Biscayne National Park

Biscayne Expedition Teacher Guide

Produced by Biscayne National Park Staff and Volunteers
Updated 09/2011

This guide is available on-line at www.nps.gov/bisc/forteachers

Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul.
John Muir (1838-1914) Naturalist

Dear Educator:

Since its establishment in 1916, the National Park Service has been challenged to preserve and protect the natural and cultural treasures of the nation. An important ingredient in meeting this challenge involves instilling in our children an understanding and appreciation of the world around them. Education is the key to understanding complex natural systems, the values and diversity of our nation's history, and our global environment and the threats it faces. In recognition of its responsibility, Biscayne National Park is pleased to offer this educational opportunity for area schools. This program has been developed to enhance classroom instruction and has been designed to meet curriculum standards for the State of Florida.

The Biscayne Expedition Teacher Guide outlines the residential environmental education program available at Biscayne National Park, linking your field trip with classroom studies. The guide will also assist teachers and other field trip leaders in planning and conducting their trip to the park. We encourage your participation and solicit your suggestions on how we can improve our service to you and your students.

We look forward to your visit.

Sincerely,

Mark Lewis
Superintendent

"It is our task in our time and in our generation to hand down undiminished to those who come after us, as was handed down by those who went before, the natural wealth and beauty which is ours." John F. Kennedy

Setting the Stage

Interpretation and education play an important role in conveying the significance of our national parks. Because national parks belong to all of us, we have a responsibility to protect them for future generations. Understanding their importance to our natural and cultural world is the first step toward preservation.

Education has been a goal of the National Park Service (NPS) since its creation in 1916. Education focused on general visitors until the 1960's when the NPS Office of Environmental Education was established. Through this effort, curriculum materials and programs focusing on environmental education were developed. The 1970's and Bi-Centennial of the nation moved education to focus more on history. In 1989, the Department of the Interior began to re-evaluate its role in education and, as a result, held the first meeting of the NPS Education Task Force in 1990. Building on that momentum, in 1991, the 75th Anniversary Vail Symposium "Our National Parks: Challenges and Strategies for the 21st Century" produced strategic objectives for the agency, including an Education and Interpretation Strategic Objective.

In 1993, the National Park Service established the first Cooperative Park Education Unit (CPEU) in the country. One of the goals of the CPEU is to further the educational mission of the agency by developing practical tools to assist field rangers. Parks as Classrooms supports this goal.

The first item listed in the report receommends that the National Park Service "embrace its mission, as educator, to become a more significant part of America's educational system by providing formal and informal programs for students and learners of all ages inside and ouside park boundaries".

In 1999 the Director of the NPS asked the NPS Advisory Board to "develop a report that should focus broadly on the purposes and prospects for the NP System for the next 25 years."

The Advisory Board is a congressionally chartered body of citizens appointed by the Secretary of Interior charged to provide advice on matters relating to operations in the parks and management of the NPS. The first item listed in the report recommends the National Park Service, "Embrace its mission, as educator, to become a more significant part of America's educational system by providing formal and informal programs for students and learners of all ages inside and outside park boundaries."

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Environmental Education

Biscayne National Park provides a unique outdoor learning laboratory for discovery during a 3-day, 2-night field trip for 5th-7th grade classes. Special exceptions can be made for other grade levels not listed above.

At Biscayne, the subtropical marine habitats, maritime history, as well as environmental issues, provide learning opportunities that reinforce and enrich school curriculum. Using Biscayne National Park as a model of the earth's natural systems, teachers and students can gain new insights and skills for experiencing, appreciating, understanding and caring for the environment and all its inhabitants. The park is able to introduce future users to principles of safe and minimum impact enjoyment of the resources. It also provides the park with an opportunity to instill concern for fragile ecosystems and the ecosystems' problems in these future voters and community leaders.

School camping visits to Biscayne National Park began in 1976 as an extension of the Everglades National Park education program. The program began on Elliott Key and moved to Adams Key during the 1980-1981 school year, but due to facility damage from Hurricane Andrew the camp was moved back to Elliott Key in 1993.

Biscayne National Park's Primary Theme

The past, present and future are reflected in Biscayne National Park's waters, connecting South Florida's communities to one another and to the human spirit.

Environmental Education Program Goals

- To bring about a greater awareness of Biscayne's resources and programs and its place within the context of the National Park System and the global community.
- To provide an outdoor learning experience that speaks to the needs of a diverse population and is accessible to all geographic and socioeconomic segments of South Florida.
- To provide programming that addresses the whole person and challenges students to respect themselves, others and the world around them.
- To develop and promote critical thinking skills so that students can learn to make informed decisions.
- To conduct an Education Program that is issue oriented as well as resource oriented.
- To cultivate values and behaviors which lead to the preservation and protection of Biscayne's resources.

PARTICIPATING IN THE PROGRAM

Biscayne Expedition is conducted on Elliott Key. It is an overnight program with a maximum of 25 students and a mininum of 15. The camping program uses three-day time blocks during the school week (Monday-Wednesday and Wednesday-Friday). During a holiday week Tuesday through Thursday may be requested. A four day program may also be requested during a holiday week.

Workshops

In order to participate in the camping program, interested teachers must attend a mandatory two-day weekend workshop. The workshops provide teachers with the hands-on experience and knowledge to prepare and participate in the camping experience. They introduce new ideas and techniques, make teachers more comfortable with the Biscayne environment, and reinforce good relations between school and park staff. Any other teachers or chaperones that will attend the camp with the students are also encouraged to attend.

Attendance is mandatory for returning schools if they are changing camp leaders, or if they had issuess with their previous camp.

Scheduling

Expedition field trip reservations are accepted online (www.nps.gov/forteachers). The reservation form is available at the start of the school year. Trip reservations are filled on a first-come, first-served basis, and are finalized in mid-October. You do not have to be workshop qualified to secure a date, but you must attend the camping workshop prior to your class visit. Reply letters are sent to all teachers who submitted reservation requests. Since teachers tend to favor the same dates, it is important to request your reservation early. Flexibility is important when choosing camp dates and earlier camps tend to have fewer problems with mosquitoes.

A waiting list is maintained **in** case of cancellations. We also encourage teachers who think they might particpate in the program in the future and want to learn more about the camp to come to the workshop.

Transportation

Each school must arrange and pay for its own transportation to the park. It is best to transport students to and from the park in a bus; insurance is not an issue, and loads of camp gear can easily be stowed. Some schools do transport students and gear in private cars. Whatever method you use, it must meet school board regulations.

******One vehicle must remain at the park for the duration of the camp**. Students are not permitted to ride in park service vehicles.

Trip Reservation and Confirmation

When a camping date has been reserved, a confirmation will be sent to your school. This is a good time to begin working on your schedule. Communicating with the education coordinator in advance of your camp ensures your program meets your educational goals. Rangers can assist you with realistic time schedules and expectations. Of course, just like teachers, rangers will differ in their expertise and interests. It's important to discuss the camp schedule and activities with the ranger assigned to your camp beforehand, so that <u>your</u> objectives, as well as the park's are met. It is helpful to let the ranger know about your class' dynamics, any disabilities or special health concerns.

PROGRAM PARTICIPANTS

Lead Teacher

The camp leaders have a variety of duties. They work closely with the park ranger and their school making sure that the student experience meets the goals of the program and the school system. The lead teacher is in charge of the camp, but also delegates responsibility to the other teachers and chaperones.

The camp leader will work with the school principal and with the park to arrange a date for the camp. Proper adherence to school system regulations such as swim testing, parental permission slips, travel authorization, insurance, arranging transportation, etc. is a must. They will also prepare an agenda for the camp and talk to the park ranger at least four weeks in advance to resolve any conflicts. It is important to notify the park of any changes you make in your program plans. If you must change the size of your group, the length or time of your program, or make a cancellation, notify us immediately so that we can make necessary adjustments if possible. ***The boat trip to the island is provided by an independent business. There are other customers who rely on their services.

Setting up a “Parent Night” with a park ranger is an excellent way to answer questions and address any concerns that families may have. Chaperones are chosen by the lead teacher and may be other teachers or parents. Chaperones who attend “Parent’s Night” are generally more prepared for the camping experience. It is also possible to set-up a video conference using Skype for the “Parent Night” or to interview the ranger before the camp.

It is up to the lead teacher to set up a menu, arrange for buying the food, and make arrangements for proper refrigeration (ice and coolers). Ice is available on Elliott Key. They are also in charge of making sure they have transportation to and from the park and gathering the necessary group equipment. Free buses may be available.

They should ensure that all students have the necessary clothes and personal gear. Review the gear list with the students. Jackets or raincoats are necessary if it is cool or cloudy. Open-toed shoes and sandals are dangerous and should not be worn. Old clothing is advised since activities will require sitting on the ground and wading in water. Included in this packet are checklists to organize your planning. If you have problems or questions please contact your ranger. Above all, the lead teacher must be thoroughly committed to the camping program-sharing their enthusiasm with the other teachers, chaperones and students.

Park Ranger

Park Rangers are the liaisons between Biscayne National Park and the schools in the program. The lead teacher and the park ranger maintain close and frequent communication. The park ranger assists the schools in becoming proficient in conducting a camping program.

Workshops are conducted by park rangers to assist leaders in preparing the camp agenda and dealing with logistics. During the camp, the park ranger is with the students until 4 pm on the first day and returns to the island at 2 pm the second day. The ranger will spend the second night on the island and be with the group for the remainder of the trip. The ranger who is on your trip will be the ranger who attends parent and student meetings before the camp date.

Chaperones

Chaperones are an integral part of the park visit, and at times, can make the difference between a successful camp and a difficult one. A minimum of one adult chaperone or teacher for every five students is required, with a maximum of eight chaperones allowed per camp. Children look at adults as role models- they will watch and model the adults' actions and reactions. Teachers should review the chaperone responsibilities on pages 26-27 with all adult participants. These guidelines, printed in English and Spanish, can easily be copied as a handout. Familiarize chaperones with camp rules and provide them with a framework for how the camp is organized. Chaperones must follow the same rules as the students. They should be prepared to participate and be responsible for the safety and discipline of their tent group. We ask that if chaperones must smoke they do so away from the students.

