments. Following is a brief overview of the working group reports.

The Connectivity Group reported on their efforts to analyze the connection of The Bahamas with the Greater Caribbean and to collect data for charting the genetic linkages. Preliminary results suggest that The Bahamas are tied to the flow along the north side of the Greater Antilles Islands. The group also updated and tested the drift simulation model, which is an important tool for the interpretation of genetics data. Initial work on the genetics of queen conch, lobster, corals, and land crabs is well under way. Sampling efforts will continue to be made in the same islands targeted by the Habitat Working Group.

The Habitat Working Group described field surveys in Andros of key fish groups, benthic (sea floor) assemblages, and nursery habitats for focal species. Preliminary results showed that the *Montastraea*-dominated fore-reef habitat was the most structurally complex and species-rich, so there was an intensification of sampling efforts in this habitat type to collect enough information to estimate various biodiversity parameters. Ground-truthing of nursery habitats was performed to record physical and biological variables, and to collect data on the presence and abundance of juveniles. The group has now completed similar survey work in Bimini and San Salvador and is planning to work in the Turks and Caicos and Abacos later in the year.

The Social Science Working Group noted similarities with the Habitat group in terms of research questions and data collected. The two groups made plans to continue to coordinate their schedules for activities at research sites and to share preliminary findings. Dialog between the Social Science Working Group and the Modeling Working Group resulted in a decision to clarify the gaps and strengths encountered in developing the models. This information will help guide the identification and scale of the data necessary to fulfill the modeling goals.

The Geographic Information System (GIS) Working Group announced the newly developed basic GIS system, available online at <http://www.ncoremiami.org/GIS.htm>. Initial data layers include a Bahamas base map, current roads, human settlements, hotels, airports, and broad ocean depth contours. Several other data layers are being processed and will be added regularly. The group has been processing the prototype of a tightly coupled environmental-socioeconomic model, using a multi-level approach. The final models are intended to assist decisionmakers in narrowing the range of potential outcomes of a given management action for the ecosystem, and for the people dependent on the local environment. All working groups have been encouraged to submit data layers for incorporation into the online GIS.

The newly formed Education Working Group discussed ways to involve all BBP working groups in the transfer of information to Bahamian researchers, students, and to the Bahamian public. Possible educational and outreach activities were identified, including development of new marine conservation science curricula, a high school-based fisheries-monitoring project, community outreach materials, and travelling exhibitions. Future gatherings to discuss implementation, collaborations, and funding opportunities are being planned. Throughout this year and the next, the CBC, the BBP working groups, and their collaborators will continue to explore ideas and funding opportunities to increase participation and support for our common commitment in research and education in The Bahamas.



The BBP has adopted a new logo...

A queen conch was chosen to represent both the marine biota at large as well as culturally and economically important marine resources. The silhouette face in the conch represents people and their links to their resources while the blue circle suggests the marine ecosystem as a whole. Of course the colors are drawn from the Bahamian flag. Some pink has been added to make the conch a little more conch-like and to better emphasize the face.

Engaging the Public in Biodiversity Conservation

Meg Domroese (AMNH-CBC)

An important component in the effort to conserve biodiversity is engaging the public to play an active role. Outreach efforts offer a range of approaches, from disseminating information and encouraging dialog among various stakeholders to providing educational experiences that lead to conservation action.

The American Museum of Natural History's Center for Biodiversity and Conservation (CBC) sponsors research and training programs as well as outreach to scientists, students, and organizations worldwide. Established in June 1993 to bring the Museum's extensive scientific and educational resources to bear in conservation decisions and actions, the CBC has been successfully partnering with other institutions to apply science and outreach to important conservation issues. Projects span the globe from the New York region to Vietnam, Bolivia, Madagascar, and now The Bahamas.



Linda Hammerton admiring a healthy stand of *Acropora palmata* of a reef crest off of San Salvador. © K. Holmes (AMNH-CBC)

In Bolivia, the CBC has been working with Bolivian-based museums and other research and resource management institutions to map biological diversity and its distribution in protected areas; facilitate dialog among groups with conflicting interests; build communication skills; and support community-based conservation projects. In addition to contributing to scientific information about the region, these efforts involve the local population in sustainable resource management, including the development of community museums that link cultural traditions to biodiversity, artisanal centers, interpretive trails, and ecotourism facilities; creating informational outreach materials; and improving waste management practices.

