
BAHAMAS
NATIONAL TRUST

R E P O R T

of

T H E E X U M A C A Y S P A R K P R O J E C T

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under the auspices of the New York Zoological Society
and the Conservation Foundation

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Edited by
Carleton Ray, New York Aquarium
New York Zoological Society

Photographs by
Russ Kinne and Carleton Ray

EXPEDITION MEMBERS AND ADVISORS

1.	Mr. Robert P. Allen	National Audubon Society, Tavernier, Florida
2.	Mr. Dan Beard	Superintendent, Everglades National Park, U. S. National Park Service, Florida
3.	Mr. Russ Kinne	Photographer, New York
4.	Hon. Herbert McKinney	Nassau
5.	Mr. John O'Reilly	Sports Illustrated Magazine, New York
6.	Dr. John Randall	Marine Laboratory, University of Miami, Florida
7.	Dr. Carleton Ray	New York Aquarium, New York Zoological Society, Leader of expedition
8.	Mr. Oris Russell	Director, Bahamas Department of Agriculture and Marine Products, Nassau
9.	Dr. Donald Squires	American Museum of Natural History, New York
10.	Col. Ilia Tolstoy	Nassau and New York

Advisory to this project and to the preparation of this report are:

1.	Hon. Godfrey Higgs	Nassau
2.	Dr. F. G. Walton Smith	Director, Marine Laboratory, University of Miami, and advisor to the Bahamas Department of Agriculture and Marine Products
3.	Mr. Samuel Ordway	Conservation Foundation, New York

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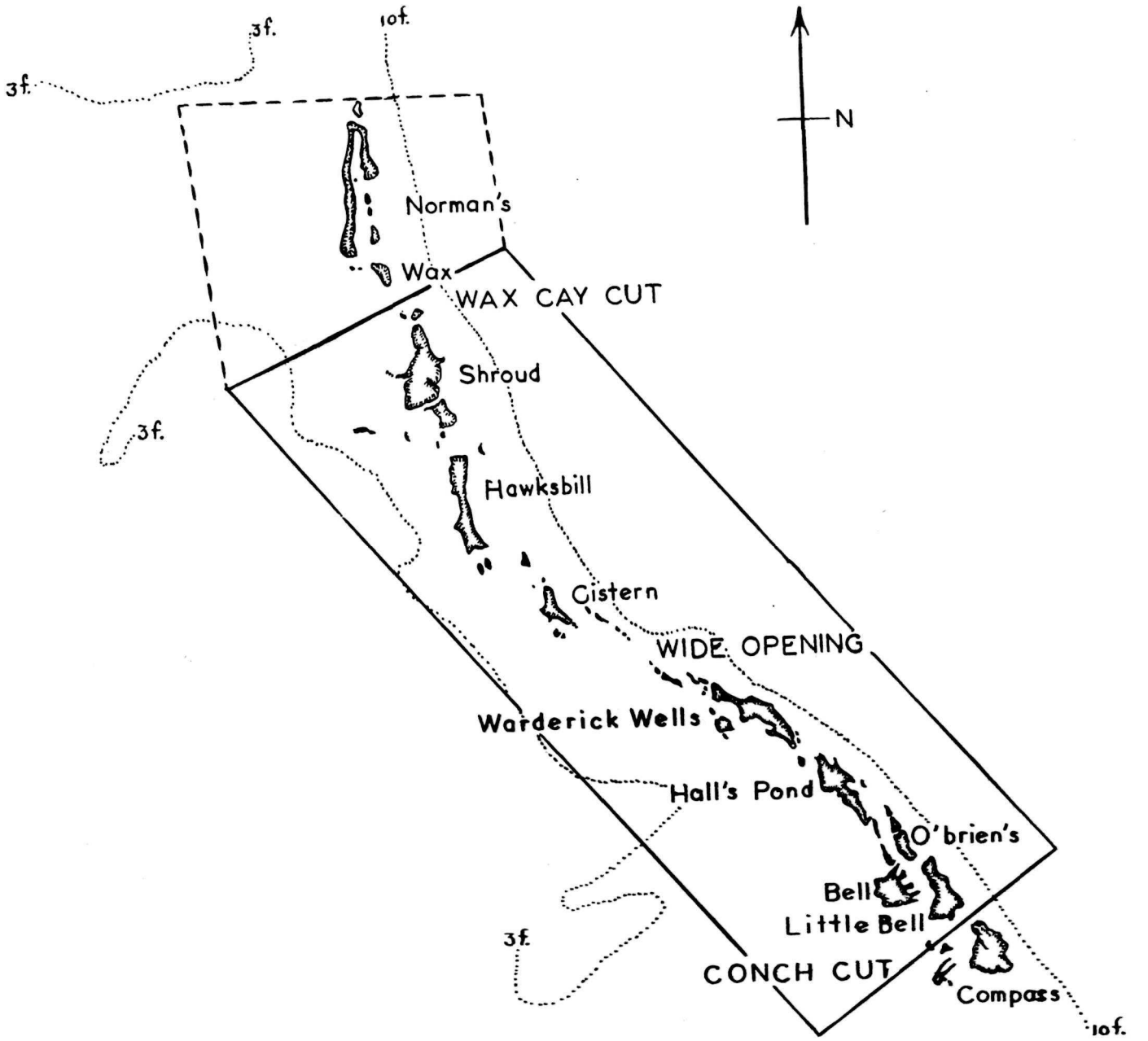


EXUMA CAYS LAND-AND-SEA PARK

Proposed boundaries

INTRODUCTION

by Carleton Ray, Asst. to the Director

New York Aquarium, New York Zoological Society

This report is the result of a survey of the natural resources of the Exuma Cays from Norman's Cay and Wax Cay Cut to Little Bell Cay and Conch Cut. It recommends the establishment of a National Park in this area to be governed by a proposed Bahamian National Trust in cooperation with the Bahamian Government.

The boundaries of the park area (see map) are at present determined by the Bahamian Government and include those cays from Shroud Cay* to Bell Island excepting those cays already under lease or privately owned. Major cays in the park area include: Shroud (Hungry Hall, Pigeon), Hawksbill (Shroud), Cistern, Warderick Wells, Hall's Pond, O'Brien's, Bell Island and Little Bell. Of these, the following are under lease or privately owned: Bell, Little Bell, Cistern, and Hall's Pond.

Every effort should be made to incorporate all these cays in the park and to include Norman's Cay (just north of Shroud) as an integral part of the park. Norman's and adjoining cays are now under lease or privately owned. Norman's Cay forms the best anchorage in the area, is a location of great natural beauty and would serve as a fine park headquarters.

The multiple purposes of a park are outlined in a later section by Dr Walton Smith, and the recommendations made here will, we believe, serve to implement those important purposes. As Dr. Smith points out and Mr. Beard expands upon, the value of a park system and conservation in general to the economy of the Bahamas can hardly be overestimated. By means of sound conservation measures, the Bahamas will preserve its most saleable commodities, its island atmosphere and wildlife.

In a world of rapidly increasing human population and increasing per capita consumption, resource protection literally means life or death to a community or a nation. The Bahamas are fortunate in having many comparatively untouched areas so that the opportunities for the development of wise conservation policy are almost unique in New World tropical island groups where too often conservation is merely a rear guard action.

* This name is the one used on U. S. Navy Hydrographic Office Chart 26b and in the Yachtsman's Guide to The Bahamas, No. 8. This cay is called "Hungry Hall" on some of the older Turtle Charts and is also referred to as "Pigeon Cay". Similarly, the name "Shroud" is applied to Hawksbill Cay on the Turtle Charts. It would appear preferable to use the HO chart names.

Nevertheless, The Bahamas has assets that are disappearing; such esthetic ones as Flamingo (still in some danger on Inagua), White Torch Trees, Dildo Cactus, Sergent Palm, Bahamian Iguana, Bahamian Parrot and such commercial or sporting ones as conch, lobster, white-crowned Pigeon and sea turtles. These with such scenic areas as the swamps of Norman's and Shroud Cays, the Upper Lakes of Inagua, and the reefs of Andros, Abaco, Lyford Cay and Rose Island, form the Bahamian "essence" which the tourists come to see.

In the words of one expedition member, John O'Reilly, "Everyone goes to a place for something, and when it disappears, they go somewhere else." It is the purpose of this report to make recommendations that will insure the perpetuity of the things that people come to see in The Bahamas as well as to assure a lasting supply of those natural resources that are so necessary for the livelihood of The Bahamas themselves. A serious problem would appear to be, in Hon. Herbert McKinney's words, "one of making people aware of the pressing need for conservation. The attitude of the people seems to be that the good Lord would always send more."

* * *

Though the basic ideas behind this proposed park are not new, it is true that no land-and-sea park (with the possible exception of Dry Tortugas Monument) now exists. The Exuma Cays National Park will be the first park anywhere in the world to treat the land and the sea as one entity with similar conservation policy established for both. It will be the first park to include land and coral reefs and waters to the edge of the "shelf" in its domain, and the second park in the Western Hemisphere to preserve a coral reef. As such, and particularly with regard to inshore, marine conservation, it will be a precedent-setter, and the "Bahamas Plan" which is represented in concrete form by this first Bahamian National Park in the Exumas is a development which will, we hope, keenly influence the course of inshore, marine conservation throughout the world. Some of the persons and organizations which will be watching this park's progress are mentioned by Col. Tolstoy in his report.

Our recommendations are simple ones: The sea is to be treated like the land with parks, sanctuaries, protected species, game laws. The emphasis is on environmental control in which the land and sea are held interdependent and man is held to be an integral part of the natural system, reaping a resource harvest, enjoying natural esthetic values, but never destroying resources beyond their ability to replenish themselves.

Eventually, at least a part of the financial or logistic responsibility of a Park System might fall on the Bahamian Government when the financial benefits of the Park System begin to be felt. For the present, it is recommended that an endeavor be made for private financing under a separate corporation, tentatively called the Bahamian National Park Association and patterned after the successful British National Trust.

The Exuma Cays Park Project expedition members respectfully submit their report and recommendations to the Bahamas Government with optimism for the future of conservation in those unique islands which are so close to modern civilization, yet, in a way, so far.

PLATE 1

Some members of the survey team

An aerial of Shroud Cay

PARK INTEGRITY AND ECONOMY

by Daniel B. Beard, Superintendent

Everglades National Park

As a professional national park superintendent, the writer is inclined to a less enthusiastic reaction to a proposed national park than the groups, both lay and scientific, who often urge such projects. This lukewarm approach is perhaps not unlike that of a newspaper reporter used to having eager mothers try to get him to build up a four-column story on the society page on their only daughters' wedding.

It became evident as the field studies progressed that Exuma Cay including contiguous coral "gardens" had outstanding natural values that should be preserved and made available for the enjoyment of all (one recognizes that "enjoyment" as used here does not mean exploitation or destruction of the natural phenomena which will be the resources of the park and its reason for existence.)

The integrity of the section of the Exuma Cays being considered for the park has been quite well preserved to date. Integrity as applied here connotes a composite quality of essentially unspoiled natural conditions with unmodified associations of plants, animals, earth processes, and those intangible elements that combine to give an area its outstanding character.

There is a considerable degree of unity to the proposed area. It embraces all the territory, both land and sea, that is required for effective administration and continuing representation of its biological and geological resources. This is of utmost importance in a biological park, of course, because failure to include an adequate biological "unit" can negate the whole project.

The idea of a national park that might include a living coral reef with its associated life is not new. Everglades National Park maximum boundaries in Florida were authorized in 1934 to include a representative portion of the coral reefs off Key Largo. But by the time the park was established in 1947 it was too late. Developments on Key Largo and the multiple problems stemming from them caused the reef to be deleted from the park as actually established. It takes no seer to predict an exact duplication of this situation in the Exumas unless action is taken soon.

When the State of Florida and the United States government, each performing its separate function, created Everglades National Park in southern Florida in 1947, the action was just in time. It would have been very difficult to do a year later, impossible by 1949 or 1950. Usurption of land for private developments, exploitation and destruction of natural

resources, and the rapid rise of the real estate market would have eliminated the project. In very much the same way, time is running out on the Exuma Cays and perhaps other areas of importance in the Bahamas. Norman's Cay, which is recognized by this survey as a logical control or administrative center for the future park, is already in private ownership and, if acquired as suggested, will be relatively expensive. The rate of Out Island land occupancy has apparently stepped up rapidly in the last five years so that an adequate national park in the Exumas will be impossible unless action is taken soon.

The waters around the Exumas are fantastic shades of deep blue, turquoise, purple, and buff. Contrasted with the sparkling white beaches, rather drab hillsides, and dark sea cliffs, these gorgeous seascapes rival any other scenery in North America and the West Indies. To an average tourist, the land would seem drab except along beaches and cliffs. Yet opportunity to see some of the land (by trail perhaps) with interpretation of its interesting flora and geology would stimulate a great deal of interest.