Please impress upon the chaperones that this is a learning experience. Although we want the students to have fun, it is not the time or place for frisbees or electronic games. We want the activities to be centered around national parks, camping and the environment.

Students

The camping experience is strictly reserved for 5th-7th grade students. Exceptions can be made by contacting the education coordinator.

Impress on students that this is a school trip and that they are there to learn. However, education is not the only goal of the program. Many of these students have never been away from their families, and have never had to make decisions for themselves. Take advantage of this growth experience. Students often leave their camping trips feeling more self-reliant. The staff at Biscayne National Park want the students to enjoy their camping experience and remember Biscayne National Park as a special place.

Parents

Some parents may feel more comfortable letting their children participate if they can attend a "Parent Night" where they can ask questions and discuss concerns about the camp. Parents can help by providing encouragement to their children for what may be the child's first night away from home. In some cases, parents may be called upon to provide transportation or to assist as chaperones. Parents of all children must fill out medical forms and review personal gear lists to ensure that students have the appropriate gear. Parents need to impress upon their children the importance of appropriate behavior on this expedition.

PLANNING YOUR FIELD TRIP

Preparation

To enrich your field trip experience, prepare students, chaperones and parents prior to your visit. Research has shown that well prepared groups learn more, behave better and have a better time.

- Make the trip a part of a unit of study. Language arts, fine arts and social studies as well as science can be taught on field trips to the park.
- Involve your group/class in planning the program and in what to wear and bring.
- Study the area you will visit; look at pictures, familiarize yourself with the Park and Biscayne Bay, plan to look for specific things on the trip.
- Make sure your group understands the program logistics: how long they will stay on the island, the length of the boat trip, when they will eat and what they can expect to see and do.
- Assign Field Team roles, if using, and incorporate into classroom activities (see next page).
- Maintain close communication with parents, chaperones and rangers.
- Don't hesitate to call and talk to your park ranger or the park's education coordinator should you have any questions or concerns about the camp.

Field Teams (Optional)
Pre-assigned tent groups will also act as field teams throughout the entire expedition experience. This will allow students to stay more focused on tasks and programs and gain a better uderstanding of the scientific process.

If you would like to incorporate this into your camp, please notify the lead ranger and prepare your class accordingly, as it will be a theme woven through the entire camp experience. *Using field teams is also the only way stuednts will be allowed to use the park's digital cameras.*

On the Field Team, each student will have a role and be responsible for corresponding duties during each activity, throughout camp (shoreline walk, labs, teacher-led activities, etc.). Students should be assigned a role and understand it prior to arriving for expedition (see next page).

Field Team roles and responsibilities:

1. Principle Investigator

The principle investigator is responsible for managing the team.

Responsibilities -
- Reads directions to the group;
- Keeps group on-task;
- Main group member who communicates with the teacher;
- Shares summary of group work/ results with the class.

2. Data Recorder

The data recorder is in charge of recording all data.

Responsibilities -
- Records data in tables and/or graphs;
- Completes conclusions/final summaries;
- Assists with conducting lab procedures;
- Assists with clean-up.

3. Lab Technicians (2)

The lab tech(s) is/are responsible for obtaining all necessary materials and/or equipment for the lab.

Responsibilities -
- Main people who pick up needed materials;
- Organizes materials and/or equipment in the work space;
- Facilitates use of materials during investigation;
- Assists with conducting lab procedures;
- Returns all materials at the end of lab to designated area.

4. Photographer

The photographer is responsible for operating the camera and associated equipment.

Responsibilities -
- Operates camera and takes photographs;
- Responsible for keeping track of camera and other technology;
- Assists with conducting lab procedures when not photographing;
- Keeps track of time;
- Assists other team members as needed.

THE SIX WEEK COUNTDOWN
Coordinator's checklist

Week Six

_____ 1. Write memorandum to appropriate office requesting permission for out-of-county travel, if necessary.
_____ 2. Confirm date for camping with Biscayne National Park program coordinator.
_____ 3. Select goals and set standards for behaviors.

Week Five

_____ 1. Select chaperones.
_____ 2. Initiate student selection process.
_____ 3. Arrange for transportation (bus or private cars).
_____ 4. Supervise selected staff in planning and carrying out responsibilities.

Week Four

_____ 1. Finalize student selection (15 minimum, 25 maximum).
_____ 2. Initiate menu planning.
_____ 3. Order instructional supplies for on-site activities, if needed.
_____ 4. Arrange for parents' night with park ranger.
_____ 5. Send any special requests for camp activities to the park's education coordinator.

Week Three

_____ 1. Contact park ranger assigned to your camp to discuss camp schedule (305-230-1144 x 08).
_____ 2. Begin pre-site activities with selected students.
_____ 3. Initiate student orientation to specific campsite behavior.
_____ 4. Orient chaperones to day-to-day activities and precautions for safety and well-being.
_____ 5. Collect all money if applicable.
_____ 6. Obtain signatures on Assurances and Release of Liability forms if private transportation is used.

Week Two

_____ 1. Hold parent night with students, parents and park ranger.
_____ 2. Organize a ranger pre-visit with students at the school (optional).
_____ 3. Assure that all permission slips be on file this week.
_____ 4. Conduct joint staff/chaperone final planning session, review emergency procedures.
_____ 5. Continue pre-site activities for students.

Week One

_____ 1. Contact assigned park ranger to finalize details of camp schedule and any logistical concerns (equipment needs, etc.).
_____ 2. Assist assigned staff in checking camping equipment and proper emergency procedures.
_____ 3. Continue pre-site activities for students.
_____ 4. Assign students to tents, to a chaperone, and Field Team (optional); have each tent group/Field Team pick an appropriate name that pertains to Biscayne National Park and make a sign for their tent.
_____ 5. Have 3 copies of emergency contact and medical information forms. One will remain with teacher and two will be given to the park ranger when arriving.

One Day Before

_____ 1. Call the park to verify that no emergencies (mechanical breakdowns, weather, etc.) have occurred that may cause a postponement or cancellation of the trip.

Two Weeks After

_____ 1. Mail in camp evaluation to program coordinator.

PREPARING THE CAMP SCHEDULE

Camping trips are most successful when a school comes to Biscayne National Park with an agenda that has every minute of the stay planned. This does not mean that every minute from dawn to dusk is filled with activities. Instead, it means that periods of activity, meal preparation, clean-up, and rest are all mapped out prior to the beginning of the camp. The schedule should be carefully balanced to include active, fun, quiet and educational activities. If everyone knows what is to be done, and when it is to be done, both teacher and students benefit.

Program schedules are meant to be highly flexible and should be designed to meet the needs, interests and circumstances of each educational group. Camp experiences can follow many courses. To ensure a successful camp, teachers, students and Biscayne staff should work cooperatively in establishing purposes for the camp experiences and developing the means of achieving the desired outcomes. Some groups may prefer an informal structure with students involved in individual or small group inquiry and exploration. Others may want a more structured schedule, with teachers and park staff leading large groups in field explorations and activities.

The teacher should begin to prepare the camp schedule well in advance of the camp date. The first step in preparing the schedule is to determine the objectives for the camp. The overall goals and objectives of the camping program should serve as a framework for setting individualized objectives for a particular school. Once these objectives are formulated, the actual schedule can be planned.

When reviewing your schedule the ranger will see that the schedule fits in with the plans of the other camp that week and with the availability of boat transportation. Biscayne National Underwater Park, Inc. is a private concessionaire in the park that provides transportation to and from the island. On Wednesday it is possible to have one group leaving while another is arriving. Because of this, tent set up or breakdown may not be necessary for some camps.

At least two weeks before the camp, submit a copy of the teacher-led activities planned for your camp. Consult with the park ranger concerning the ranger-led activities and your needs. The three general ranger-led activities are the hammock hike, the shoreline walk and the night hike. Other activities are available when given ample prior notice. Together you will decide where to include ranger assistance and activities. (Due to life guard certification, the shoreline “wet” walk requires ranger assistance for all schools.)

BISCAYNE NATIONAL PARK CAMP SCHEDULE

Copy this form and return to:
Biscayne National Park
Education Coordinator
9700 SW 328 Street
Homestead Florida 33033
Fax: 305.230.1190

Make a copy of this request for your records.

School: _____

Principal's name: _____

Coordinator's name: _____

School Telephone: _____

Coordinator's home phone (optional): _____

Name of NPS Ranger: _____

Dates of Camp: _____

Time Activity
DAY ONE

_____ Arrive at school

_____ Pack bus/cars

_____ Leave school

9:30 Arrive at Biscayne National Park Visitor Center
*Welcome/Orientation by Park Ranger
*Load boat
*Safety regulations for boat trip (allow 45 minutes from bus arrival to boat departure)

10:30 Depart from Convoy Point (30 minutes from Convoy Point to Elliott Key)

11:00 Arrive at Elliott Key
Unload boat (30 minutes)

11:30 Camp tour, rules and regulations, move into assigned tents

12:00 Bag Lunch (30 - 45 minutes)
Make sure lunch for the 1st day is easily accessible.

12:30 Set up camp (allow 1 hour if tents need to be set up, if not, allow 30 minutes)

2:00 Hammock Hike and Intertidal Zone Exploration (also choose Hammock Bingo, Camouflage Trail, Plant ID and/or I&M): _____

_____

Ranger conducted activities end by 3:45 pm.
Ranger will leave the island at 4:00 pm.

4:00 Teacher conducted activities (I.e. fishing, labs, Black Caesar's Legend, skit prep): _____

_____

Time	Activity
	Dinner and Clean up (allow 1 to 1 1/2 hours) Begin early enough to finish 20 minutes after sunset.
	Teacher-led evening activities (I.e. Bat & Moth, Night Smells, Night Sounds): _____
	_____
9:30	Hit the Sack!
10:00	Lights out

DAY TWO

7:30	Breakfast and Clean up (allow 3/4 - 1 1/2 hours)
8:30	Teacher conducted activities (I.e labs, Role Playing, Fishing by the Rules): _____
	_____
12:00	Lunch and Clean up (allow 45 - 60 minutes)
1:00	Teacher conducted activities (I.e Predator Prey, Commons Game, etc.): _____
	_____
2:15	Shoreline Walk and Mangrove Exploration: _____
	_____
	Ranger will arrive on the island by 2:00 pm. Ranger led activities will begin at 2:15pm.
5:00	Dinner and Clean up (allow 1 to 1 1/2 hours) Begin early enough to finish 20 minutes after sunset.
6:00	Rest time and/or prepare for evening activities
6:30	Nike Hike (also choose night smells, night sounds and/or bug light): _____
	_____
8:00	Campfire
9:30	Hit the Sack!