In The Bahamas, the CBC's outreach staff is interested in joining with Bahamian partners to increase awareness about the conservation and stewardship of marine resources in communities adjacent to marine protected areas (MPAs), as well as to create and disseminate information about The Bahamas Biocomplexity Project. These efforts will not only contribute to conservation efforts in The Bahamas, but will have relevance for MPA systems throughout the Caribbean and worldwide. More information about all the CBC's programs and publications can be found at: <http://research.amnh.org/biodiversity>.

Announcement

Friends of the Environment is hosting the first Abaco Science Alliance Conference in Marsh Harbour from January 15th to 18th, 2004. The topic will be:

A CONFERENCE TO SHARE SCIENTIFIC KNOWLEDGE OF ABACO AND THE BAHAMIAN ENVIRONMENT

The purpose of the conference is to provide a forum for the networking of researchers and the sharing of scientific information in and around the Abacos. We hope to encourage more research in the area for educational purposes, and to stimulate the use of these findings in local environmental management decisions.

Among our speakers will be:

- * Dr. Stephen Thompson - *Fish Assemblages of the Blue Holes of Great Abaco*
- * Dr. Kathleen Sullivan Sealey - *Land Cover Mapping of The Bahamas Using LandSAT 7*
- * Nancy Elliott - *The Aculeate Wasps of Abaco*
- * Dr. Henri Grissino-Mayer - *Environmental History from Tree Rings and Lake Sediments on Abaco Island, The Bahamas*

For further information contact Friends of the Environment at:

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We look forward to having you here with us.

Forum 2003 at the College of The Bahamas

by Dan Brumbaugh (AMNH-CBC) and Pandora Johnson (COB)

This summer (30 June–4 July 2003), the COB in association with The Bahamas Association for Cultural Studies (BACUS), hosted a broad and exciting symposium in honor of the nation's 30th anniversary of independence. Entitled "Looking Back, Looking Inward, Looking Ahead: Examining Bahamian Culture, Society and Economy to Promote Economic Development, Heritage Preservation and a Culture of Equality and Peace," the symposium featured three thematic tracks: Culture; Science, Technology, and the Environment; and Politics, Society, and the Economy. Within the Science theme, several presentations specifically addressed MPAs, and many discussed other aspects of marine conservation, relevant land-based threats to marine ecosystems, and issues for sustainable development.

With respect to MPAs, Everton Joseph, a BBP summer intern, presented results from a group project conducted at the Cape Eleuthera Island School that analyzed the suitability of nearby marine habitats for supporting a population of queen conchs in a potential reserve area. Livingston Marshall, of the Office of the Prime Minister, discussed

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research conducted in collaboration with Rom Lipcius, of the Virginia Institute of Marine Science, about the population dynamics of spiny lobsters, queen conch, and Nassau groupers. G. Carleton Ray of the University of Virginia discussed and displayed videos of the science expedition that led to the creation of the Exuma Cays Land and Sea Park. Dan Brumbaugh provided an overview of the BBP.

Other talks, including those by Neil Sealey, Peter Lutz, Steven Lutz, Diane Claridge, Kathleen Sullivan Sealey, Craig Layman, Lester Flowers, Vanessa Nero, Krysia Rybczuk, Jeffrey Simmons, and Susan Larson devoted attention to other aspects of coastal and marine conservation. Still more talks by Roberta Quant, Earl Deveaux, Lelawatee Asha Rahming, DeCosta Bethel, Oral LaFleur, Mike Hartman, Horatio Smith, Christian Henry, Romuald Ferreira, and others discussed multiple aspects of sustainable development for The Bahamas. These individuals represented a broad range of institutions, including the University of Miami, Friends of the Environment, Texas A&M, Bahamas National Trust, Tiamo Resorts, and Island School.

The conference program provided ample opportunities for professional networking and discussion of important cultural, environmental, and societal issues. Still, there was a sense among the approximately 300 participants that this was just a beginning, and that Forum 2003 should be the first of a regular, ongoing series of meetings that could help focus attention on various national issues. COB is currently planning to host Forum 2005 (in honor of the 30th anniversary of the College) in a couple of years in order to maintain momentum and fulfill the potential of this summer's great inaugural event.

A Bahamian Reef in New York City?!

Kate Holmes (AMNH-CBC)

This May, after adding new exhibits and improving old favorites, the American Museum of Natural History in New York reopened its Hall of Ocean Life. One of the highlights of the refurbished Hall is the 94-foot long model of a blue whale, originally created in 1969. Today, much more is known about the blue whale, and to reflect this growing knowledge, the Museum whale (which is modeled after a female) received a makeover: she had her eyes touched up, her tail trimmed, she was painted a truer color, and now even has her bellybutton in the correct place.