Hawksbill Cay is particularly interesting. Its northerly edge is sandy with flats extending out to the turquoise channel separating it from Shroud Cay. There are good dunes with excellent examples of dune and rock formations in progress and vegetative adaptations to strands. The Cay's western side has a series of rocky hills, up to perhaps sixty feet, fronting directly on the sea. These are broken here and there with small crescent beaches. There are interesting little offshore islands. The extensive beaches along the eastern side of the cay are attractive.

Shroud Cay is almost atoll shaped. Like Hawksbill Cay, western beaches are smaller with more extensive shoals than those to the east. The center of the cay has an extensive mangrove swash and salt flat. There are some fresh water ponds surrounded by cabbage palms.

Warderick Wells Cay is the most scenic of those examined. It consists of a series of rocky islands to the north forming a moderately deep lagoon of great beauty where there is a fair anchorage. The spacing of islands makes the anchorage a precarious one if there are wind changes.

The main part of Warderick Wells Cay has some interior mangrove swash areas at its northerly end. The northeastern part of the cay is dominated by craggy cliffs as much as sixty feet high and often undercut by the surging blue sea. The occasional beaches are generally narrow. There is a greater variety of both land and sea than any of the other cays with the possible exception of Norman's Cay.

We did not find much evidence of human occupancy on any of the cays, but there are some very old plantations elsewhere on the Exumas. The writer suggests that historical commemoration should be a part of the park project, if not in sites then at least by other means such as reconstruction. Architectural treatment of such future structures as might be required in the park

could be by adaptation of the historical plantation style.

The waters around the Exumas are among the finest cruising areas anywhere. When sail gives way to diesel, something of great charm will have disappeared. And so it is suggested that an attempt be made to preserve and use the typical Bahamian sailing craft in the park. It is still too early to say how this might be done, but almost too late to call it to attention.

In the United States, almost every attractive seashore area on the Atlantic and Gulf coasts has pre-empted for commercial or private development. In 1935 the National Park Service made a survey of the situation and found 12 major strips (437 miles) of superb beach that might be saved for the public. There were many others that were less desirable. Only one of the 12 was actually acquired. All the rest except one, have long since gone into private and commercial development. The only coral formation (and it is not a reef) that is being protected in North America as far as the writer can determine is at the Dry Tortugas, Florida as part of Fort Jefferson National Monument. So, the relatively pristine Exuma Cays and their surrounding waters comprise what is fast becoming a relic habitat and one that, through scarcity, offers ever increasing opportunities for public enjoyment.

The Exuma Cays are about fifty nautical miles from Nassau which is the hub of tourism in the Bahamas. Although one must use caution because of coral heads, most craft can make the trip in a relatively short time. In fact, the sea voyage to the Exumas is an interesting experience which adds zest to a visit to these islands. An airplane can make it in a matter of minutes but a feeling of remoteness after the sea voyage seems to this writer to be a vital part of the Exuma Cays experience.

United States citizens form the bulk of tourists to Nassau. They come by plane, usually from Miami, cruise ship, and in their own craft. Not many get far from Nassau or New Providence Island.

Since tourism is the chief industry of the Bahamas, opportunities to increase the length of stay, open up new opportunities, and spread the tourists must certainly be attractive.

It is a fallacy to suppose that an area must be "souped up" in order to attract tourists. The U. S. Department of Commerce says: "Few tourists demand luxury treatment. Most of them are not looking for expensive entertainment or spectacular scenery. Tourists want a pleasant, comfortable place to visit, and some interesting things to do or watch, preferably both * * * * * There is no such thing today as being too far off the beaten track. In fact, being located in a remote place far from congested areas can be an asset in itself."

More and more people are seeking the opportunity to enjoy spacious nature away from the pressures of modern society. As the educational level

goes up and the urbanization of populations continues, this demand for the "opportunity" will increase. We recognize at Everglades National Park that nature enjoyment is a "commodity" of great value to the State of Florida. On an investment of about $3,000,000. in lands and funds to purchase private holdings, the people of Florida have, in ten years, received at least $18,000,000. in return through tourist expenditures and federal appropriation. The average visitor spends $25.-$50. a day to see the wildlife there. (The U. S. Wildlife Refuges, exclusive of parks, had 8,500,000 visitors in 1957, the great majority not hunters or fishermen.)

Everglades National Park was not developed until recently. By "developed" we mean that there were no adequate accommodations or services. In the next ten years it is conservatively predicted that the people of Florida will receive $78,000,000. from their original investment in Everglades National Park. And, it should be noted, this is a biological park featuring the flora and fauna, native and undistrubed.

The national parks of the United States are all operated upon the "conforming use" principle laid down by Congress in 1916: to conserve the scenery, natural and historic objects, and wildlife and to provide for the enjoyment of these things in a manner that will leave them unimpaired for future generations. All use must be "conforming". A roller coaster is not conforming use.

PLATE 2

The eastern (dry) side of the cays

The western (wet) forested side of the cays

HISTORY OF EXUMA CAYS PARK PROJECT IN THE BAHAMAS

by Colonel Ilia Tolstoy

The first time I went to the Bahamas was in 1931 while developing an underwater motion picture camera, and during that year and the next I had an opportunity to see much of the nature of that region both above and below water. I have been in the Bahamas many times since and fortunately have been able to visit most of the islands and many underwater areas around them. In my travels I had a first-hand opportunity to see many other islands and waters in different parts of the world, and although the terrain, reefs, vegetation, sea life and land animals in the Bahamas are not the most spectacular ones, its flora and fauna when blended together with the clearest water I have ever seen should be considered one of the outstanding creations of nature.

The wild life is still in the Bahamas, but not in the abundance that I remember when I first visited the islands. Thinking in terms of the past 27 years, it might be safe to say that without immediate steps toward conservation, in the next few years some of the terrestrial species might become extinct. Aquatic life, especially reef fishes of commercial value and conchs, will be depleted to a point where they will cease to support the population that is dependent upon them for livelihood unless buffer areas are provided in which they can breed and multiply, and in turn enrich the adjacent areas. After the war, revisiting some of the reefs, I was shocked by the lack of underwater life in them. Spearfishermen's kill was greatly responsible for this, though overfishing by surface means also had its effect.

In many areas where large conchs were abundant, now one sees only a few small ones here and there. With the small ones still being harvested, it is only a question of time until there will not be enough conchs left to reproduce in sufficient numbers. On land, the mass morning and evening flights of white-crowned Pigeons were thinned out in ranks by open season and no bag limit. I saw the ghosts of Passenger Pigeons in the air. There were fewer Iguanas, and they were not as tame. I saw some dead ones lying around with 22 bullet holes in them. Though I do not know the number of Iguanas on other islands (such as Andros), Exuma still has quite a few Iguanas left on certain cays.

After my first trip to the Bahamas after the war, I was convinced that greater conservation measures are needed in general for the good of the Colony and its people, not being limited to the Exuma Cays. The Bahamian Government with outside cooperation has made progress and has passed some laws which have helped to preserve many forms of life. I believe it is only because of certain financial limitations that they have not been able to do more for conservation on their own.

In 1953 I started to talk to different people about the advisability and possibility of setting aside some islands in the Bahamas. Such islands would serve as buffer areas, and eventually some of them might develop into the first island (land-and-sea) National Park in the world. Some of the first people in the Bahamas I talked to were Mr. Arthur Vernay, noted explorer, naturalist, and whose latest activity in the conservation field was to make it possible to save the Flamingoes in the Bahamas; Mr. Suydam Cutting, who has the same qualifications and was also greatly instrumental in saving the Flamingoes; Colonel F. A. Wanklyn, who is a member of the Bahama Agricultural Board and who is also one of the founders of the Society for the Protection of the Flamingo in the Bahamas; and Dr. F. G. Walton Smith, Director of The Marine Laboratory of the University of Miami and who for years has been adviser to the Government of the Bahamas on conservation measures and many other phases of the island's economy. It was gratifying to realize that a number of persons have thought along the same lines. The favorable response and help and cooperation from many sources gave me encouragement to go ahead.

At the annual meeting of the Boone and Crockett Club in 1953, I outlined this idea to Mr. Richard H. Pough who at the time was Chairman of the Department of Conservation and General Ecology at the American Museum of Natural History in New York. To my delight he reacted most favorably, and from there on has given me great assistance, suggestions, contacts and sometimes just encouragement.

Mr. Pough gave me an introduction to Mr. Nicholson, Director of the Nature Conservancy of Great Britain, whom I contacted on my trip abroad in the fall of 1954. Mr. Nicholson suggested that I talk with Miss Phyllis Barclay-Smith, Secretary for the International Committee for Bird Preservation, with whom we had a couple of meetings along with Sir Norman Kinnear who among other things is a noted British Conservationist, and Mr. Frank Ludlow, one of the great Ornithologists and Botanists in the world and whom I had the pleasure of knowing in Tibet. This project owes them much for their assistance.

These persons suggested that I present the idea to the Governor of the Bahamas, who at the time was the Right Honorable Earl of Ranfurly. In the spring of 1955 I contacted the Governor and The Honorable K. M. Walmsley, Colonial Secretary of the Bahamas, who, I believe, received the idea with interest. I was extremely pleased when I learned that they would consider presenting this suggestion to the legislative body. I was asked to talk in front of the members of the Nassau Chamber of Commerce on the subject, and they received the idea with enthusiasm. The Nassau newspapers strongly supported the idea and even had it in their Enquiring Report column.

It was indeed a memorable day when on February 13, 1956 I received a letter from the Governor of the Bahamas confirming that the Crown had set aside approximately 22 miles of the Exuma Cays from Shroud Cay to Little

Bell Island inclusive. They were set aside for one year providing during that time some organization would undertake to explore the possibility further and be able to give concrete recommendations to the Bahamian Government. This organization would also be responsible for the financial support of the program.

In 1956 I wrote a letter about this project to Mr. Harold J. Coolidge, Executive Director of the Pacific Science Board of the National Research Council, who in turn on August 6, 1956 stated that he had the subject mentioned by the Int. Union for the Protection of Nature, at a recent General Assembly in Edinburgh. The following is the statement which appeared in the Survival Service Report (a branch of the IUPN) which was unanimously adopted by that Assembly:

> "The Committee notes with satisfaction that the administration of the Bahamas has temporarily set aside a portion of Crown Land in the Exuma Cays to make it available for a reserve or park. The Committee favors the establishment of a park or reserve in this area for the protection of Typical Fauna and Flora associated with these islands including the Iguana, the White-Crowned Pigeon, and the characteristic Marine Life."

Meantime, Mr. Pough contacted and brought in a number of leading conservationists including Dr. Fairfield Osborn, the President of the New York Zoological Society. With their favorable reaction and support there was real hope that the project might materialize.

At that time Mr. Pough informed me that Carleton Ray, then of the Department of Zoology of Columbia University, had recently spent a great deal of time in the Bahamas doing underwater photography and scientific research. He quite independently and without any connection with my proposal made a number of concrete recommendations stressing the necessity of practicing marine conservation in the Bahamas. He and Elgin T. Ciampi had approached the Bahamas Government through the Development Board on the subject of underwater parks and the Board released a story that the Government was interested in such parks.

Meanwhile, mimeographed copies of the introduction to their book, "The Underwater Guide to Marine Life" in which was one of the first pleas for underwater parks ever made, were sent to conservationists in the United States and England including Dr. Starker Leopold of the University of California, Dr. John Moore of Columbia University, Dr. Paul Sears of Yale University, Dr. Fraser Darling of the University of Edinburgh as well as some of the same persons already contacted by me. They reacted favorably, and as a result a number of letters were sent to the Development Board urging that parks be established.

Meantime, I had to go around the world and was away for five months. I was sorry that I didn't have an opportunity to get together with Ray before

leaving. However, I wrote a letter to the Governor expressing a hope that the time limit might be extended and telling him of Mr. Ray's work in the Bahamas.

When I returned, Ray, who had meantime become Assistant to the Director of the New York Aquarium, and I met and decided to combine our efforts. This was followed by several meetings in New York of persons interested in the project, including Fairfield Osborn, who expressed his willingness to carry out a survey of the islands under the auspices of the New York Zoological Society. Dr. Osborn wrote a letter to the Governor of the Bahamas, Sir Raynor Arthur, recommending an extension of the time limit for one year.

Dr. Walton Smith and I had an opportunity to discuss the question of extension of the time limit with His Excellency, Governor Sir Raynor Arthur and the Honorable K. M. Walmsley, Colonial Secretary, and a year's extension was granted until June 30, 1958. In September of 1957 His Excellency, The Governor, and Lady Arthur made a short visit to the Exuma Cays which were tentatively set aside for the National Park.