Time	Activity
DAY THREE	
	Rise and Shine
Sunrise	Sunrise Activity (Choose one painting, creative writing and/or self reflection time):
	_____
	_____
7:30	Breakfast and Clean up (allow 3/4 - 1 1/2 hours)
8:30	Pack belongings - move gear next to dock for loading (allow 1 to 2 hours) Clean tents Clean classroom Clean restrooms Litter patrol Chaperones will need to assist with supervision of these activities
9:30	*Tent inspection
9:45	*Take down the tents All groups will have a tent inspection. Tents may be left up if another school will be using them that day
10:30	Evaluation and/or closing activity
11:00	Lunch or snack (or wait and eat at Convoy Point) Clean up
11:00 or 11:30	Load boat (allow 30 minutes)
11:30 or 12:00	Depart from Elliott Key (allow 30 to 45 minutes)
12:00 or 12:30	Arrive at Convoy Point (allow 30 minutes)
12:30 or 1:00	Unload boat Load bus/cars
_____	Lunch (if not eaten on the island)
_____	Depart from Convoy Point
_____	Arrive at school

ACTIVITY PLANNING

Ranger-led Activities

While the ranger is on the island there are three general activities that can be modified to fit the needs of your camp: the hammock hike, the shoreline "wet" walk and the night hike. During these activities it is helpful to have teachers and chaperones evenly spaced throughout the group. There always needs to be an adult at the back of the group.

1. The Hammock Hike will take students through the hardwood hammock in the interior of Elliott Key. Students will become familiar with characteristics of the hammock while learning about the plant and animal species found there. The trail through the hammock, known as Spite Highway, will lead to discussion on the history of the island. Some rangers/teachers like to take this opportunity to visit the ocean side of the island, explore the wrack line and intertidal zone and participate in a shoreline clean-up. The hammock hike generally takes 1 1/2 to 2 hours. It is recommended that students wear long pants during this activity because of mosquitoes.

2. On the shoreline walk students explore the bay communities. Students will be walking through the water along the shoreline with glass bottom buckets and dip nets. This experience is generally one of the students' favorites. Often students find a wide variety of marine life and are able to observe creatures they have never seen before. The shoreline walk cannot be done without a ranger. Student safety and resource protection must be discussed before students enter the water. This activity takes at least 2 hours.

3. Exploring the island at night is an experience that your students will never forget. During the hike only chaperones may carry a flashlight and they are to be used only in the case of an emergency. This will allow students to experience "night vision" without the distraction of lights. Students should walk in tent groups with their chaperone. The ranger will be near the front of the line and there should always be an adult at the back of the line. This activity takes 1 and ½ hours and can be ended with a campfire on the ocean side of the island.

Although these activities are ranger-led, feel free to discuss specifics with your ranger. Biscayne National Park wants the program to meet your educational goals. The campfire and sunrise activities can be led by the ranger or the teacher. Let your ranger know how you would like to make use of these times.

Teacher-led Activities

Teachers are responsible for activities on the first evening and on the morning of the second day. Tell the ranger prior to the camp if you would like to lead any of the activities while they are on the island. The activities listed below have been successfully used at camps in the past. Pick and choose from these, create your own or consult the ranger for additional ideas.

Each planned activity should have its own objectives. For example, an objective for a poetry writing activity might read, "At the end of this activity, each student will write one poem which compares Biscayne environments with their school and community environments."

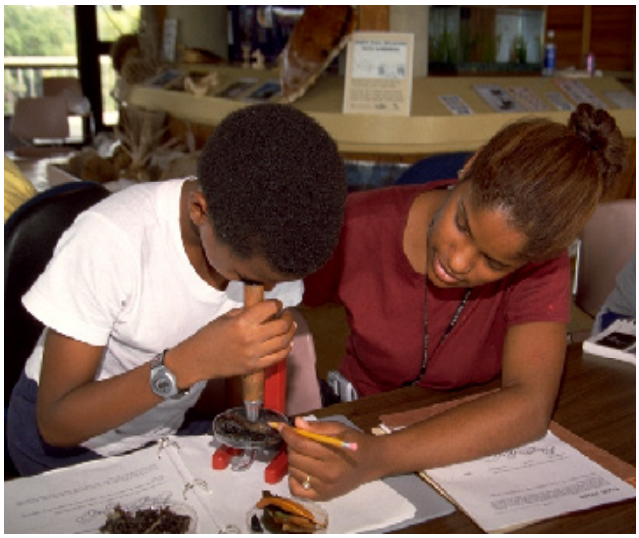
Fishing can be a valuable experience for students, and can be used as a teaching tool in many ways, if permitted in your school district. It is the perfect opportunity to teach kids the values of a resource and the regulations imposed to protect that resource. All fishing should be done off of the maintenance dock. Please make sure the students are following the fishing regulations. These regulations will be available to you in the Elliott Key classroom.

All rangers involved in the camping program are required to have lifeguard certification. However, swimming is an activity that is controlled by school board regulations. This activity is not a ranger led activity and should not be scheduled for times when the ranger is on the island. <u>If you are considering swimming as an activity a certified lifeguard must be present.</u>

Activities related to Biscayne National Park can be done before and after the camp to enhance the experience. Pre-site activities are a great way to prepare students for the trip. Reviewing maps of the area or compiling vocabulary lists will familiarize students with the park before their arrival. After the students experience Biscayne National Park, many teachers find it valuable to have students share their experiences with others. This may involve further research into specific subjects, allow students to learn effective communication skills and promote support for the program. The park will help provide the teacher with pre and post-site activities.

Simple Activity Ideas

- Sciene Labs
- Journal Writing
- Creative Writing
  - -Pioneer POV
  - -Wildlife POV
- Wildlife observation and drawing
- Photography
- Public Service Announcement skits
- Cooperative games
- Orienteering activities
- Star gazing
- Weather reading
- Plankton Netting
- Squid dissection and fry
- Sing-a-thon using songs about the park and environmental awareness



CAMP RULES

The camp rules were established to protect both the students and the resources in the park. Please discuss the following rules with your students and chaperones.

GENERAL CAMP RULES

1. All the plants, animals, shells and rocks in the park are protected. Plant specimens or parts of plants may not be collected.
2. In keeping with the wilderness philosophy, no radios, tape players, electronic games, balls or frisbees are allowed at camp.
3. Closed shoes must be worn at all times, except in tents.
4. Stay within camp boundaries. Students may only go beyond boundaries to explore with a chaperone. Stay on the trails.
5. Life jackets must be worn whenever you are on a boat, on the dock, or in the water.
6. The dock is off limits except when accompanied by a teacher or chaperone.
7. Long pants, socks that cover ankles and sturdy shoes (no sandals, aquasocks or flip flops) must be worn on shoreline activities. Capri pants are not acceptable.
8. Walk at all times. It's very easy to trip on the limestone if you are running.
9. Students should walk with flashlights at night (unless instructed otherwise by a ranger/ teacher during a program).
10. Noise is pollution, too. Quiet hours are from 10:00 p.m. to 6:00 a.m.
11. Campers will be required to keep the tents, shelter, classroom, bathroom and grounds clean.

CAMPFIRE RING

1. Use the sticks provided by the park for roasting marshmallows.
2. Only six people at a time may roast marshmallows.

TENT RULES

1. No shoes inside tents.
2. When shoes are not on feet, they should be neatly arranged outside of the door of the tent. Inside the tent is okay overnight.
3. Use zippers gently; they are very fragile. When going in or out of the tent, zip the door zippers all the way open or closed.
4. Tents are for sleeping – no horseplay in or around tents.
5. No food, drink, candy or gum in the tents. This attracts raccoons.
6. Insect repellent must be applied outside the tents.
7. After lights out, students must take an adult to the restroom with them.

Trash Reduction Contest
The school who produces the least amount of trash during the camp season, will win a grand prize for their classroom from Biscayne National Park!

FOOD RULES

1. Food and garbage must be raccoon-proofed.
2. Raccoons can find food on their own - don't feed them!
3. Pour out all liquid (including milk) at designated location before putting excess food or empty drink containers in trash cans.
4. If you pack it in, pack it out. All trash will return to Convoy Point with you.
5. Separate trash from recyclable items. Let's slow the growth of our landfills!

EMERGENCY PROCEDURE

Emergency Assistance

During your camp the ranger will be with the group approximately seven hours a day. If there is an emergency while the camp ranger is on the island, then chaperones will be asked to help lead the group or be with a student for transport. Your camp ranger is trained in first aid and CPR but is not necessarily an EMT. The following is a list of procedures in the event of an emergency if the camp ranger is not on the island

Minor Emergency:

There is a first aid station located in the classroom with a complete first aid kit. If a situation is not immediately life threatening but you would like the assistance of an EMT, follow the steps listed below.

Step 1: Attempt to contact a ranger living on Elliott Key.

Step 2: Use the Park Service radio to contact Everglades Dispatch.

Step 3: If the Park Service radio is not working, use the VHF radio to call US Coast Guard on channel 16.

(Instructions for use of radios and phones are posted next to the above sources)

Immediately Life Threatening Situation:

Call Everglades Dispatch on the park radio. The instructions for using the radio are posted next to the radio. Dispatch is open 24 hours a day and will send the necessary assistance.

Parental Emergency Contact Information:

Students will not have access to a phone to call home. Should an emergency situation arise that a parent must contact his/her child during the camp, there are two phone numbers to use:

(305)230-1144 ext. 555 – Dante Fascell Visitor Center at Convoy Point. This number can be used from 8:00 am to 4:30 pm. Explain that your student is camping on Elliott Key and information will be given to the appropriate party.

(305)242-7740 - Everglades National Park Dispatch office. After 4:30 pm this number should be used. The dispatch office is open 24 hours a day. They can contact Biscayne National Park Rangers by radio at any time. MAKE SURE THE DISPATCHER UNDERSTANDS THE CHILD IS CAMPING AT BISCAYNE NATIONAL PARK!