Another main attraction of the Hall is the magnificent two-story diorama of the Andros coral reef, originally completed in 1935. The top story reveals iron rocks exposed above the surface of the ocean and flamingos flying overhead. Visitors can look down through the water's surface to see the reef below. Descending to the lower floor, visitors are treated to a view of the reef beneath the waves. Huge stands of elkhorn coral provide a habitat teeming with life. The diorama was built using actual pieces of the reef from Andros - an approach that, in current times, would certainly not be used. Once considered to be as timeless as stone, it is now known that reefs are delicate ecosystems when exposed to certain human and natural stresses. Like the blue whale, we are beginning to understand coral reefs better.

To create the diorama, Museum curator Roy Waldo Miner led a series of expeditions to Andros, and then directed a team of scientists and artists to recreate a section of the reef crest. The diorama now stands as a "snapshot in time" of a coral reef environment as it appeared some 70 years ago. It depicts an ecosystem healthy and abundant with life, with healthy coral, numerous large fish, and crustaceans swimming and crawling around the reef.

During the makeover, the diorama was cleaned up, dusted, and relit. Some of the labels were adjusted to reflect changing knowledge about the creatures on the reef. Also, a video monitor was added featuring three short video documentaries that truly enhance the exhibit. One video shows incredible black and white footage from the 1920s of the expeditions to The Bahamas. Bahamians and Americans are shown exploring the reef from above, and from below using heavy, brass diving helmets and submerged observation spheres linked to the boat above. The second video features marvelous footage of spawning corals, an event first documented in the 1980s. The third video discusses present day conservation issues and highlights work being done in Andros today. Some members of the BBP are featured along with Peter Douglas of the Andros Conservancy and Trust.

Despite the serious conservation issues Andros is facing, the video ends on an optimistic note from Mr. Douglas, who states: "There are still a few areas which are totally pristine...and one day, maybe, we might show you."



The refurbished Andros Reef Diorama. The top half shows flamingos flying over a small island at the barrier reef's crest with Andros in the distance. The bottom half shows the reef beneath. © D. Finnin (AMNH)

Global Initiatives to Protect the Oceans by Kate Holmes (AMNH-CBC)

The IUCN World Parks Congress concluded in Durban, South Africa on September 17th. Representatives from over 25 countries discussed the present state of terrestrial and marine protection under the overarching theme of "Benefits Beyond Boundaries." At present, over 70% of the planet's surface is composed of marine and coastal systems but less than 1% of that is officially protected. The meeting endorsed two main recommendations: (1) a global system of MPA networks and (2) protection of the high seas. For more information, visit <http://www.iucn.org/themes/wcpa/wpc2003>.

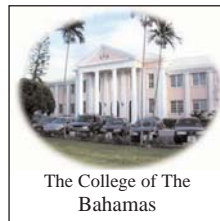
The United Nations World Summit on Sustainable Development (WSSD) (<http://www.johannesburgsummit.org/>), which took place in Johannesburg, South Africa, in August-September 2002, developed a plan of action which similarly reflected a concern for preserving the world's marine resources. The WSSD Plan of Implementation (see: http://www.johannesburgsummit.org/html/documents/summit_docs/2309_planfinal.htm) sets an ambitious marine conservation agenda. Areas of focus include the protection of vulnerable ecosystems such as wetlands and coral reefs, the reduction of marine pollution, the elimination of illegal fishing, and the conservation of marine biodiversity in general (see sections 29-32 of the Plan).

What is BBP? An Overview

The Bahamas Biocomplexity Project (BBP) is a five-year initiative funded primarily by the National Science Foundation to investigate the complex environmental and social factors that affect the design, management, and effectiveness of networks of marine protected areas (MPAs). Researchers involved in the project include oceanographers, biologists, and social scientists from nine institutions working in collaboration with various governmental and non-governmental groups in The Bahamas.

Ultimately, the primary goal of the project is to integrate studies of natural and human processes, leading to a more sophisticated understanding of how individual MPAs work, and how they could work as part of a network throughout The Bahamas and in other coral reef ecosystems. Other important goals include the integration of this research with conservation education and decision-making.

BBP Collaborators and Partners



BBP is funded primarily by the National Science Foundation. This newsletter is made possible through funding from the National Aeronautics and Space Administration.

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BBP partners would like to acknowledge the following organizations for their field assistance and contributions to various project activities:

- * Andros Conservancy and Trust
- * International Field Studies
- * The Bahamas Environmental Research Centre
- * Gerace Research Center