A committee was formed to organize the survey and several meetings were held during the fall and winter of 1957. The following is the list of committee members:

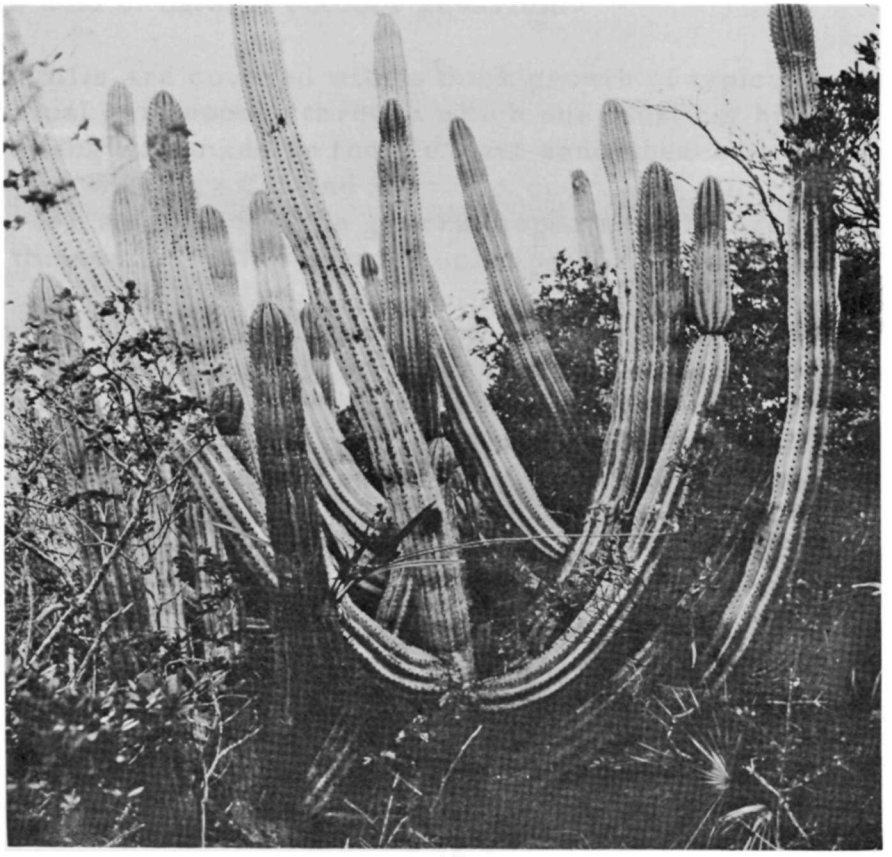
Dr. Fairfield Osborn,	New York Zoological Society
Dr. John Tee-Van,	New York Zoological Society
Mr. Samuel Ordway,	Conservation Foundation
Mr. Richard Pough,	Nature Conservancy
Col. Ilia Tolstoy,	New York and Nassau
Dr. Ross Nigrelli,	New York Zoological Society
Mr. C. W. Coates,	New York Zoological Society
Dr. Carleton Ray,	New York Zoological Society

Fairfield Osborn and Christopher Coates made it possible for Carleton Ray to organize the scientific survey personnel and to head the survey.

The date for the survey was set to begin January 20, 1958. Since Ray was unable to leave his New York duties until the middle of January, and since I was going to Nassau in December, he asked me to help him to organize some of the physical aspects of the expedition while he organized the expedition team.

The Bahamian Government was extremely helpful in rounding out the group by appointing the Honorable Herbert McKinney of Nassau who is one of the best informed men on the Bahamas. All of his life he has been extremely interested in wild life and has an inexhaustible amount of knowledge and observation on the subject. Mr. Oris Russell, the Director of the Department of Agriculture and Marine Products of the Bahamas, was also appointed for the survey.

Robert P. Allen explores the mangroves
and marls of former flamingo country



The dildo cactus

GENERAL ECOLOGY: BIRD LIFE, LIZARDS AND MOLLUSCA

by Robert P. Allen

National Audubon Society

At the invitation of the New York Zoological Society, the writer joined a survey group that visited certain of the Exuma Cays in the Bahamas, January 22-28, 1958. The purpose of the trip was to examine the area recently proposed as a Bahamian National Park. Within the proposed Park area, shore trips were made to Shroud Cay (January 23), Cistern Cay (January 25) and Warderick Wells Cay (January 26). In addition, shore visits were made to Highbourne Cay and Norman Cay, both of which lie outside the proposed boundaries but have many features in common with the entire group.

Shroud Cay lies between Wax Cay Cut and Hawksbill Cay. This cay is, in reality, an archipelago of small islands divided by swamps and creeks. The creeks, as one would expect, are tidal, and the "swamps" are actually tidal marl flats or swashes that lie bare at low water and awash at high water.

Perhaps it is the creeks that lend Shroud its greatest charm. Hours may be spent in exploring their winding courses in a small boat, and in a deep hole just inside the entrance to one of them we found many colorful fish swimming about in a kind of natural outdoor aquarium.

The low hills are covered with a thick growth of typical palms, palmettos and tropical hardwoods, through which one must cut his way with a machete. A landing was made on the pleasant sandy beach at the west side of the cay between Wax Cay Cut and Shroud proper. By climbing a slight elevation, we were able to view the general aspects of the area, including the 50-foot hill in the center. This was then climbed for a better view.

Descending to a bog-like pond at the northeast base of the hill, we found its shallow depths lined with sawgrass and other aquatics. Tadpoles (Hyla) were noted; also at least two species of dragonflies, suggesting that this pond is generally quite fresh. At elsewhere in the region, small lizards are common, including chameleons (Anolis).

On Shroud, we were landed on a narrow beach facing Exuma Sound on the northeast side of the cay. Here the sea cliffs are low, rising to rather bare, rounded tops with only scanty tree growth. However, the sparse vegetation is of considerable interest and beauty, with a dwarfish quality all its own. On the face of the cliffs are countless periwinkles (Littorinidae). Curly-tail lizards (Leiocephalus) darted in and out of crevices and miniature caves in the rocks. At the base of the cliffs many good-sized West Indian top-shells (Livona pica) reposed, along with the ubiquitous bleeding-tooth shells (Nerita).

Climbing to the low ridge above the beach, we walked easily along its crest towards the east. On the hillside facing away from the sea the plant growth is more luxuriant, with many fine seagrapes (Cocoloba uvifera), spreading out in low, sprawling thickets. Close by we came upon one finger of the so-called "swamps" that typify Shroud. Descending once more to the beach, this time to the east, we were picked up by skiff and carried to the nearest creek entrance, where we explored for the remainder of the afternoon.

One of the most delightful cays that we visited is Warderick Wells, where a landing was made on January 26. Warderick Wells, between Long Rock (West Shroud) and Hall's Pond, consists of three detached cays, one large and two small ones. Landing on the edge of a wide sandy area on the west side, we were immediately greeted by the notes of the red-legged thrush (Mimocichla plumbea), coppices of Sea Grapes, palms and Joe Wood (Jacquinia) near the shore. The flat, sandy habitat has a desert-like quality and nowhere else did we see so many curl-tails and other lizards. Their tameness is both characteristic and amusing. That we did not see the Bahamian Iguana (Cyclura) pointed out the increasing rarity of this lizard. Bahamian mockingbirds, Banaquits and Palm Warblers added to the interest of this entrancing spot.

Climbing the two commanding hills, we looked down on a world that is uniquely Exuman, to coin a sufficiently descriptive phrase. The surface of the hills, towards their tops, is quite bare of anything but the most sparse vegetation, so that walking is pleasant and easy, and the view unobstructed. On the Exuma Sound side, to the east, sheer cliffs rise straight out of the sea, and we could look down to clear blue water. Stretching away to the horizon, on every side, deep blue waters sparkled in the sun.

Near the eastern shore, above the rock cliffs, a "blow-hole" was found, and each time the surge rolls in from the open sea, a strong draft of air wells through, creating a low, moaning sound that may be the basis for rumors that the cay is haunted!

Interior depressions south of the higher hill contain brackish water and little or no organic life. They are surrounded by both red and white mangroves. Beyond, on a ridge that rises towards the west, the growth is so thick that progress was slow and laborious. We made our way through groves of Silver Thatch Palms (Thrinax), Sabal Palmettos, and the rare and beautiful Buccaneer or Sargent's Palm (Pseudophoenix sargentii). The heavy thickets, scarcely more than shoulder high, contain Smilax, Joe Wood, Gumbo-limbo, Poison Wood, and numbers of Epidendrum orchids. There are numerous solution holes, some of them containing rainwater.

Along the western shore of the cay, the rocks are sloping and heavily eroded. Here and there we found stretches of sand, on which a small boat or skiff can be landed without difficulty.

Terrestrial Animal Life

The general features and the animal life of certain of the Exuma Cays are described in the record of the Van Voast-American Museum expedition (Rabb and Hayden Amer. Mus. Novitates, No. 1836, June 28, 1957). However, only Warderick Wells, of those cays within the present project, was visited by the Van Voast party, but reference to their report on this and other Exuma islands will give one a good general understanding of the chief animal types encountered.

The Bahama Islands can boast only three endemic species of birds among 42 nesting land birds. The oceanic status of this island group, plus certain habitat characteristics, result in a limited avifauna.

Had our visit been in May or June we might have observed a number of highly interesting nesting birds, including the Yellow-Billed Tropic-bird, two or three species of terns, and possibly Audubon's Shearwater. As it was, we had difficulty routing out the few birds seen, less than two dozen species, only six of which were strictly Bahamian. This list follows:

1. Great Blue Heron, Ardea herodius
2. Green Heron, Butorides virescens
3. Osprey, Pandion haliaetus
4. Oyster-catcher, Haematopus ostralegus
5. Snowy Plover, Charadrius alexandrinus
6. Wilson's Plover, Charadrius wilsonia
7. Black— bellied Plover, Squatarola squatarola
8. Spotted Sandpiper, Actitis macularia
9. Dowitcher, Limodromus griseus
10. Sanderling, Crocethia alba
11. Royal Tern, Thalasseus Maximus
12. Nighthawk, Chordeiles minor
13. Bahamian Woodstar, Calliphlox evelynae
14. Belted Kingfisher, Ceryle alcyon
15. Bahamian Mockingbird, Mimus gundlachii
16. Western Red-legged Thrush, Mimocichla plumbea
17. Blue-gray Gnatcatcher, Polioptila caerulea
18. Bananaquit, Coereba flaveola
19. Blackburnian Warbler, Dendroica fusca
20. Palm Warbler, Dendroica palmarum
21. Stripe-headed Tanager, Spindalis zena
22. Black-faced Grassquit, Tiaris bicolor

Of these 22 species, only the Woodstar (a hummingbird), the Red-Legged Thrush, the Bahamian Mockingbird, the Banaquit, the Stripe-headed Tanager and the Black-faced Grassquit--six species and 27% of the total--are not North American.

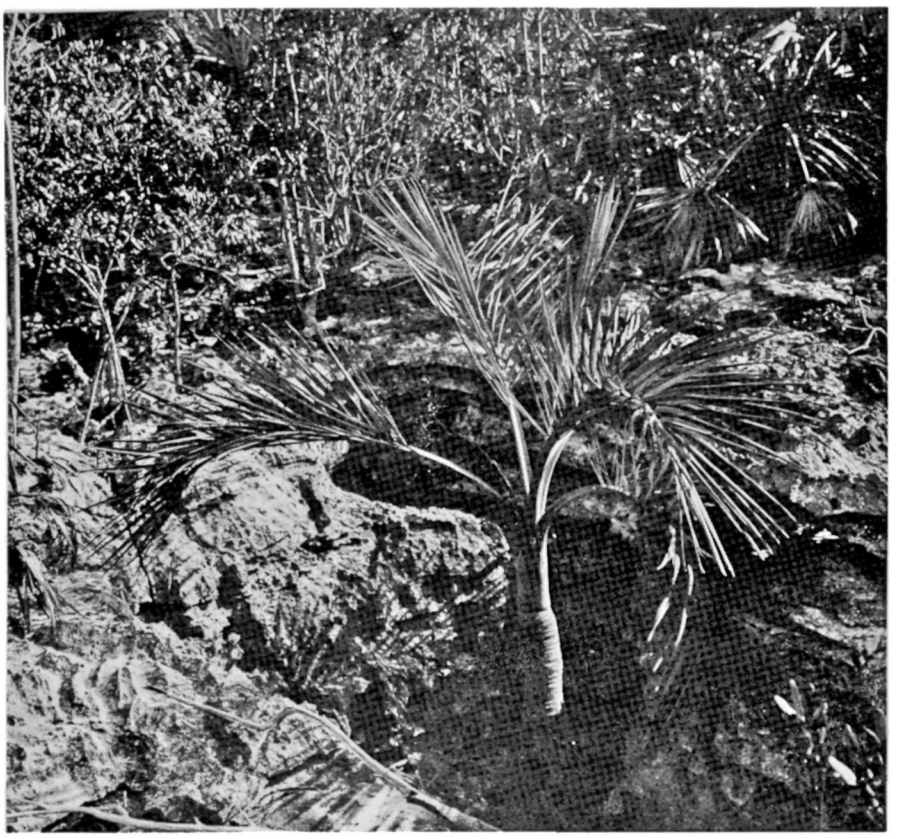
There was neither time nor opportunity for making a representative collection of mollusks. However, a few were taken at all locations. These

included the following:

1. Atlantic Partridge Tun, Tonna maculosa Dill
2. Flamingo Tongue, Cyphoma gibbosum Linne
3. West Indian Top-shell, Livona pica linne
4. Turkey-wing, Arca zebra Swainson
5. Pink Conch, Strombus gigas L.
6. Undulate Bittersweet, Glycymeris undata L.
7. Sunrise Tellin, Tellina lineata Turton
8. Several Horn Shells, Cerithiidae
9. Pen Shell, Atrina sp.
10. Several Cowries including the Reticulated Cowrie Helmet, Cypraecassis testiculus L.
11. Several Nerites (Bleeding-tooth), Nerita sp.
12. West Indian Chitons, Amphineura
13. Keyhole Limpets, Fissurellidae
14. Cockles, Cardiidae
15. Periwinkle, Littorinidae
16. Cerion sp.