SAFETY

The rules provided in this guide are designed to maintain safety. Anyone who is putting themselves or others in danger while on this trip will be removed from the island. Teachers and chaperones need to follow safety regulations for their own benefit, but also to be an example for students.

Wildlife

Insects are the most frequently encountered forms of wildlife on the islands. Insects will not spoil a camp unless you let them. They are not usually a problem during the winter/ early spring. However, one or two camps each season experiences an unexpected outbreak of mosquitoes and sand fleas. Bugs are a part of life on Elliott Key, so we accept it as part of the total experience. Put on long pants and a long-sleeved shirt, slap on some liquid or cream insect repellent, and go ahead with the schedule. Insects are an important part of the food chain in South Florida. If an outbreak occurs during your camp, don your bug jackets and seize the opportunity to include insects in your program. Insects such as fire ants, bees and wasps are not generally a problem, but do be aware of their presence.

Raccoons are one of only four mammal species found on Elliott Key. Raccoons cannot be ignored. Store all food and garbage securely at night. Do not allow students to keep or take food into their tents at any time. Raccoons easily smell food (even crumbs) from a distance. Do not attempt to feed the raccoons; remember they are wild animals. Enjoy them at a safe distance, and if they approach the picnic area, shoo them away. This provides an excellent opportunity to explain the negative effects of feeding wildlife.

Parents often express concern about snakes on the island. There are poisonous snakes, but it is doubtful that your students will get a chance to see one. Most of the snakes we see are of the non-poisonous variety.

Personal Protection

Students will need to bring and use some items to protect themselves from the elements. The sun can be intense so we recommend that all students use sunscreen, wear a hat and bring a water bottle to prevent dehydration.

Students will also need to bring insect repellent. The most effective insect repellents on the market are those that contain a chemical named N,N-diethyl-m-toluamide also known as DEET. Be aware that DEET is a very strong chemical. Students should be warned of this fact. Extra care should be taken with students wearing glasses. DEET will eat through plastics.

Fire Safety

Firewood is not provided by the park. Ensure that adults supervise the building of the campfire and keep an eye on it at all times. The campfire circle is located on ocean side of Elliott Key directly east of the classroom. Keep a bucket of water or a fire extinguisher close by. The gathering of tree limbs (dead or alive) should not be encouraged. Teachers should limit student activity around the fires in relation to the strength of the wind and the type of activity.

MEAL PLANNING

Meals at camp are a time for everyone to work together to satisfy their hungers after an exciting day. It's important to involve the students in meal preparation and clean-up. If camp leaders prepare a duty schedule before camp, each tent group can rotate cooking, dish washing and clean-up with the other duties at camp. Being in charge of feeding the whole group provides a sense of participation and confidence for the campers.

Since the students will be involved, and since the camp schedule is booked solid with activities, it's essential to plan meals that are filling and nutritious, as well as quick and easy to prepare and clean-up. School cafeteria managers can suggest serving amounts for various dishes you plan to serve. Remember to plan for a few extras, since campers tend to eat more than they generally would at home (especially since they are not allowed to bring any candy or extra food to camp). Students can be involved in menu planning; choosing foods they already know how to prepare (i.e. cereal for breakfast, sandwiches for lunch). Many teachers have found cafeteria managers willing to pre-cook dishes for them such as lasagna or baked chicken, (which can be frozen at school) so that it only requires re-heating at camp. Of course, camper favorites are still hot dogs and hamburgers on the grill. Remember, the only way to keep things cool at camp is by storing them in an ice chest. Freezing water in a gallon jug ahead of time can serve as an ice block. Any perishable foods that you bring will need to be eaten the first night. After that, rely on dishes that use canned products. Don't forget to bring a can opener. These are easy to store, raccoon-proof, and simple to prepare. Ready-made meals, such as canned spaghetti, can be doctored up with a few spices to make a meal the students really enjoy.

Finally, don't forget to bring drinks (lemonade or instant juice drinks), snacks (already cut up carrots and celery), and/or desserts (many camps like to make s'mores at the campfire). For the finicky eater or bottomless pit, having peanut butter and jelly on hand is a lifesaver.

Students should bring their own mess kits: an unbreakable plate/bowl, a drinking cup and a fork/spoon. If students want to pack a water bottle instead of a cup, it can be reused throughout the camp and carried with them on hikes. Do not bring disposable plates or cups. They are wasteful and create too much garbage. For a clean-up, three tubs are filled with water; one has soap, one has a small amount of bleach (chlorine) for disinfecting, and one is clear for rinsing. Students can each individually wash their cups and trays, or everyones dishes may be assigned a tent group.

When purchasing supplies, think about conservation, recycling and packaging. You should take everything home with you that you brought. Nothing will be left on the island. From the park, students will have a view of 'Mt. Trashmore', the landfill. Trash can be used as an educational experience.

SAMPLE MENU

Day One

Breakfast	At home
Lunch	Bag lunch from home, orange drink
Dinner	Pre-cooked chicken, dinner rolls, mixed vegetables, fruit cocktail, juice/milk
Snack	Granola bars, apple slices, orange sections

Day Two

Breakfast	Cereal, juice/milk, apple/banana/orange
Lunch	Cold cuts & cheese sandwich, chips/pickles, applesauce, lemonade
Dinner	Spaghetti, bread, salad, brownies, juice/milk
Snack	Peanut butter crackers, fruit

Day Three

Breakfast	Leftover cereal, muffins/bagels, cream cheese, apple/banana, juice/milk
Lunch*	Peanut butter & jelly sandwich, pretzels, carrots/celery, cookies, juice/milk

*Lunch on the last day of camp should be a fairly quick nourishing meal and should be prepared while cleaning up after breakfast.

Helpful Hints

- partially boil prior to camp or use frozen chicken breast strips
- sauce and noodles can be precooked
- milk can be frozen in its original plastic jug
- remember to minimize garbage, buy in bulk rather than individual packaging

PARK SUPPLIED GEAR

Biscayne National Park will provide the following equipment for use by school groups during their stay. *If any activity requires the use of the below art/office supplies please notify the ranger to ensure its availability.

Camping Equipment
Tents - 5 (10'x16' tents that sleep up to 6 people)
Ground Cloths - 5
Tent stakes
Mallets
Camp Stoves - 2
Garbage cans
Garbage bags
Dry Food storage boxes - 3
Rain ponchos
Water coolers with spout - 2
Dish washing pans - 4
Barbecue grills - 4
Rope
Safety Equipment
Life jackets
Bug jackets
Fire extinguishers- 2
First aid kit

Kitchen Equipment
Various cooking pots and pans
Mixing bowls
Serving dishes
Cooking knives
Long fork/tongs
Ladle
Spatulas
Serving spoons
Pot holders
Can opener

Program Equipment
Glass bottom buckets - 12
Dip nets - 13
Collection buckets
Compasses - 10
Hand lenses (small) - 10
Small microscopes (check with Ranger)
Monocular microscope (check with Ranger)
Slides/slide covers (check with Ranger)
Eye droppers
Petri dishes
Blindfolds - 30

Art/Office Supplies
Modeling clay (limited colors)
Yarn (assorted colors)
Crayons
Colored pencils
Pastels
Pencils
Felt pens & markers
Unlined white paper
Lined white paper
School glue
Construction paper (assorted colors)
Button maker and supplies
Butcher paper
Scissors
Stapler
Tape (masking)
Rubber bands
Paper Clips
Rulers
Glue Sticks

SAMPLE DUTY ROSTER

Everyone should pitch in to help during the camping program. When you get to camp, students and chaperones should already have been assigned to tent groups. Posting a chart similar to the one below will make it clear who is responsible for certain duties. The lead teacher and chaperones must assist the group in completing their chores.

Tent Name or #	Day One	Day Two	Day Three
The Angelfish Field Team #1	Set up Kitchen Prepare Dinner	Breakfast clean-up	Prepare lunch Help pack up kitchen
Schaus Swallows Field Team #2	Clean girls bathroom (PM)	Prepare lunch	Breakfast clean-up
The Raccoons Field Team #3	Lunch clean-up	Dinner clean-up	Prepare breakfast Clean girls bathroom (AM)
The Hammerheads Field Team #4	Dinner clean-up	Prepare breakfast	Clean boys bathroom (AM)
The Rattlesnakes Field Team #5	Clean boys bathroom (PM)	Lunch clean-up Prepare dinner	Patrol grounds

SCHOOL SUPPLIED GEAR

Biscayne National Park will provide only the equipment listed on the previous page; schools must provide all other needed camping equipment. The following list of equipment can serve as a guide to planning the camp.

Item	# Needed	Purchased?	Packed?
Ice chests (48 quarts)	3-4		
Propane canisters (stoves)	3-4		
Insect repellent	6		
Box of matches	3		
Aluminum foil	1		
Extra mess kits (plate, etc)	2		
Bag of charcoal (if necessary)	1		
Lighter fluid (if necessary)	1		
Dishwashing fluid (enviro-safe)	1		
Dish towels	2		
Dish sponges	4		
Scouring pads	2		
Plastic containers (for leftovers)	4-6		
Paper towels	1		

PERSONAL GEAR

The following is a checklist of items you will need while camping at Biscayne National Park. Remember to check the weather before your camp and pack appropriate clothes (warm clothes for cold weather, rain gear). Nights on the island can be cold. Please pack your gear in something that is compact and waterproof such as a duffle bag, backpack or even a large plastic garbage bag will do. Make sure you label all your items with your name.

____ Sleeping bag or two blankets
____ Pillow (optional)
____ Toothbrush & toothpaste
____ Soap
____ Towel (1)
____ Washcloth (1)
____ Comb or hair brush
____ 2 pairs of sneakers or comfortable shoes without heels (one pair will get wet; no open-toed, open-heeled, or high-heeled shoes allowed)
____ Underwear (3-4 changes)
____ Socks-need to cover ankles (4 pairs)
____ Long pants-that go to ankle (2-3 pairs) (one pair will be worn while on the shoreline walk and will get wet)
____ Long sleeve shirts (2)
____ Short sleeve shirts (3)
____ Sweater
____ Jacket (type determined by weather: wind-breaker, heavy coat, or rain poncho)
____ Mesh dunk bag (or similar)
____ Approved medications (with name on i

____ Plastic bags (2 for wet items)
____ Reusable drinking cup (no glass please!)
____ Plate
____ Bowl
____ Fork & spoon
____ Water bottle or canteen
____ Insect repellent (non- aerosol)
____ Flashlight & extra batteries
____ Bag lunch for the first day (packed in an accessible location)

Optional Items:

____ Deodorant, facial tissues, sunglasses

Remember this is a nature experience, the salty environment can damage valuables, please do not bring the following items: candy, gum, extra food, games, balls, electronic devices, electronic games, cell phones, pagers or money.