There were many others and further opportunities for assembling a representative list of forms characteristic to the Exumas would be both interesting and useful for future reference. There is certain to be a tendency for visitors to make casual, or even elaborate, collections of mollusks, at least along the beaches facing Exuma Sound where most of them are found. Since the great bulk of these will be merely the dead shells, such activities need not be discouraged, even in an area with National Park status. On the other hand, elaborate collecting of living mollusks underwater should not be tolerated.

PLATE 4



Sergeant palm grows through oolite limestone

Fossil coral in the limestone

PRELIMINARY REPORT ON THE FLORA OF THE EXUMA CAYS

by Oris S. Russell, Director

Dept. of Agriculture and Marine Products, Bahamas

The cays on which brief floral surveys were conducted were Little Wax Cay, Shroud Cay, Hawksbill Cay, Cistern Cay and Warderick Wells Cay.

The greater portion of the cays is covered with woody vegetation consisting primarily of shrubs and low trees which are often found in great density of growth. This scrubby growth is often referred to locally as "scrub-lands". In some of the interior shallow valleys previously formed by sand dunes, where a rather deep sandy brownish-grey soil is found, the vegetation reaches the stage of "low coppice".

A few isolated communities of plants were found on the larger Cays which nearly approached the "high coppice" in appearance. These plants were often growing in close association with stands of Silver Thatch Palm and were in all cases in protected areas. In few cases did the height of the trees exceed twelve to fourteen feet. The so-called "scrub" and "low and high coppices" are composed of evergreen and semi-deciduous trees. On the whole, the color scheme of the vegetation is a dull, greyish green, relieved by dashes of silver, creamy palm blossoms, copper colored sea grape leaves and the bright yellow flowers of the coast Sophora.

Certain edaphic features such as the rockiness and porosity of the soil have tended to produce a more xerophytic vegetation than one would normally expect to find in the subtropical to tropical climate which prevails here.

The following botanical formations or zones were observed on the Cays:

Sand-Strand Formation or Pioneer Shore

This zone is somewhat unstable in parts since the sandy beaches are often shifted by winds and tides. The principal plants found here consist of Sporobolus grass, Uniola or sea oats, sand spur grass, Scaevola, Mallotonia, sea purslane and bay cedar. On the more elevated portion of the beaches further away from the sea are found bay geranium, bay marigold and Salmea. On beaches or shores which are fronted by shallow sand banks or which are so located that they have very little current or wave action, there is often found a succession of white and red mangroves which grade into the sand-strand.

Rocky Shore Formation

The rocks on these shores may be steep or may slope gently to the sea. Growing in the crevices of the rocks and in pockets of sand are found such plants as Rachicallis, Strumfia, bay cedar, Salmea and bay marigold. Where the rocks are covered with a thin layer of sand, plants similar to those of the sand-strand formation may be found.

Rock Scrub

The rocks forming this area are wholly aeolian limestone and the surface is often greatly eroded into sharp projections. Sink holes are found and on many of the smaller cays loose flat rocks are encountered which slide when stepped upon. The principal plants forming this zone are sea grape, Strumfia seven year apple, silver thatch palm, Joe wood and wild dilly. Since the rocky scrub zones are located on the more exposed parts of the cays the vegetation has a decided wind swept appearance.

Low Coppice

The plants in this zone range in height from six to twelve feet and are woody evergreen and semi-deciduous trees. The sandy soil is at times interspersed with projections of rock and has become a darker grey than the sand of the sand-scrub zone. Plants predominating the area are white wood, black torch, wild dilly, Bumelia, pigeon berry, Joe wood, poison wood and pigeon plum.

Silver Palm - Low Coppice Association

The silver thatch palm predominates this association and towers above the other plants in the group. Growing amongst the palms are wild billy, coast Sophora, black torch, lignum vitae, white wood, pigeon berry, strong back, Bumelia and white sage. This association is often found on the leeward side of former sand dunes.

The following is a list of the plants identified on the Cays visited. Only some of the rarer and lesser known plants were collected. A few of the plants collected are not included in the list as time has not permitted their proper identification. The taxonomic reference used through has been "The Bahama Flora" by Britton and Millspaugh:

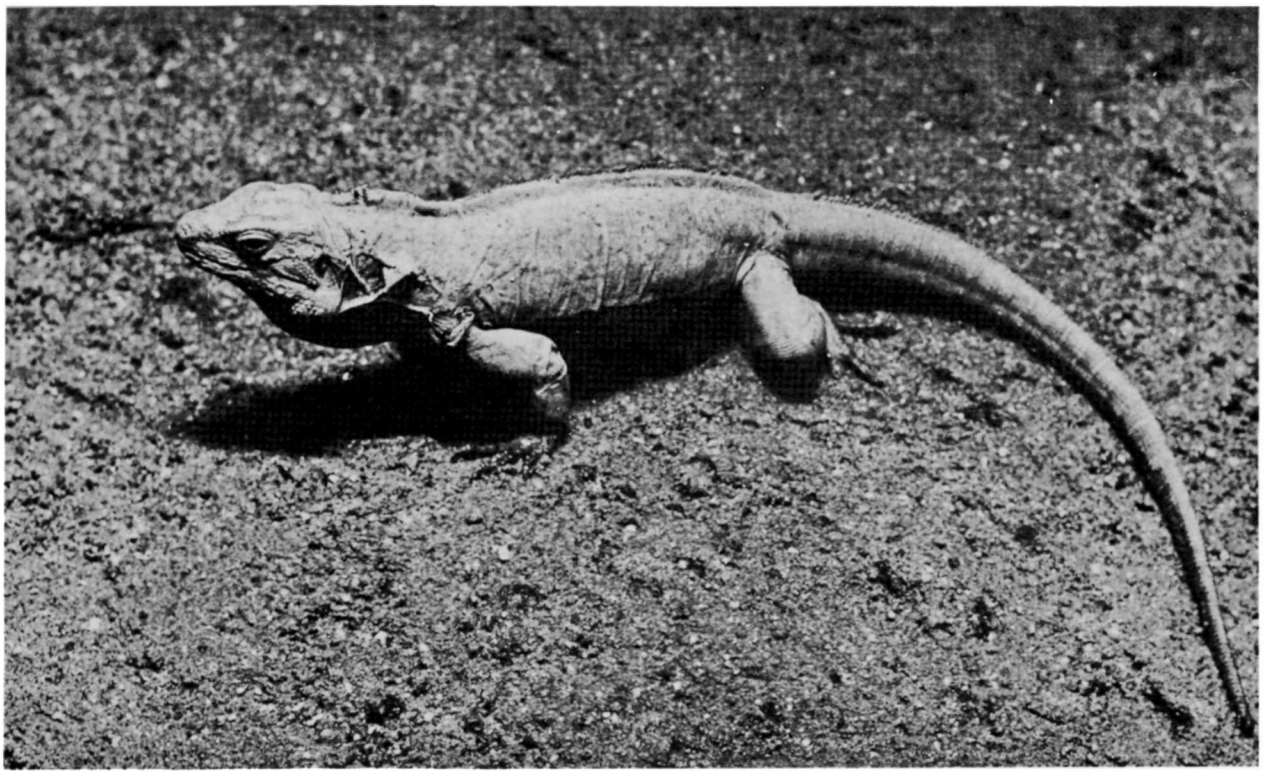
1. Silver Thatch	Coccothrinax argentea
2. Pond Top, Sabal Palm	Sabal Palmetto
3. (Hog Cabbage Palm	Pseudophoenix vinifera
(Buccaneer Palm	(P. sargentii)
(Sargeant's Cherry Palm	
4. Strong-Back	Bourreria ovata
5. Coast Sophora	Sophora tomentosa

Sand Scrub

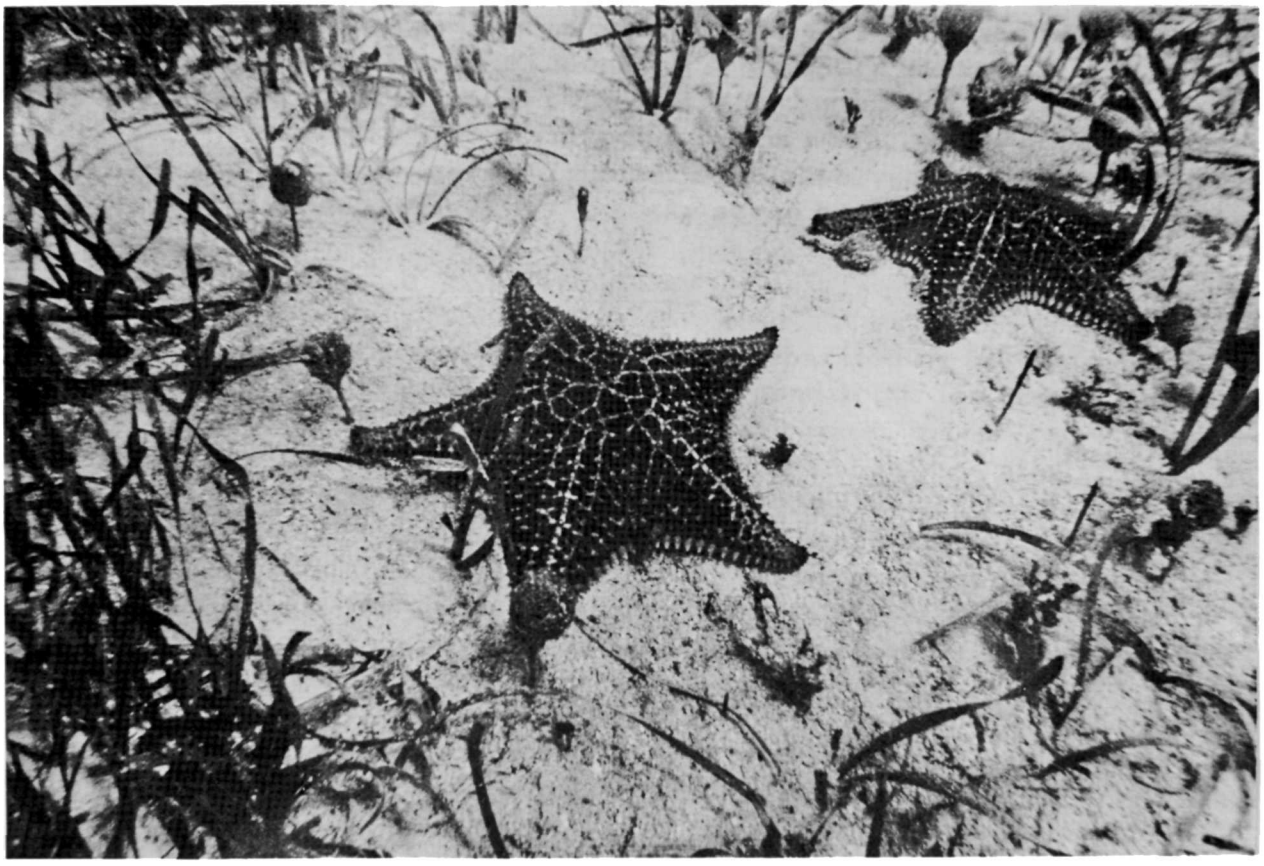
This zone usually commences from the top of sand dunes which have become stabilized behind beaches twenty to fifty feet wide. These established dunes slope inland fifty feet or more to shallow valleys or depressions. Plants of this zone are found growing from the tops of the dunes inland along the sheltered leeward sides. Silver thatch, strong back, coast Sophora, black torch, white stopper and pigeon plum are commonly found growing in such locations. The sand in this area is a light brownish-grey color due to the addition of organic matter from leaf fall.