ARTICULOS PERSONALES

A continuación les ofrecemos una lista de artículos que necesitará. Recuerde que las noches en las islas de Biscayne pueden ser extremadamente frías. Se recomienda traer ropa adecuada para temperaturas bajas. Por favor empaque sus cosas en una bolsa conpacta e impermeable como una bolsa de lona, una mochila, o hasta una bolsa de basura plastica.

- ___ Bolsa de dormir o dos frazadas
- ___ Almohadas (opcional)
- ___ Cepillo y pasta de dientes
- ___ Jabón
- ___ Toalla
- ___ Esponja o toallita para lavarse
- ___ Peine
- ___ Zapatos cerrados (2 pares, pueden ser zapatos deportivos <sneakers>, 1 par que se pueda mojar)
- ___ Ropa interior (3-4 mudas)
- ___ Medias que cubran el tobillo (4 pares)
- ___ Pantalones largos (2-3 pares, 1 par se va a mojar)
- ___ Bolsa de malla que se pueda mojar
- ___ Medicinas permitidas (deben tener la etiqueta con el nombre **– el maestro estará cargo de controlar todos los medicamentos)**
- ___ Camisas de manga larga (2)
- ___ Camisetas deportivas <T-shirts> (3)
- ___ Suéter o jersey
- ___ Chaqueta impermeable <windbreaker>o capa de agua
- ___ Sombrero para el sol
- ___ Dos bolsas plásticas de basura (para los artículos mojados y la ropa sucia)
- ___ Vaso plástico (no vidrios), plato y tenedor/cuchara
- ___ Cantimplora
- ___ Repelente de insectos
- ___ Gorro tejido (para el frío)
- ___ Linterna de mano con baterías de repuesto
- ___ Bolsa con almuerzo para el primer día (en un lugar accesible)

Artículos opcionales:

Desodorante, pañuelos desechables, gafas del sol

Recuerde que esta es una experiencia de contacto con la naturaleza, la sal en el ambiente puede estropiar articulos de valor, por favor no traiga ninguno de los artículos siguientes: caramelos, goma de mascar, comida extra, radios, grabadoras, juegos, pelotas, cámaras fotográficas, juegos electronicos, teléfonos celulares, “beepers” o dinero.

BISCAYNE NATIONAL PARK
Camping Program Chaperones

Thank you for volunteering to chaperone Biscayne National Park's education program. You are an important partner in our program. We need your participation and cooperation for a successful trip to Biscayne!

Be an active participant! Joining in on the activities allows you to interact with, and set a good example for, the students. Be prepared; this may include a wet shoreline walk or hiking.

Students will need your guidance when preparing meals or cleaning up. By jumping right in to help and providing encouraging words, you will be teaching students how to be better helpers.

Students look to adults to set boundaries and provide leadership. Chaperones are expected to comply with the same rules at camp as the students. They are often called on to help enforce rules. This includes wearing long pants, socks and shoes at all times, respecting plants and animals (no collecting) and showing respect for others.

Assisting with safety is one of the primary chaperone duties. By watching over your group, you will help to insure that everyone has a safe outing.

Guide the learning process! Please help keep the group's attention focused on what the ranger or teacher is saying, and encourage the students to answer the questions.

Most importantly - go with the flow, adapt and have fun at Biscayne! The students will pick up on how you react; if you are having fun, they will too.

BISCAYNE NATIONAL PARK

Acompañantes del programa de acampar

Gracias por ofrecerse como acompañante voluntario para el Programa Educacional del " Biscayne National Park" (Parque Nacional Biscayne). Usted es una parte muy importante de nuestro programa. Necesitamos su ayuda y cooperación para que la excursión a Biscayne sea todo un éxito.

¡Sea un participante activo! El tomar parte en las actividades le permitirá tener contacto con los estudiantes y darles un buen ejemplo. Esté preparado, entre las actividades a realizar pueden estar incluídos caminatas por la orilla del mar y terrenos cubiertos de agua.

Los estudiantes necesitarán su ayuda para preparar las comidas y posteriormente para la limpieza campamento. Al ofrecerse ayudar y darles palabras de aliento, usted estará enseñando a los estudiantes como ayudar mejor a los demás.

Los estudiantes esperan que los adultos impongan límites y pautas a seguir. Se espera que los acompañantes cumplan las mismas reglas del campamento que se les exige seguir a los estudiantes. En ocasiones se necesitará su ayuda para hacer que estas reglas se cumplan. Lo anterior incluye el uso *en todo momento* de pantalones largos, medias y zapatos, no dañar las plantas o animales (no se permite colectar), y el respeto a las demás personas.

Ayudar con el cumplimiento de las reglas de seguridad es uno de los principales deberes de los acompañantes. Al cuidar de su grupo, usted hará su parte para que todos tengan una experiencia segura y sin peligros.

¡Guíe el proceso de aprendizaje! Por favor, ayude a mantener la atención del grupo concentrada en lo que el guarda parques o el maestro están diciendo, y aliente a los estudiantes a contestar las preguntas.

¡Lo más importante es - adaptarse, ir con la corriente, y divertirse en Biscayne! Los estudiantes se fijan como usted reacciona; si usted se divierte, ellos también lo harán.

Dear Parents:

Your child has been selected to take part in the environmental education program at Biscayne National Park, a cooperative effort between the National Park Service and participating South Florida schools. Since its establishment, the National Park Service has been challenged to preserve and protect the natural and cultural treasures of the nation. An important ingredient in meeting this challenge involves instilling in our children an understanding and appreciation of the world around them. This program has been developed to enhance classroom instruction and has been designed to meet curriculum standards for the State of Florida.

As a parent, there are things you can do to help your child prepare for the trip. When packing, remember to check the weather forecast. Remember that this is a camping trip, students will get dirty. Please do not allow students to pack any items of value or items that are inappropriate for island camping (electronic games, open-toed shoes, etc.). The personal gear list provided details what students will need.

Safety is the number one priority during the camping trips. The lead teacher attended a two-day workshop to prepare for this program. There will be at least one chaperone for every five students. The camping ranger will be with the students for seven hours of each day. Law enforcement rangers also live on Elliott Key, the island where students will be camping. Chaperones are also briefed on emergency procedures. The park and school ask that you remind your child of safety issues prior to the trip. We explain to all students that if they are behaving in such a way that puts themselves or others in danger they will need to leave the island and be picked up by a parent.

During the camp students will not have access to a phone to call home. Should an emergency situation arise that a parent must contact his/her child during the camp, call either:

> **(305)230-1144 ext. 555** – Dante Fascell Visitor Center at Convoy Point. This number can be used from 8:00 am to 4:30 pm. Explain that your student is camping on Elliott Key and information will be given to the appropriate party.
>
> **(305)242-7740** - Everglades National Park Dispatch office. After 4:30 pm this number should be used. The dispatch office is open 24 hours a day. They can contact Biscayne National Park Rangers by radio at any time. **MAKE SURE THE DISPATCHER UNDERSTANDS THE CHILD IS CAMPING AT BISCAYNE NATIONAL PARK!**

This experience is an excellent opportunity for your student. They will gain an appreciation for the ecology of South Florida while building on information learned in the classroom. An experience like this helps students grow in many ways.

Thank you!

Estimados Padres:

Su hijo/a ha sido selecionado/a para participar en un programa de educación ambiental en el Parque Nacional de Biscayne. El programa es un esfuerzo de cooperación entre el Servicio de Parques nacionales y las escuelas participantes de el Sur de la Florida. Desde su establecimiento en 1916, ha sido un reto para el servicio de parques nacionales preservar y proteger los tesoros naturales y culturales de la nación.Un ingrediente importante para llegar a esta meta es la enseñanza a nuestros hijos el mundo que le rodea. Este programa ha sido deseñado para desarollar el material dado en el aula mientras se mantiene adentro de las reglas de curriculo educativo del estado de la Florida.

Hay varias cosas que usted puede hacer para ayudar a que su hijo este preparado para esta excursión. Antes de empacar por favor fijese en el pronóstico del tiempo. Acuerdese que esta es una excursion de camping. Los estudinates se van a ensuciar. Por favor no empaquen ningún artículo de valor o artículos que no son apropriados para acampar en una isla (Juegos electrónicos, zapatos inapropriados, etc.). La lista de equipo personal que hemos presentado es lo único que van a necesitar los estudiantes.

La seguridad de sus hijos es nuestra prioridad numero uno durante la excursión. El maestro encargado de la excursion fue certificado para participar en este programa. Habrá por lo menos una chaperona por cada cinco estudiantes. El guarda parques de la excursión va a estar con los estudiantes por siete horas cada día. Hay guarda parques que viven en la isla donde los estudiantes van a estar acampando aunque no estan en la isla las 24 horas del dia. Los procedimientos de emergencia se le explicarán a los maestros. El parque y la escuela les piden que les recuerden a sus hijos las reglas de seguridad. A todos los estudiantes se les explica que si se comportan de manera que ponga a ellos o a sus compañeros en peligro van a tener que salir de la isla y ser devueltos a sus padres.

Durante el programa los estudiantes no van a tener acceso a un teléfono para llamar a la casa. En casos de emergencia el padre puede contactar su hijo/hija a uno de los dos siguientes números:

> **(305)230-1144 ext. 555**– Centro de Visitante Dante Fascell en Convoy Point. Pueden usar este numero desde las 8:00 am hasta las 4:30 pm. La informacion va hacer comunicada a la persona adequada.
>
> **(305)242-7740**- Oficina de comunicaciones del Parque Nacional Everglades. Este número es para uso despues de las 4:30pm. La oficina de comunicaciones esta abierta 24 horas al día. Ellos pueden contactar a los guarda parques de el Parque Nacional de Biscayne por radio a qualquier hora del dia. ASEGURENSE QUE EL OPERADOR SEPA QUE SU HIJO/HIJA ESTA ACAMPANDO EN EL PARQUE NACIONAL DE BISCAYNE.

Esta experencia es una excelente oportunidad para su hijo/a. Ellos van a lograr alcanzar un mejor aprecio a la ecologia del Sur de la Florida, mientas avanza en el material enseñado en el aula. Una experencia como ésta ayuda a estudiantes a crecer en muchos aspectos.

DIRECTIONS TO THE PARK

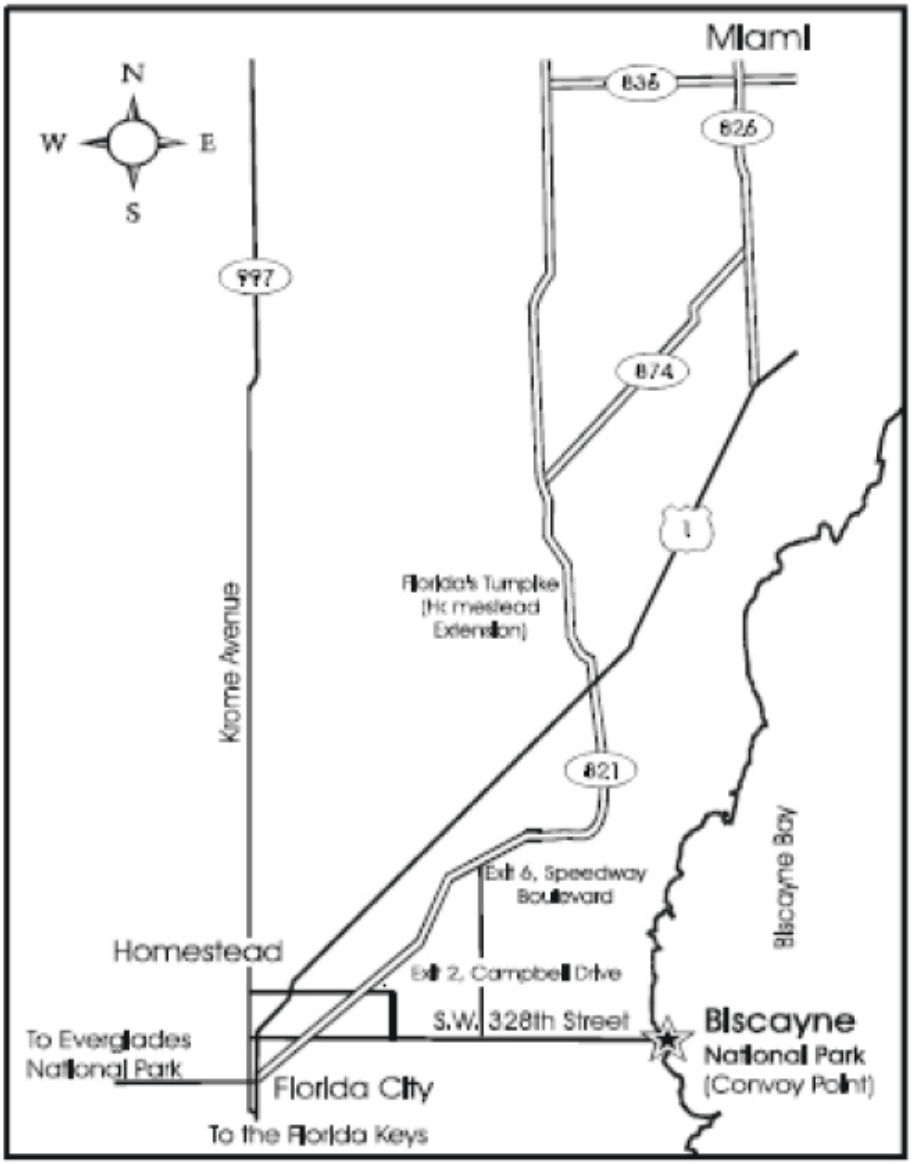
The headquarters and main visitor center for Biscayne National Park are located nine miles east of Homestead on North Canal Drive (SW 328 Street), adjacent to Homestead Bayfront Park and Marina.

FROM THE NORTH

Drive south on the Florida Turnpike to Exit 6 (signed Speedway Boulevard). Drive south (left) on Speedway Boulevard to SW 328 Street (North Canal Road) and turn east (left). At the end of the road, bear left into Biscayne National Park. Follow the road to the Visitor Center.

FROM THE SOUTH

Drive north on US 1 to Palm Drive (Mutineer Restaurant on southeast corner). Turn right on Palm Drive, drive through Keys Gate community, and turn left on Kingman Road. At SW 328 Street (North Canal Drive), turn right. At the end of the road, bear left into Biscayne National Park. Follow the road to the Visitor Center



Natural and Cultural History

NATURAL HISTORY OF BISCAYNE NATIONAL PARK

Biscayne National Park offers teachers and students a unique opportunity to observe and study the interrelationships between marine and terrestrial environments. Surrounding Elliott Key are lush seagrass meadows. Fringing each island is a "textbook" shoreline transition zone (mangroves), and covering the interior of each is a beautiful hardwood hammock.

The following pages will introduce you to some of the most common marine and terrestrial resources found on and around Biscayne's keys. As with the other sections of this guide, use, copy, or add to this information in any way that will help you and your students prepare for camping in the park. Note: The park brochure is a good reference to use while reading the following sections.

GEOLOGY

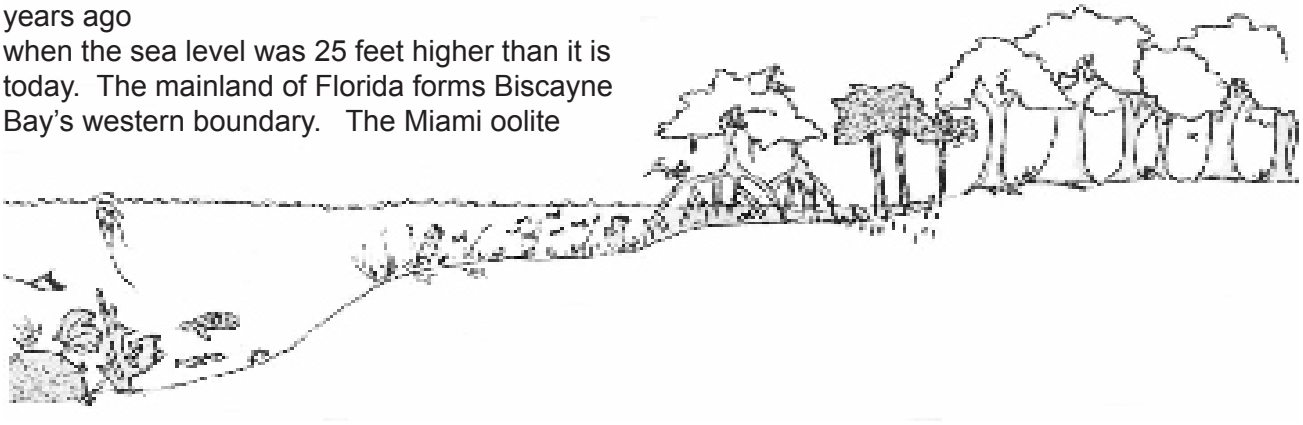
Stretching along the eastern margin of Biscayne Bay lies the Florida Keys, the major land forms of Biscayne National Park. These islands provide a marked contrast to the marine environments that characterize the majority of the park. The islands are separated from one another by tidal channels and creeks connecting the waters of Biscayne Bay with the Atlantic Ocean to the east, thus providing passages between the islands to open water.

The floor of the bay is composed of hard limestone and covered with thin layers of soft sediments. The east and west sides of the basin-shaped bay were formed about 100,000 years ago
when the sea level was 25 feet higher than it is today. The mainland of Florida forms Biscayne Bay's western boundary. The Miami oolite in this area was formed by the evaporation of water and the calcium carbonate deposited by marine life living on the shallow continental shelf.

To the east of the bay are the northernmost Florida Keys which were once part of a living coral reef. The area was uncovered as the sea level fell, exposing the limestone deposits of both ridges to the atmosphere. These areas then hardened into rock. About 20,000 years ago, warmer climatic conditions caused a rise in sea level and the flooding of the area behind the fossilized reefs forming Biscayne Bay. As sea waters filled Biscayne Bay, they covered a freshwater lake and mangrove swamps.

Natural processes also formed the channels that separate the keys. Wave and tidal forces eroded weak places in the reef line more deeply and rapidly than other areas. Once the area had been eroded to the point that water could pool on both sides of the islands, the cuts were subject to increased tidal scouring. This tidal action widened and deepened the new channels. This process continues to the present, maintaining the current channels. New channels can also be established where weak points in the line of shoreline vegetation exist.

The keys of Biscayne National Park provide an opportunity for exploration and study of the geological features of the bay and islands and the interrelationships of marine and terrestrial ecosystems.



WATER FLOW

Most of the Florida peninsula depends on rainfall to meet its freshwater needs. South of Gainesville and Daytona Beach, stretching from coast to coast, is the hydrologic divide. North of the divide, Florida receives water from Georgia and Alabama but south of the divide freshwater comes in the form of rain. Less than half of Florida's rain falls south of the hydrologic divide where the majority of the population resides and accounts for two-thirds of the state's water use.

The topography of South Florida is divided into two main regions, the Atlantic coastal ridge (which roughly follows US 1) and the Everglades. The highest point on the coastal ridge is about twenty feet above sea level in Coconut Grove. From this ridge the land slopes eastward to the Atlantic and westward, more gently, to the Everglades. East of the ridge there were areas of sheet flow and numerous small creeks that flowed through marl prairie and mangroves supplying freshwater to Biscayne Bay. Historically, upwellings in the bay were also a fresh water source. The dredging of canals diverted the traditional flow into major canals changing water flow patterns, timing and quality. Today, fresh water enters the bay through these canals and the salinity of the bay has increased. This intern has affected the vast underwater communities that sustain a wide variety of marine life.