6.	White Stopper	Eugenia axillaris
7.	Box Briar	Randia mitis
8.	Seven-year Apple	Casasia clusiaefolia
9.	Strumpfia	Strumpfia maritima
10.	Black Torch	Erithalis fruticosa
11.	Sandfly-bush	Rachicallis americana
12.	Common Ernodea	Ernodea littoralis
13.	White Wood	Picrodendron macrocarpum
14.	Pigeon-Plum	Coccolobis laurifolia
15.	Sea Grape	Coccolobis uvifera
16.	Milk-Berry	Bumelia loranthifolia
17.	Wild Dilly	Mimusops emarginata
18.	Mastic	Sideroxylon foetidissimum
19.	Joe Wood	Jacquinia keyensis
20.	Poison Wood	Metopium toxiferum
21.	Saw Grass	Mariscus jamaicensis
22.	Ram's Horn	Pithecolobium guadalupense
23.	Cinnecord	Acacia choriophylla
24.	White Anneslia	Anneslia formosa
25.	Bahama Solanum	Solanum bahamense
26.	Buttonwood	Conocarpus erecta
27.	White Mangrove	Laguncularia racemosa
28.	Crab-wood	Gymnanthes lucida
29.	Rock Phyllanthus	Phyllanthus pruinosus
30.	White sage (Wild sage)	Lantana involucrata
31.	Black Mangrove	Avicennia nitida
32.	Saw-brier	Smilax havanensis
33.	Old-Man's strength	Tabebuia bahamensis
34.	Bay Cedar	Suriana maritima
35.	Black Soap Berry	Scaevola plumierii
36.	Bay Marigold	Borrichia arborescens
37.	Shanks	Salmea petrobioides
38.	Darling Plum	Reynosia septentrionalis
39.	Lignum Vitae	Guaiacum officinale
40.	Red Mangrove	Rhizophora mangle
41.	Bahama Century Plant	Agave bahamana
42.	Dildo	Cephalocereus Millspaughii
43.	Sea Purslane	Sesuvium portulacastrum
44.	Sea Oats	Uniola paniculata
45.	Sea-shore Rush-grass	Sporobolus virginicus
46.	Sand Spur	Cenchrus carolinianus
47.	Bay Lavender	Mallotonia gnaphalodes
48.	Bay Geranium	Ambrosia hispida
49.	Love-Vine	Cassytha americana
50.	White Torch	Amyris elemifera
51.	Gumbo-Limbo, Gum-elemi	Elaphrium Simaruba
52.	Casuarina	Casuarina equisetifolia

PLATE 5



Bahamian iguana



Bahamian starfish

Little Wax Cay

A short visit was made to the northwest section of this cay. We landed on a small sandy beach backed by sand dunes which arose about twenty feet from the sea. The beach was interspersed above high water mark with flat plate rock. Growing along the shore were found bay cedar, silver button wood, Scaevola, Joe wood, Rachicallis and Strumfia. On top of the dunes the beautiful coast Sophora with its silvery leaves and yellow flowers were growing. Also on top of the sand dune were seen silver thatch palm, seven year apple, Joe wood, a considerable amount of wild dilly and hog cabbage palm.

On the western end of the beach was a rocky shore with Rachicallis forming the first zone plant and being predominant in the area. Bay marigold was also seen growing in some of the shallow rock pockets. In back of this rocky beach rising between twenty to thirty feet above sea level was a zone of "rock scrub". This consisted of a mixture of sea grape, Strumfia, Joe wood, seven year apple, wild dilly and silver thatch palm. On the summit of this rise and sloping inland was a stunted growth of wild dilly, Bumelia, darling plum, black torch, pigeon berry, hog cabbage palm and white stopper.

Travelling southward from the top of the sand dunes a "low-coppice" formation was observed which consisted of silver thatch palm, strong back, coast Sophora, white stopper, black torch, white wood, pigeon plum, Bumelia, pigeon berry, Joe wood and wild dilly. This coppice steeply slopes into a brackish water pool which is approximately fifty feet long and thirty feet across. Around the edge of the pool is a stand of saw grass. Growing in the pool are musk grass and needle grass. It is estimated that the pool lies in a depression twenty feet below the surrounding slopes. The eastern side of the pool is flanked by a large clump of sable palmetto, growing on moist sandy grey soil. On the western and rocky side of the pool, button wood, ram's horn, seven year apple, Bumelia and Bahama Solanum were observed. Further west on the rocky side was land typical of the rocky scrub coppice.

Shroud Cay

Shroud is composed of a group of cays separated by inlets. On the northernmost cay in this group is a salt water pond about 150 feet to 200 feet inland. On the northern side of the pond is a salt water marsh, on which are growing white and red mangroves. Bay marigold and Salmea also grow in this area. A fairly large stand of lignum vitae was also observed in the southwest section. The land became very rocky to the south of the pond and contained fresh water catchments, some of which were six to eight feet across and three feet to four feet deep. Solution holes, some six to eight feet deep were also found in this vicinity. Some of these holes had the appearance of being recently polished.

One of the most attractive features of Shroud is the inlets or waterways which separate the cays in this group. The water in the inlets is crystal clear

and a large number of fish and also conch were observed. The inlets are bordered in parts by plant covered rocky shores and by mangroves. The interior of Shroud consists of a large body of red mangroves and large marl flats in the process of being occupied by red mangroves. Occasional clumps of black mangroves tower four to eight feet above the red mangroves. One can spend several enjoyable hours traversing from west to east across the cays by these inlets or along the winding waterways through the mangroves. There are several lovely beaches on this cay.

Cistern Cay

The time spent on this cay was very short and only permitted confirmation that the plants growing there were typical of the other cays. In the center of this island is a high ridge which appears to contain a number of small caverns. It is regretted that the flora of this area could not be studied. A change in the weather made it necessary for us to hasten back in the small boats to our parent ship.

Hawksbill Cay

There are some beautiful stands or savannas of silver thatch palm on this island. Also of interest is the fact that sand dunes are constantly being pushed up on the northern end of this cay At one location the wind blown sand had covered such rocky shore plants as seven year apple and Joe wood, which averaged four to six feet in height, to within six to eighteen inches of their tops. In several places the sand had already begun to lithify thus forming a hardened crust. Sand binding plants such as Sea Oats and Sporobolus grass were in evidence. Adding interest to this Cay are two fresh water ponds which are located at the northeast end. Both ponds contain fish and very fresh water.

Warderick Wells

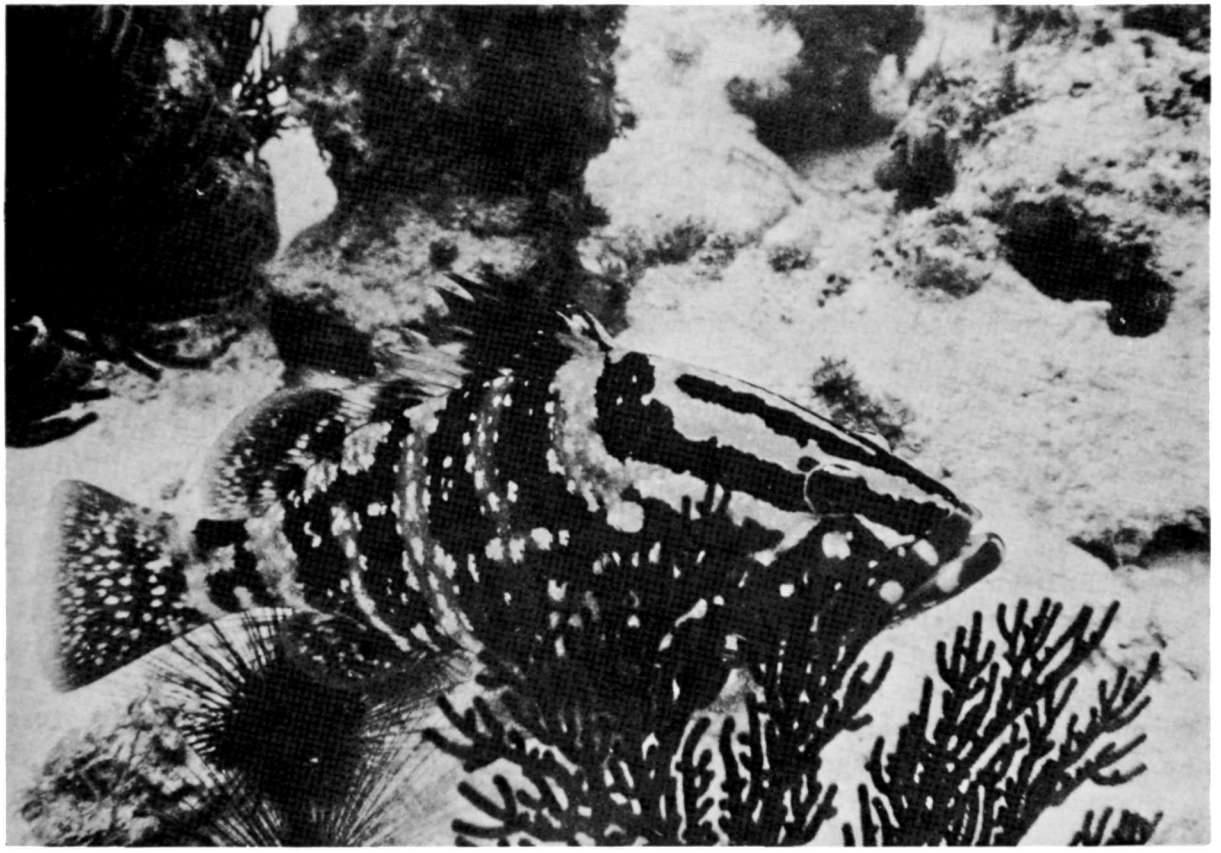
This windswept cay is very attractive in appearance. Along most of the east side there are very picturesque steep cliffs or bluffs. There are several beaches on the western side which is much lower. A large raised sand flat on the northwest section of the island is most attractive. This area which is covered with a stunted growth of Rachicallis, Borrichia, Joe wood, Strumfia, hog cabbage palm and buttonwood, has a semi-desert like appearance. The hillside leading to the high ridge on the northern section of the island is covered with an association consisting of a stunted growth of silver thatch palm, sea grape, hog cabbage palm, Joe wood and wild dilly. This island has perhaps the largest number of hog cabbage palms in the group surveyed. Some excellent specimens of dildo cactus were also seen.

The fifty odd plants previously listed in this report are typical plants of the Bahama flora The rocky calcareous soil and salt-laden air of the cays have in many cases severely restricted the plant growth found thereon. But of great

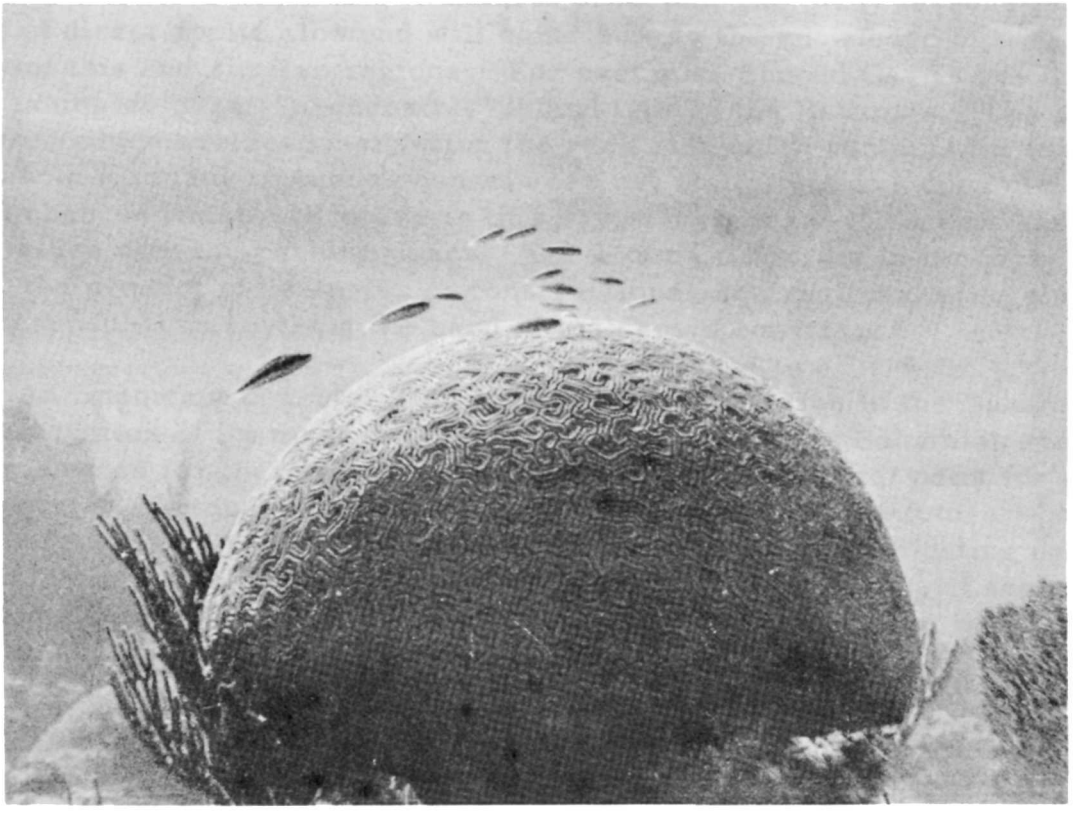
interest to students of plant life are the adaptations of structure and habit in the vegetation which have been brought about by the plants having to exist under such rigorous conditions. Often the same association of plants growing on an exposed rocky coast or in a sheltered shallow valley, formed previously by sand dunes, will show remarkable difference in structure and size. Only the trained eye can tell at a glance that the plants forming the associations are the same. The diverse means by which drought, heat, salt and wind are resisted by the plants offers a fascinating study in itself.