The Comprehensive Everglades Restoration Plan (CERP) has been described as the world's largest ecosystem restoration effort. It will take more than 30 years to construct and will cost an estimated $7.8 billion. Most would think the plan only affects the Everglades but the Restoration Plan addresses water for all of South Florida including the freshwater flow into Biscayne Bay.

CERP is a partnership project that is intended to accomplish several things:

- change surface structures to begin to replicate the historic sheet of water that once flowed from north to south in Florida;
- create increased capacity to store water;
- continue to provide flood protection and water supply for South Florida communities; and
- create and test pilot projects to determine the effectiveness of new and

THE MANGROVE SHORELINE

Fresh water flowing into the park first passes through the mangrove shoreline. The mangrove shoreline on the western edge of the park represents the longest stretch of undeveloped mangroves remaining on the East Coast of Florida. The mangrove community contains four similar but unrelated trees. They are all grouped as mangroves due to their similar habitats and special adaptations for life in the low oxygen seaside environment.

Mangroves typically follow a zonation pattern. The red mangrove grows in shallow coastal waters. Black mangroves can be found in tidal zones and can withstand flooding during high tides. White mangroves and buttonwood trees are found on higher ground in salty soils. White and black mangroves have methods for excreting salt from their systems, but cannot tolerate extended inundation by salt water. In areas where the landscape has been altered with canals and spoil banks the areas of zonation are not as distinct.

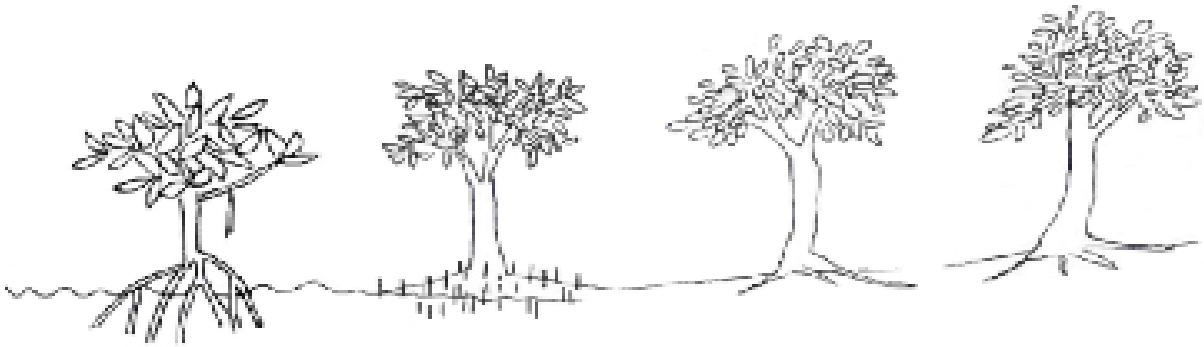
Red mangroves and seagrass beds occur close to one another in the clear waters of the bay. Fallen leaves form the basis of an extensive food chain and nourish many species of algae and invertebrates. Both areas also offer protection to juvenile and small fishes and invertebrates. The red mangroves' fruits develop into cigar-shaped seedlings on the tree. After the seedlings drop off, they can float up to one year before settling along the shoreline and developing into new trees. In addition, the roots of the red mangrove trap soil and detritus; thus protecting and stabilizing delicate shorelines against wave and storm action.

Black mangroves can be found near shore growing in wet or swampy soil. These trees, with their twisted limbs, are surrounded by pencil-like projections emerging from the ground. These are "breathing roots" or pneumatophores. They promote gas exchange between the tree and the surrounding air. This tree excretes salt through the lower surface of the leaf. Because of the saltiness of the leaf early settlers used them as a seasoning in cooking.

The white mangrove is usually found on higher ground further from the saltwater than either the red or the black mangrove. Its roots are beneath the soil and may have knobby pneumatophores if growing in very moist soils.

Even farther inland are the buttonwood trees; they are often referred to as the fourth mangrove and are found along the fringes of swampy mangrove habitat.

Tree Name	Origin of Name	Salt Removal System	Leaf Shape and Color	Identifying Traits
Red Mangrove	Reddish color of prop roots	Filtered by prop roots	Oblong, with rounded tips; dark green	Stilt-like prop roots extending from branches; cigar-shaped seedlings



BISCAYNE BAY

Throughout its history, Biscayne Bay has received freshwater from the same system that sustains the Everglades. Freshwater entered the bay through overland sheet flows passing through the mangroves and by springs that bubbled up from groundwater. In this environment, systems developed that were capable of tolerating reduced salinity. This situation has changed. A system of drainage canals and agricultural and municipal uses has disrupted and decreased the amount of freshwater that enters Biscayne Bay. Although the bay still sustains several distinct communities, the long-term effects of increased salinities are unknown.

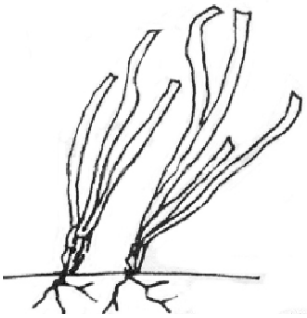
Biscayne Bay is a shallow estuarine lagoon, originating north of the boundaries of Biscayne National Park. The bay extends nearly the entire length of Dade County; from just south of the Broward-Dade line to the Arsenicker Keys in the southern end of the park. The bay is only 5 to 10 miles wide. The widest point in the park is in the "Safety Valve" area to the north of the Ragged Keys. This area is composed of shallow tidal flats. Depths within the bay rarely exceed 10 feet. The bay is separated from the Atlantic Ocean by sedimentary barrier islands, the Safety Valve and the northernmost Florida Keys (these features run in a north-south tract). Mixing of these two bodies of water occurs primarily in the Safety Valve region and several narrow cuts between the islands.

The bay bottom changes with the direction and speed of water currents. The faster the water is moving, the rockier the exposed surface. Areas that are more protected are those that are more biologically productive. In these areas you can find as many as 20,000 individual organisms per square meter. Many reef dwelling creatures begin life in the shallow waters of the mangroves and seagrass beds. The bay serves as a nursery to a variety of marine life because of the available shelter and food supply.

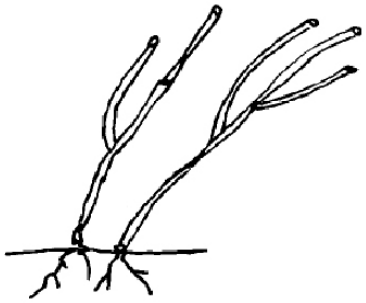
Seagrass Meadows

The most productive community in the bay is the seagrass meadow. Fine examples of this rich and varied environment surround Elliott Key. Seagrasses are marine flowering plants with true roots, leaves and stems. They produce tiny flowers, spiny seeds and energy through photosynthesis.

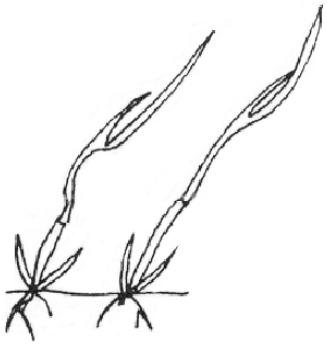
The dominant plant found is turtle grass (Thalassia testudinum). The blade is wide and ribbon-like, 1/4 to ½ inch wide. A single plant can grow to one foot tall.



Manatee grass (Syringodium filiforme), a cylindrical, thin bladed grass about 1/8 inch wide also grows here.



Shoal grass (Halodule wrightii), a narrow, ribbon-like blade, 1/16 to 1/8 inch wide, can also be found in these seagrass meadows.



These grasses form dense mats on the sea floor. Their extensive root systems help stabilize the sediments. This action keeps the water clear, enhancing photosynthesis. The broad blades of the turtle grass leaves also provide an ideal substrate for the attachment of numerous organisms, including filamentous algae, diatoms and varied sizes of bivalve mollusks.

Seagrass meadows support one of the richest assemblages of individual species of any known marine community. The productivity of this community is extremely high, and it is the known nursery ground for the early stages of the commercial shrimp, the spiny lobster, and many species of fish. Manatees, sea turtles, sea urchins and certain parrotfish all graze in the seagrass beds of Biscayne Bay.

Marine Algae

Many species of algae are found growing throughout the seagrass meadows. When seagrass beds are destroyed or disturbed, algae move in and stabilize the sediments; this allows seagrasses and other organisms to become established.

Algae are simple plants, lacking the complex root and stem systems of the higher plants. However, they do have parts that resemble these structures. The plant body is called a thallus, the leaf-like part is called a blade and attached algae have root-like structures called holdfasts. Occasionally, the algae will develop a framework of calcium carbonate, which they obtain from sea water. These have a stiff thallus and are called calcareous algae.

Algae have chlorophyll, a green pigment which enables them to convert the sun's energy into food (photosynthesis). In many algae, chlorophyll is the dominant pigment. Others contain red or brown pigments. Algae are grouped according to these pigments, their structures, and other characteristics.

Mermaids Wine Glass

Some of the common algae found in the park include:

Reds :
Laurencia
Dasya

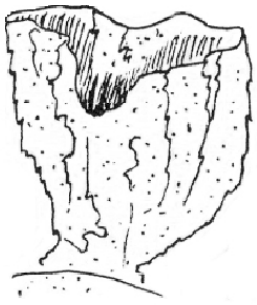
Browns:
Sargassum
Peacock's Tail (Padina)
Dicryora

Green:
Wide blade-shaped and calcareous (Halimeda) . The most common in the bay and on the reef; this algae contributes a lot of material to the sand/sediment.

Shaving Brush Algae (Penicillus)
Bubble algae (Valonia)
Tree-like algae (Rhipocephalus)

Sponges

Sponges are animals and are considered to be among the simplest living organisms. Sponges can be found in many places and can attach themselves to anything that is stationary. A sponge can be found living on a submerged portion of a dock, a piling, even a crab trap. In Biscayne Bay, sponges can be found attached to the bay bottom or a piece of hard sediment such as a shell, a piece of coral, or a tiny grain of sand.