The cays visited possess a unique portion of the flora of the Bahamas and their protection by the establishment of a National Park is strongly urged.

PLATE 6



A fine food fish - the Nassau Grouper



Brain coral

GEOLOGY AND CORAL REEFS

by Donald F. Squires

American Museum of Natural History

This report contains materials pertaining to two phases of the investigation: 1) the geological aspects, and 2) the corals and coral reefs of the region.

The Bahama Islands have long been known to be geologically unique and to exhibit geologic processes uncommon at present in the rest of the world, but which are known to have been more extensive in the remote geologic past. For these reasons, the region has been the subject of geologic study for over a century. Investigation has not flagged, but has become more intensified in the last decade. Two aspects are important for present considerations: processes of the formation and destruction of islands in the Bahamas and the unique formation of calcium carbonate sand. The latter is a process of scale, occurring mainly on the open expanses of the banks. With continued population increase and construction in the Bahamas, the unrivaled geological laboratory present will cease to exist through the efforts of man to stabilize his environment.

The Exuma Cay tract set aside by the Bahamian Government is typical of the Bahamas and contains cays of various types of origin and in varying stages of evolution and destruction. If these cays can be set aside and allowed to develop and form according to natural precepts, the many lessons learned will be of direct application and will contribute to the knowledge of the geologic history of this and similar regions. For example, Shroud Cay is one of the better examples of the "pseudoatoll" island type in the Bahamas. The geologic processes which are responsible for the rock rim which contains the mangrove swamp with its many tortuous channels are not static, but are dynamic. The natural changes which will occur in this cay will increase its scenic and educational values with the passing years. The Exuma Cay tract in its current "wild state", the product of centuries of constructional-destructional struggles are more beautiful than anything the hand of man could construct.

An important consideration of marine conservation in the Bahamas is the preservation of its most important scenic areas. The Bahamian reefs are world renowned for their beauty and are, therefore, the focal point for a host of underwater visitors, the skin divers of the present and the future who will wish to observe and photograph areas such as this. Indiscriminating collecting and unthinking fishing can reduce the region to a virtual desert. Larger and more beautiful coral formations may be damaged, the important sea fans may be removed, and inquisitive fish may become "gun" shy.

Coral reef development in the Exuma Cays tract is of an intermediate character for the Bahama Islands, where perhaps the most fully developed reefs of the tropical Atlantic Ocean exist. The reef development is adequate for the underwater visitor to appreciate, for the reef-associated organisms to populate, and for the scientist to study. The very intermediate nature of the reefs does, however, particularly excite the scientist, for it is a region such as the Exuma Cays that studies of the growth, development and controls upon coral reefs can best be made. Where development is not at its fullest, prohibitive environmental factors must be operating, and these are of greatest importance to the biologist.

In general, coral reefs are best displayed at the northern end of the park area. Many of the coral formations in the vicinity of Shroud and Hawksbill Cays compare favorably with those of the well-known Andros and Abaco reefs, although on a smaller scale. Associated with these and other coral formations are the numerous associated organisms including sea fans, sea pens, spiny lobster, conch, and diversified reef fishes. Also present in some abundance are a diversity of clams and snails which are so interesting to the beachcombing shell collector.

It is a matter of record in several tropical areas that commercial and "sport" fishing and diving activities have deplenished reefs within a very short time. It has been the observation of many Bahamian residents that the larger conch, lobster, snapper and grouper have disappeared from certain areas as a result of these activities. Similarly, the collection of coral or sea fan from a region can quickly reduce the numbers of these animals, or at least detract appreciably from its natural beauty.

Experiments have shown that the more rapidly growing corals such as the antler coral (Acropora palmata) or the staghorn coral (Acropora cervicornis) increase in length at the rate of about one inch a year on the average, while the brain coral group (Diploria spp.) may grow at the rate of only a fraction of an inch a year. Sea fans increase in height on the average of several inches a year under optimum conditions. These rates are sufficiently slow that collecting can soon greatly reduce the numbers of individuals.

Another respect of the problems confronting a developing region such as the Bahamas is the lack of toleration of most marine animals to the waste-products of man's civilization. It has been noted elsewhere, principally Bimini, that a concentration of population, with attendant sewage disposal, waste petroleum products, and the inevitable cans and bottles thrown overboard, soon seriously affect the faunal balance and change the aspects of the community.

If the tract in question were to undergo moderate development, probably no serious problem would arise. But should hotels, extensive camps, docking facilities, or other features of development occur at closely spaced cays, the effect upon the fauna might be deleterious. Limitation of the construction of such facilities to specified points will insure faunal and scenic preservation.

Corals collected from Wax Cay:

(depth 50 feet)

1. Porites porites
2. Agaricia agaricites
3. Montastrea cavernosa
4. Madracis decatis
5. Acropora cervicornis

(depth 20 feet)

1. Acropora cervicornis
2. Montastrea annularis
3. Siderastrea siderea
4. Porites astreoides
5. Solenastrea hyades
6. Agaricia purpurea
7. Agaricia agaricites
8. Diploria strigosa
9. Diploria labyrinthiformis
10. Diploria clivosa
11. Manicina areolata
12. Stephanocoenia michelini
13. Favia fragum
14. Eusmilia fastigata
15. Mycetophyllia lamarckana
16. Porites porites
17. Millepora alcicornis

Corals observed from Shroud Cay:

1. Acropora palmata
2. Solenastrea hyades
3. Porites astreoides
4. Siderastrea siderea
5. Agaricia agaricites
6. Eusmilia fastigata
7. Diploria strigosa
8. Diploria labyrithiformis
9. Diploria clivosa
10. Montastrea annularis
11. Porites porites
12. Manicina areolata
13. Siderastrea radians
14. Stephanocoenia michelini
15. Mussa angulosa
16. Isophyllia spp.
17. Mycetophyllia lamarckana
18. Favia fragum
19. Isophyllastrea sp.
20. Dichocoenia stokesii
21. Montastrea cavernosa
22. Millepora alcicornis

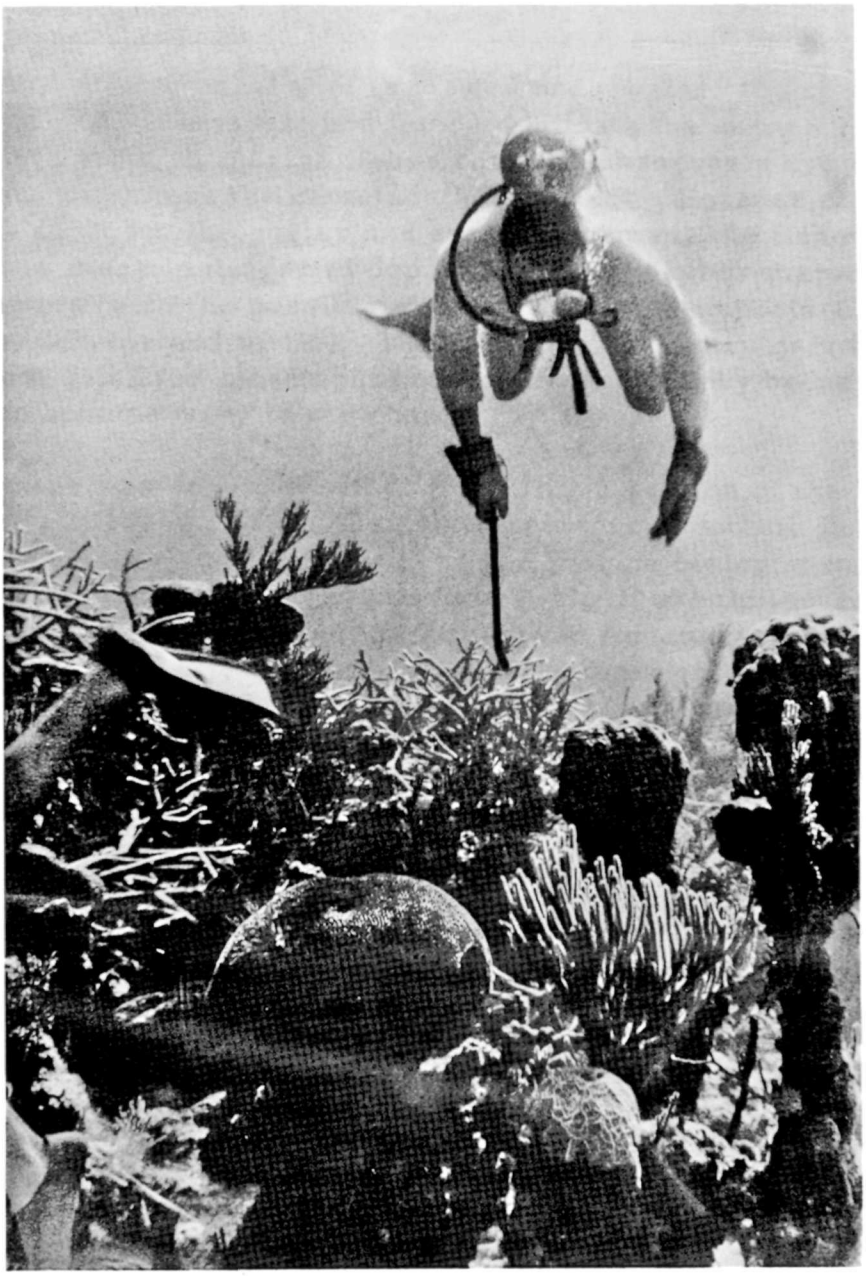
Corals observed at Cistern Cay:

1. Diploria strigosa
2. Diploria clivosa
3. Manicina areolata
4. Siderastrea radians
5. Isophyllia sp.
6. Favia fragum
7. Siderastrea radians
8. Porites astreoides
9. Porites porites
10. Millepora alcicornis

On Norman's Cay, near the southern tip of the cay, a fossil reef was discovered. Similar species of corals to those mentioned above are found in a large roughly circular area about four feet above sea level. These fossils, several thousand years old, are easily discernible in the rock and add a

notable geologic feature to this cay, as yet outside the park area, but a cay worthy of incorporation within the park, if possible.

PLATE 7



A geologist-diver explores the reef

FISHES

by John E. Randall

Marine Laboratory, University of Miami

When an Atlantic coral reef is viewed underwater, the coelenterates (corals, gorgonians, anemones) and fishes dominate the scene. Highly colorful and often bizarre tropical marine fishes catch an observer's eye like parrots in a rainforest, with much the same aesthetic effect. Because of their value as food and as sport for the angler and spearfisherman, the fishes in a restricted reef area are more in danger of depletion than any other major group of marine organisms (with the possible exception of some important food species such as conch, lobster and turtle). Furthermore, areas subject to spearfishing become poor sites for close observation or photography because the surviving fishes soon become wary of a swimmer.

The writer was very pleased to learn that a section of the Exumas might be set aside as a national park. Besides the obvious economic importance of such action, this is of great importance to the marine biologist today and probably of even greater significance in the future, for it should insure that reefs free of fishing pressure will always be preserved for study in their primordial state. It is also important to skindivers (whose ranks increase unbelievably year after year) who are becoming more interested in observing and photographing than hunting and destroying. In the clear water for which the Bahamas are famous, the corals, graceful gorgonians, unique sponges and brightly-hued fishes integrate to an image of natural beauty unexcelled on earth and well worth preservation.

From January 23 to January 26, inclusive, a survey was made of the marine fishes in the proposed national park site. The vast majority of inshore fishes are associated with the coral reefs. Very few live over the extensive sand flats or turtle grass (Thalassia) beds because of lack of cover and limited food. When reefs are large and coral growth luxurious, as is the case on the eastern or windward side of some of the keys, the number of fishes (both individuals and species) is great. The lee or western side of these keys consists mostly of vast shoals of white sand with infrequent coral knolls, and consequently few fishes.

The fishes, in general, were relatively easy to approach. Large groupers, which are the most sought-after targets by the spearfishermen on local reefs, were plentiful and often swam up to us in the water. It is evident that the area has enjoyed considerable freedom from human intruders, in contrast to reefs near Nassau.

The survey of the Exumas fishes was made solely by underwater observation during the day. Many groups of fishes which are prominent in the coral reef community are not readily observed and are not considered here. These include small fishes like gobies, nocturnal or secretive fishes like cardinal fishes and eels, and well camouflaged species such as the scorpion fishes.

On the east side of Wax Cay at a depth of 15 feet over large patch reefs with good coral growth, notably staghorn coral (Acropora cervicornis) and numerous sea fans, other gorgonians, grunts, particularly the yellow grunt (Haemulon flavolineatum) occurred in large aggregations and was the dominant species.

Many snappers were seen, especially the schoolmaster (Lutjanus apodus) and young mutton fish (Lutjanus analis). Of the larger groupers the Nassau (Epinephelus striatus) was the most common. Several yellowfin rockfish (Mycteroperca venenosa) were seen and one tiger rockfish (Mycteroperca tigris). Of the smaller groupers the coney (Cephalopholis fulvus) was the most abundant, as would be expected.

The squirrel fish (Holocentrus ascensionis rufus) was surprisingly common, darting in and out of cover. The lovely black angel fish (Pomacanthus paru) rock beauty (Holocanthus tricolor), the queen angel (Holocanthus ciliaris), and the four-eye butterfly fish (Chaetodon capistratus) were occasional. Numerous blue tang (Acanthurus caeruleus) and doctor-fish (A. bahianus) graced on algae. Of the smaller fishes the blue head (Thalassoma bifasciatum) and slippery dick (Halichoeres bivittatus) predominated. Other wrasses such as the red-back (H. garnoti) and the blue creole (Clepticus parrae) were frequently seen. The beau gregory (Pomacentrus fuscus) and yellow-tail demoiselle (Microspathodon chrysurus) were often observed among the interstices of the reef while the brilliant blue reef-fish (Chromis cyanea) and to a lesser extent the brown reef-fish (Chromis marginata) formed small schools over heads of coral. The parasite-picking goby, (Elacatinus sp., was plying its trade from atop heads of Porites coral and the bright purple and yellow fairy basslet, (Gramma hemichrysos) rested in odd poses beneath ledges, etc.

The green parrot fish (Sparisoma viride) was the most common of several species of parrot fish. Over the sand near the coral occasional razor fish (Xyrichthys spendens) and rarely the elongate blanquillo (Malacanthus plumeri) took refuge in the sand where approached, the former at nearly any location and the latter in a burrow or hole beneath a small rock. One hawksbill turtle was caught by hand and released. Lobsters were fairly common.

Farther from shore at a depth of 50 to 60 feet, the bottom was about 60% sand and 40% low coral rock with sparse living coral and gorgonian growth. Fishes were less numerous, probably because of less cover than in the shallower inshore areas.

Grunts and snappers were very scarce. Groupers, however, were almost as common as inshore and in roughly the same proportion by species. Blut-heads, red-backs and the same angel fishes and surgeon fishes as in shallow water (plus one or two Acanthurus chirurgus) were observed.

Occasional four-eye butterfly fish (Chaetodon ocellatus) were seen as were several small unidentified butterfly fish with an elongated snout. Parrot fishes included the bahama parrot fish (Scarus criocensis) the blue parrot fish (S. caeruleus), the green parrot fish, and several smaller species of Sparisoma. Fairy basslets were common, and parasite-picking gobies and several butter hamlets (Hypoplectur sp.) were occasional. One large amberjack (Seriola dumerili) swam by with a regal air.

The depth increased very gradually to about 80 feet; then suddenly a zone of large mounds of coral rock, cut through with tortuous crevices appeared. Shelter was exceptionally good and fishes very numerous. Some species not previously seen, such as certain snappers, the black margate (Anisotremus surinamensis), large blackfin rockfish (Mycteroperca bonaci), and an unidentified squirrelfish (Holocentrus sp.) were encountered.

Within this zone (approximately 100 feet in width) the slope of the bottom became steeper. Beyond it the gradient was even steeper, there was almost no cover, and very few fishes. The latter area was explored to a depth of about 150 feet.

On the east side of Shroud Cay at a depth of 4 to 12 feet, over reef patches, some with stands of antler coral (Acropora palmata) the following species of fishes were observed. They are listed in approximate order of dominance as based on number of individuals. It is well to note, however, that the average observer will take much greater interest in a large Nassau grouper or queen angel fish or barracude than he might in dozens of slippery dicks scuttling over the bottom.

1. Blue Head, Thalassoma bifasciatum
2. Yellow Grunt, Haemulon flavolineatum
3. Slippery Dick, Halichoeres bivittatus
4. Demoiselle, Pomacentrus leucostictus
5. Blue Tang, Acanthurus caeruleus
6. Beau Gregory, Pomacentrus fuscus
7. Yellow-tail Demoiselle, Microspathodon chrysyrus
8. Coney, Cephalopholis fulvus
9. Doctorfish, Acanthurus bahianus
10. Bahama Parrotfish, Scarus croicensis
11. Squirrelfish, Holocentrus ascensionis
12. Schoolmaster, Lutjanus apodus
13. Green Parrotfish, Sparisoma viride
14. Fairy Basslet, Gramma hemichrysos
15. Red-back, Halichoeres garnoti
16. Nassau Grouper, Epinephelus striatus

17. Demoiselle, Pomacentrus chrysus
18. Blue-Striped Grunt, Haemulon sciurus
19. Parasite-Picking Goby, Elacatinus sp.
20. Queen Triggerfish, Balistes vetula
21. Mutton Snapper, Lutjanus analis
22. Red-Banded Parrotfish, Sparisoma rubripinna
23. Sergeant Major, Abudefduf saxatilis
24. Blue Reeffish, Chromis cyanea
25. Parrotfish, Sparisoma (yellow caudal)
26. Queen Angelfish, Holocanthus ciliaris
27. Rock Beauty, Holocanthus tricolor
28. Four-eye Butterfly fish, Chaetodon capistratus
29. Common Butterfly fish, Chaetodon ocellatus
30. French Angelfish, Pomacanthus paru
31. White grunt, Haemulon plumieri
32. Pudding wife, Halichoeres radiata
33. Wrasse, Halichoeres maculipinna
34. Yellow-fin Rockfish, Mycteroperca venenosa
35. Black-fin Rockfish, Mycteroperca bonaci
36. Tiger Rockfish, Mycteroperca tigris
37. Blue Parrotfish, Scarus caeruleus
38. Skipjack, Caranx ruber
39. Trumpetfish, Aulostomus maculatus
40. Spotted Goatfish, Upeneus maculatus
41. Parrotfish, Sparisoma chrysopterum
42. Barracuda, Sphyraena barracuda

On the east side of Cistern Cay at edge of island at a depth of 4 to 8 feet, a short dive was made near a rocky shore undercut by wave action to a depth of 6 feet or more to form well developed ledge at water level. Beneath the ledge only the following species were seen: squirrel fish (Holocentrus vexillarius), Lutjanus sp. (Yellow-finned and apparently the Schoolmaster), red hind (Epinephelus guttatus, or rock hind, E. adscensionis), blue tang and blue-head.

Away from the shore was a zone of sandy channels containing small stones and broken shells moving with the surge. Interspersed between the shallow channels were low smooth rock areas bearing a rich growth of algae of many kinds. About 50 feet from shore were patches with small corals and gorgonians. The fish fauna here was not well developed as seen in inshore areas the two previous days. Several large parrotfishes were seen which had not been observed before. One of these was the indigo parrotfish (Pseudoscarus coelestinus).

The entire windward or east side of Warderick Wells Cay was searched for a suitable place for underwater photography. However, no adequate patch reefs could be located. The low rock areas were small, mostly alga-covered, and with poor coral and gorgonian growth. Fishes were scarce.

A dive was made in a channel between two islets, where, as in other channels, a current was running. The dominant sessile organism was the alga, Sargassum. The most common fishes were blue-head, slippery dicks, blue tang, doctorfish, rock beauty, black angelfish, Epinephelus sp. (one of the hinds), Nassau grouper, a demoiselle (Pomacentrus partitus), and a small hawkfish. Two good-sized margate fish (Haemulon album) were sighted and a porcupine fish (Diodon sp.) was captured and photographed.

The west side of Warderick Wells was surveyed on the return trip. One small coral head was investigated. The water depth was about 8 feet at the base of the head and the least depth about 2 feet. Considering the small surface area of this little reef, the population of fishes was large. Many of the fishes were juveniles, however. Young grunts, mostly yellow grunts, were most numerous. Other common grunts were yellow tom tate (Bathystoma aurolineatum) and sailor's choice (Haemulon parra) the latter forming a school which circled the knoll just off the sandy bottom.

Other fishes were young mutton fish, lane snappers (Lutjanus synagris) gray snappers (Lutjanus griseus), blue-head, slippery dick, white grunt, redback, schoolmaster, green parrotfish, Bahama parrotfish, common big-eye (Priacanthus cruentatus) squirrelfish, Nassau grouper, blue reef-fish, demoiselle, beau gregory, sergeant major, brown reef-fish, Spanish hogfish (Bodianus rufus), sharp-nosed puffer (Canthigaster rostratus), and queen triggerfish (Balistes vetula).

As has been discussed, the concept of preservation of the Exuma reefs has real merit, as also does the maintenance of the cays proper in their primitive state. The availability of Crown land in an unexploited area not too distant from Nassau gives the Exumas the best reason for consideration as a sanctuary.

A SUMMING-UP

by Dr. F. G. Walton Smith, Director

The Marine Laboratory, University of Miami

The functions of a national park may be conveniently grouped under four headings. The first is the conservation of natural resources, the second science and education, the third the safeguarding of beauty in nature which, with related objectives, may be called the aesthetic purposes. The fourth is the provision of recreational facilities. In all four objectives there is the inherent idea of an organization which will ensure their permanency in the face of encroaching human population and building and industrial activities. The organization here proposed is the Bahamas National Trust.

Conservation

The first objective alone does not justify a national park in the Bahamas. The Government, through the Agriculture and Marine Products Board, has adequate powers to pass rules and regulations setting aside areas closed to hunting and fishing. The Legislature has further power to prohibit the destruction of birds and land animals. Moreover, the Legislature has power to make such rules and regulations regarding closed areas permanent in nature. The Government, through the Out Islands Constabulary and the Agriculture and Marine Products Board, has the function of enforcing these rules.

On the face of it, it would appear unwise for the Government to turn over its powers of regulation and enforcement completely to a private corporation. There is, however, an important consideration to be taken into account. The effectiveness of control depends not only upon enforcement but upon the general attitude of the public. Although Government may have in its employ or have access to experts in the management of natural resources, it very rarely has the proper machinery for moulding public opinion. This is where a Bahamas National Trust can be of very real value. Through its activities it can educate the general public in the purposes and need of regulation and through the devices of membership, conducted tours and other activities, can encourage and develop the strong support of residents and visitors for the purposes of conservation far beyond the bounds of the park itself.

In short, the Bahamas National Trust would provide public relations in conservation and also would be valuable to the Government in an advisory capacity.

Science and Education

Parks serve as natural wilderness laboratories for accumulating knowledge of man's effect upon nature, for investigating methods of increasing productivity, for formulating better conservation policy and for basic scientific research.

Aesthetic Values and Recreation

The third and fourth objectives may conveniently be grouped together since, in a sense, they represent the conservation of spiritual values and of human beings. With the expansion of human population, more and more natural areas of land, water and sea are becoming fenced in for private purposes, buildings for residences and commercial purposes are being erected and access to nature and its wild state becoming increasingly more difficult. To set aside such areas in the public interest will conserve them and keep them open to visitors in the face of rapidly growing Out Island real estate development and hold them in perpetuity. The importance of this in a world of predominantly material values cannot be overestimated.

There is also an economic value to the proposed Exuma Cays National Park which for practical reasons should not be underestimated, and that is the attraction which such a park will have for tourists. The tremendous interest shown in the Everglades National Park is sufficient evidence of this. Even parks such as Mt. McKinley in Alaska, which are fairly remote, are powerful economic assets.

In proposing a Bahamas National Trust, consideration must be given to setting aside more than one area in the future. The Exuma Cays Park under consideration should be regarded as only the beginning of a conservation movement that is vital to the Bahamas as a whole. It will also be a beginning of a new concept, integrated land-and-sea conservation, in which the Bahamas will take the lead and show the way to other nations throughout the world.

SPECIFIC RECOMMENDATIONS
for
EXUMA CAYS NATIONAL PARK
AND A PARK SYSTEM FOR THE BAHAMAS ISLANDS
edited by Carleton Ray
from the recommendations of the survey team
and from comments made at meetings on
January 19 and January 28 in Nassau

1. Park

We recommend that the items outlined here be immediately considered for passage into a law patterned after the National Trust Act of Great Britain, 1907.

A. General

1. The Exuma Cays between Wax Cay Cut and Conch Cut are suitable for the multiple purposes of a National Park in terms of esthetic values, recreation, education, and conservation. The establishment of this National Park as a nucleus of a Bahamas National Park System is strongly urged. The inclusion of marine areas in the park is held mandatory.

2. A moratorium on leasing or other development should immediately be placed by the Government on the Park area, leaving at least one year for passage of law on the Park. Concurrently, the Department of Agriculture and Marine Products should declare the region--land and sea--a wildlife sanctuary according to the recommendations made here.

3. Some cays not in the Park area, but not under lease, should be held for use of the public. With the increase of the population of the Bahamas, more and more areas for public recreation are needed.

4. The names of the islands within the Park area are somewhat confused (See Introduction). Names used on chart HO26b and in the Yachtsman's Guide to the Bahamas should be the permanent ones adopted.

5. Boundaries of the Park are proposed on the map included here. In general, the boundaries extend a maximum of three miles to sea, eastward of land, and five miles to sea, westward of land. The total area is 8 miles in breadth by 22 miles in length or a total of 176 square miles. The land area is 8.75 square miles or about 5% of the total.

(a) Northern. A line bearing NE 59° true, from a point 24° 32' N. Lat. by 76° 52' 7" W Long. to a point 24° 36' N Lat. by 76° 40' 25" W Long.

(b) Eastern. A line bearing SE 138° true, from a point 24° 36' N. Lat. by 76° 40' 25" W Long. to a point 24° 20' N Lat. by 76° 29' 30" W Long.

(c) Southern. A line bearing SW 233° true, from a point 24° 20' N. Lat. by 76° 29' 30" W Long. to a point 24° 15' N Lat. by 76° 36' 17" W Long.

(d) Western. A line bearing parallel to the Eastern boundary, from a point 24° 15' N Lat. by 76° 36' 17" W Long. to a point 24° 32' N Lat. by 76° 52' 7" W Long.

(e) Extension. It is strongly urged that a way be found to include Norman's Cay and its waters in the Park area, even on a nominal basis. Norman's Anchorage, its marls where flamingos might one day nest, and its fossil reef, discovered by Dr. Squires of our team, are good reasons for its inclusion. This is shown by the dotted lines on the map and involves a northern extension of about 6 miles and an area increase of 48 square miles, bringing the total up to 216 square miles. The northern boundary would become a true east-west bearing on 24° 39' 30" N Lat. Within the Park area there are also several areas held under lease (See Introduction). These should also be obtained or incorporated within the Park, if possible.

B. Bahamas National Trust

1. It is proposed that the present committee (see Tolstoy Report) be dissolved to be replaced by a new group to represent the Bahamas National Trust. The Trust should be incorporated and empowered by the Government by Legislative Act to gain title to lands for Park development, to raise funds, to manage the Exumas Park and other parks which may be set up, to publicize the park and conservation in the Bahamas, and to advise the Government on conservation matters. It will be composed initially of public-spirited Bahamians, scientists, specialists, and interested persons from abroad who should be asked by the Government to form the Trust. (See Section III).

2. The Trust will endeavor to finance the Exuma Cays Park. Until such time as the Association is set up, The New York Zoological Society will be the depository for donations. The Trust will not be empowered as an inforcement or regulatory agency. These matters will continue to be handled by the Department of Agriculture and Marine Resources, whose board should, however, sit with the governing body of the Trust so as to integrate actions on the Park and on conservation matters in the Bahamas. The Trust should be considered advisory to the Government on conservation matters.

3. The Trust will endeavor to enlist the support of land-owners throughout the Bahamas for conservation measures. This is being done in California with good success since it is found in general that people like to preserve the natural aspects of their land. Mr. Grant, leasee of Cistern Cay in the Exumas Park area, has agreed to full cooperation already.

4. Publicity and education. These are major Trust activities. The publication and distribution of park information in particular and Bahamas regulations on wildlife in general, will be handled by the Trust in cooperation with the Bahamas Development Board. The Yachtsman's Guide to the Bahamas would be a good place to publicize the park and to publish regulations. A series of books might be contemplated. Dr. Norman Newell, of the American Museum of Natural History has offered to write a short geology of the Bahamas and other volumes on fishes, corals, birds, mammals, general ecology of the Bahamas and reptiles might be contemplated. School visits to parks and school lectures on conservation should be considered.

C. Ranger

At least one ranger should be placed in the park area, given adequate housing, a marine radio, a camera for the recording of violations, a boat and motor, binoculars and incidental supplies. It is suggested that Cistern Cay in the middle of the park area be used as a ranger station if permission can be obtained from the leasee, Mr. Will C. Grant. The ranger should have constabulary status and training. His salary should be in accord with other out island constables or perhaps a little higher in view of the special training he should receive in park affairs. His selection, possible from among existing constabulary, should be made jointly by the Trust and the Bahamas Government. His salary is to be paid by the Trust. He should be required to periodically submit a log of visitors to the park to the Trust.

D. Funds

The Trust will endeavor to raise most of the money needed by subscription. Eventually, some Government aid might be necessary as the value of the park to the economy of the Bahamas is realized. Certain Government services, such as logistic support, radio service, publicity, etc., might be made available from the outset. As soon as possible the park should be placed on a self-supporting level, possibly through concessions (See Section I. E.).

E. Park headquarters, and tourist accommodations

At a future date, limited accommodations should be set up for visitors to the park. Norman's Cay, if integrated with the park area, would be the best site for development, with utmost care being taken to preserve the island atmosphere of the park and with emphasis on boating and not hostelry as the principal accommodation. As is the case with the U. S. National Parks, the development of the accommodations might best be handled through a concessionaire, responsible to the Association. With such development, additional wardens and guides would become a necessity.

F. Park regulations and restrictions

1. The land areas of the Park should be completely closed to hunting of any sort or to cutting of foliage or gathering of flowers, corals or souvenirs,

including rocks and fossils, with the exception of dead shells picked up on the beach.

2. The marine areas should be closed to all types of fishing except trolling and then only in the deeper cuts or in deeper water over 10 fathoms, and to the collection of any marine animals or plants. The possession of spear-guns of any sort should be considered an offense. In case of those persons who are on transit to other areas, possessing legal spear-guns (see II, C), these should be checked with the warden. Aqua-lungs and underwater cameras are to be permitted.

3. Natives permanently domiciled in the park area should be allowed to fish, but not to hunt or to spear-fish, and then only for their personal use and not for commercial purposes, within the Park area. In case even this pressure is determined to be a cause of decimation of resources, the Trust may recommend that further regulations be imposed.

4. Aids to enforcement. The help of responsible charter captains should be obtained in reporting Park violations. The charter boat captains will benefit most immediately from the establishment of this Park, and should be most helpful, if approached properly. Reports of the numbers of boats in the Park area would be facilitated by radio contact between the ranger and airplanes, regularly scheduled or otherwise, flying over the Park area.

5. Discarding of garbage on land or sea should be forbidden.

6. Penalties. The violations of the Park regulations should be punishable by fines already existant as law in the Bahamas. Confiscation of boat should be the heaviest fine, imposed when the offense consists of hunting or fishing in the Park area.

7. Taking of specimens for scientific purposes is to be forbidden (both animals and plants) except under petition to the Trust.

G. Biological Aspects

1. The status of the wildlife in the Park should be determined by periodical surveys conducted under the auspices of the Association. Outside scientific investigation within the Park should be welcomed as long as results are made available to the Association. It is only through such scientific work that sound wildlife conservation can be practiced.

2. Introduction of species. The Bahamas' unique fauna and flora demands that exotics not be introduced. Such practice almost invariably results in the destruction of the endemics. Nevertheless, certain native species deserve encouragement or reintroduction in areas where they have been extirpated. Iguana, dildo cactus, white torch tree, Sergeant's palm, conch, and white-crowned pigeon are outstanding subjects for encouragement.

Sea turtles (particularly breeding green turtles), Bahama parrot, flamingo are more difficult species which are worthy of study along these lines.

11. Bahamas in General.

The following are statements of desirable policy. Most deserve a further report with specific recommendations.

A. Bahamas National Trust

1. The Trust should be empowered by law to acquire title to other lands than the Exumas Park under consideration and to act as a single agency, similar to the National Trust of Great Britain, or to the U. S. National Park Service, for the preservation of points of natural beauty or interest and to advise the Government on conservation matters. Such integrated, single-agency planning is of greatest necessity for the future economic and natural resource health of the Bahamas.

2. Important areas that might soon come under the jurisdiction of the Trust include the following which should be declared Wilderness Preserves by the Department of Agriculture until the Trust is empowered to act:

(a) Upper Lakes of Inagua. This may well be the most spectacular land area in all the Bahamas, of inestimable value both to future tourism and to the status of the national bird of the Bahamas, the flamingo. The activities of the Society for the Protection of the Flamingo in the Bahamas could be integrated with those of the Turst and inquiry could be made to SPFB on this. Also here are roseate spoonbill, reddish egret, wild jackass, Bahama parrot.

(b) South Andros, especially Grassy Creak Area. Former large flamingo colony. Sea turtles still fairly abundant and in need of protection. Scenic area for creek fishing.

(c) Abaco Marls. Flamingo colony and possibly parrot.

(d) Green Cay (East of Andros). Valuable white-crowned pigeon rockery.

(e) Land-sea park near Nassau. An important and easily accessible area, as yet fairly primitive is the Athol-Rose Island area. Some of this is already protected in some ways, but full park status and development is needed. The reefs and beaches there are among the finest in the Bahamas. Unfortunately, the waters contain no conch now and large fishes are largely speared out and some of the smaller ones are "spooked", but restoration should only be a matter of a few years.

(f) Allen's and Leaf Cays. Good populations of the native Bahamian iguana are still to be found and the animals are still friendly there.

(g) Sea gardens. Some of the finest reefs in the world are Bahamian. Only the reefs of the New World have the gracefully swaying sea fans and gorgonians (sea whips) in abundance, so have a beauty of motion that is lacking in the Red Sea and Indo-Pacific reefs. For this reason, some people think New World reefs are the most beautiful anywhere. Some in the Bahamas are well known to fishermen and thus have suffered to a great extent in that the fishes are not nearly so plentiful or friendly as they were even five years ago. These are those of Rose Island, Lyford Cay, and Goulding Cay. These should be protected and restored by natural means. Still largely untouched are the reefs of Andros, particularly near High Cay and those of Abaco, probably the best in all the Bahamas.

B. Protected Species and Sanctuary Areas

1. Some species are valuable aside from their attraction to tourists. These are the commercially and scientifically valuable ones. Also, thinking in terms of whole faunas and floras rather than in terms of species, some areas are interesting and valuable because of their unique combination of life. The Department of Agriculture and Marine Products has at present the power to declare sanctuary areas or to protect species (even though enforcement is in some cases lacking). The above-listed areas deserve immediate protection by the Department with stiff fines imposed. In addition, commoner, but no less endangered species from the point of view of their commercial or sporting value, deserve action. These are marine species such as turtle, conch, and lobster, and terrestrial species such as iguana and white-crowned pigeon. Some of the breeding grounds of these should be set aside so that the numbers of these animals can build up. As protection results in increased numbers, as it will in surprisingly short time, harvesting of the yearly surplus should be permitted. Only in this way will future productivity be assured.

2. Commercial coral collecting for the souvenir market should be immediately banned. Whole reefs have been removed from Florida waters for this purpose and the pressures have already begun in the Bahamas. The result of large-scale coral removal is the destruction of the homes of the reef fishes and a decreased fishery.

C. General Rules for the Sea

Setting the Exumas Park aside from almost all others in the world are the facts that it includes a reef and that its concept is one of land-and-sea with similar conservation policies for both realms. But it is the special addition of the marine realm that sets the example as a Bahamas Plan (See Introduction). The following is a general outline pertaining to the sea that should be followed in the Bahamas:

1. Areas closed to spear-fishing. The nature of man's first encounter with animals greatly influences how they come to react to him. Man has hunted land animals for so long that he accepts their fear of him. The situation below the water's surface is quite different. There man is accepted and those who have experienced this acceptance realize its value. Even limited spearing teaches fishes to fear man and areas where spear-fishing has been practiced are said to be "spooked". Almost all of the seas near Nassau are in this unfortunate state. Large areas in the Bahamas need to be set aside for the prohibition of spear-fishing. Limited hook-and-line fishing in these areas could still be practiced since this does not result in "spooking".

2. Spear-fishing apparatus. High-powered guns (all those except the Hawaiian sling) should be prohibited and their possession in the Bahamas illegal. The aqua-lung should be prohibited while spearing. These rules are already accepted by many spear-fishing clubs in the states and elsewhere in the interests of sportsmanship. In spite of laws to the contrary in the Bahamas, our survey team was treated to the sight of high-powered guns and aqua-lungs--to be used together--arriving at the airport in large quantity and passed by customs last January. One group so equipped was headed for the Exumas. Enforcement is needed.

3. Protected species. Just as song birds are protected on land, so should parallel groups (butterfly fishes, wrasses, angelfishes, etc.) be completely protected in the sea. The beauty of the reefs is gone without numbers of these just as the forests seem dead without birds. Scientific collection of non-game species should be permitted after petition to the Government.

4. Game species. Other species are to be labelled "game" or "commercial". Basses, mackerels, jacks and spearfishes are outstanding among these. Season and bag limits should be established for most of these, when this has not already been done.

5. Licensing. Sports fishermen should be licensed, with a moderate fee to go to the enforcement, conservation, and regulatory agencies. Resistance will be forthcoming to this suggestion, yet never was such action more needed. It is accepted for the land and the sea is no different. The Bahamas Government has every right, and in fact an obligation, to ask that those who use the resources contribute a certain fee in order to insure the perpetuity of the resource which they reap. The license would not, however, be a permit to fish in any park area.

D. The Trust will, upon request of the Bahamas Government, endeavor to make further reports on any of these aspects which we believe are most important to the future economical and esthetic development in the Bahamas where resource dependency is so heavy and vital.

EXUMA CAYS PARK
LAND-AND-SEA