Since sponges are stationary, they cannot go out and catch their food, instead they are filter feeders. They constantly pump a steady flow of sea water through their bodies. The body of a sponge is filled with many small pores, or ostia (singular ostium) through which water enters the sponge. The water flows through a series of filter chambers, then passes into the atrium, and finally out through a larger opening called the osculum. Sponges rely on this flow of water for their food supply (microscopic organisms), oxygen, excretion and reproduction.

All animals have some sort of skeleton. The skeleton of a sponge is found throughout their entire body and made of spicules. If viewed closely through a microscope, the spicules look like little slivers of glass.

Many small creatures may live within the holes and compartments of a sponge. Here, animals such as worms, shrimps and brittle stars find ideal shelter with a constant supply of food and oxygen.

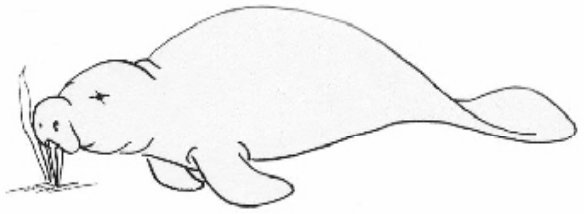
Manatees

During the winter months, West Indian Manatees can be spotted in the estuarine waters in and around Biscayne National Park. These warm-blooded mammals migrate to the waters of South Florida for the warmer temperatures. The average adult manatee is 10 feet in length and weighs 1200 pounds. Manatees, also known as sea cows, are gentle herbivores that graze estuaries for aquatic vegetation.

The reports of mermaids by early European sailors were probably manatee sightings. Christopher Columbus reportedly said, “these mermaids were not quite so handsome as they had been painted.” The Tequesta of Biscayne hunted manatee and later European explorers and settlers did the same. Hunting during the period of the Tequesta did not have a severe impact on the population, but as hunting technology improved the numbers of manatee declined. Hunting continued to reduce the population until the 1950s.

Manatees are on the list of federally endangered species and are protected by state and federal laws. A survey conducted in January 2000 found only 2,222 manatees living in the waters surrounding Florida. Today coastal development has destroyed habitat and feeding grounds of the manatee and increased the number of boaters on the waters. Propeller scars on Manatees are so common that scientists are able to identify individual manatees by their scar patterns.

Slowing down boats in manatee zones, and properly disposing of our trash are two simple ways we can help these gentle giants survive.

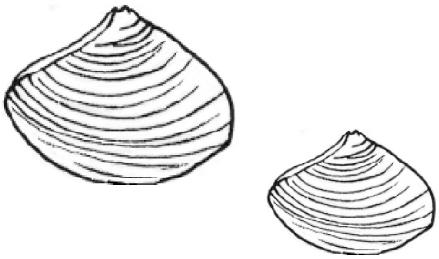


Mollusks

The invertebrate animals that produce seashells are all members of a group called Mollusca. The word mollusk is derived from the Latin word meaning “soft”. A mollusk has a soft, unsegmented body that is usually protected by one or two hard external shells. The shell is secreted by the animal itself, which keeps enlarging until the animal is fully grown. The shells are called valves. Mollusks with two shells are bivalves or pelecypods; those with one shell are univalves or gastropods.

Univalves - also called gastropods (meaning “stomach-footed” animals), are mollusks with a single shell which they carry as they crawl about on their strong muscular foot. Some gastropods, such as the sea slug, have no shell at all. Most have a distinct head with eyes and tentacles. In times of danger, gastropods with shells can retract their foot into the shell and close off the opening with their operculum. The operculum is a leathery calcareous trap door which is attached to the foot. It also serves to protect against drying out and suffocation when the tide goes out, by sealing in a small amount of water with oxygen.

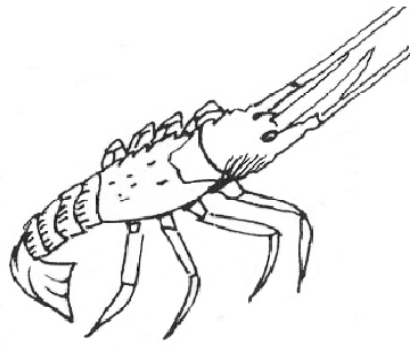
Bivalves - also called pelecypods (meaning “hatchet-footed” animals), are mollusks with a shell made of two halves joined at a hinge. One or two large muscles keep the shell pulled shut. When the muscles relax the valves open. Most, but not all, bivalves are filter feeders. Typically, the bivalve extends a siphon which can be extended or withdrawn from the shell and sucks in water, bringing in food and oxygen.



Cephalopods - (meaning “head-footed”), are mollusks that have lost their external shell. Included in this group are the squid and octopus. Unlike other mollusks, cephalopods are active swimmers. Water is drawn into their mantle cavity and then forced out through a siphon near the mouth. This propels the cephalopod in the opposite direction. The siphon can be pointed in any direction. Both octopus and squid have ink sacs which release a deep purple ink when pursued by an enemy. The ink is not toxic, but acts as a smoke screen to hide their escape.

Arthropoda

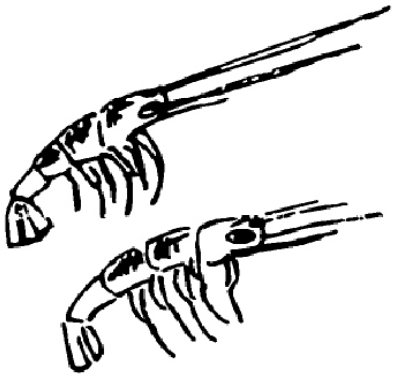
Seventy-five percent of all animals belong to the phylum Arthropoda. Arthropods can be found on land or in the water. Terrestrial arthropods include insects, spiders, centipedes and millipedes. Nearly all marine arthropods are crustaceans. Included in this group are lobsters, crabs, and shrimp.



Crustaceans live in hard shells. Their jointed appendages allow them to swim, walk, handle food and gather sensory information. One of the most common crustaceans encountered on and around the islands of Biscayne Bay is the hermit crab. Hermit crabs are not true crabs because their abdomens extend behind the thorax and are soft (unchitonized). They live inside of empty snail shells for protection. The abdomen of a hermit crab is twisted to curl around the columella of empty univalve shells. There are terrestrial and marine hermit crabs in the park.

The horseshoe crab is another common arthropod, but it is also not a true crab (it is not a crustacean). It belongs to the class Merostomata and is more closely related to scorpions than to crustaceans. Often referred to as the living fossil, horseshoe crabs have evolved little in the last 200-500 million years. Despite their menacing appearance they are harmless to humans. In fact, they are very beneficial. They are used quite extensively in the medical industry. Horseshoe crabs live in a bacteria-rich environment and have developed a protein in their blood that reacts with endotoxins. Horseshoe crabs are now collected and their blood is drawn. The blood is used to test for harmful bacteria in vaccines, injectable antibiotics, etc. The donor horseshoe crab is then given three days to recuperate and returned to the ocean.

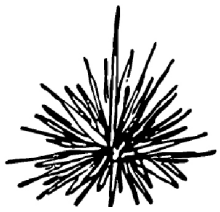
The soft bodies of arthropods increase in size and their exoskeletons do not; therefore, they molt. Molting is the process of shedding their old exoskeleton to accommodate their expanding body. In preparation for molting, the tissue layer under the exoskeleton detaches from it and secretes a new skeleton. When the new skeleton is completely formed, the old skeleton splits along specific weak points and the animal crawls out. Arthropods then take in water and air to stretch the pliable soft exoskeleton to a larger size before the tissues harden. Arthropods molt throughout their entire life, but less frequently as they get older.



Echinoderms

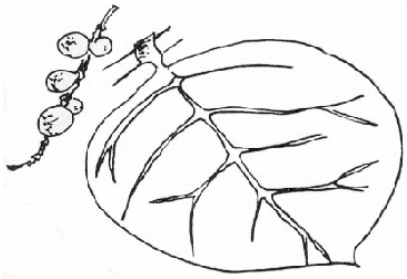
Sea stars, brittle stars, sea urchins, and sea cucumbers are all echinoderms. The phylum Echinodermata derives its name from the Greek words “echins” and “derma,” meaning “spiny skins.” Most echinoderms have prickly or warty skin. Ancestral echinoderms as well as larval stages of present day species are bilaterally symmetrical meaning the right and left halves are identical. Adult echinoderms generally show radial symmetry or a body plan of five similar parts.

Echinoderms are relatively large invertebrates. Most are benthic (bottom dwelling), and all are marine. There are no fresh water echinoderms. Echinoderms have an internal skeleton covered with spines and skin. In sea stars and brittle stars, the skeleton consists of multitudes of small plates that move with one another, forming flexible joints. Sea urchins and sand dollars have skeletal plates that are fused, forming a rigid shell. In sea cucumbers, the calcareous plates have degenerated and are buried in the leathery fleshy body.



Echinoderms possess a unique internal plumbing system known as the water vascular system. A hydraulic network of canals runs throughout the body, usually ending in a large series of tube feet on the surface of the animal. By varying the internal water pressure, the echinoderm can extend or contract the tube feet, which are used for locomotion, food, collection and respiration. Tube feet often end in small suction cups. Echinoderms usually have their mouths in the middle on the underside. Most echinoderms have the ability to regenerate lost limbs.

THE ISLANDS



To the east of the bay is another mangrove shoreline. These mangroves are found on the periphery of the thirty-two ancient coral reef islands found in the park. Here, much like on the mainland, the mangroves serve as a buffer zone between the salt water and the plants and animals of the interior. Mangroves are often the first plants to claim land from the sea, and prevent the land from eroding once in place.

Hammock

Further inland from the shore lies the tropical hardwood hammock. A hammock is a hardwood forest of tropical and subtropical vegetation. The word "hammock" comes from a Native American word that means "a shady place." Hammocks develop on high land and only in areas protected from fire, flood and saline waters. This ecosystem used to be found throughout the Florida Keys and as far north as Cape Canaveral. Hammocks dominated the Atlantic Coastal Ridge. The high land that supports hammock communities is also more favorable for human habitation. Many of these areas have been cleared for the development of South Florida's major cities.

The hammock on Elliott Key represents one of the finest remnants of this ecosystem. Here, plant communities include a variety of tropical West Indian species, including mahogany, gumbo limbo, and seven-year apple. There are over 200 species of plants found in hammocks. Hammock plants are amazingly found in rocky areas with very shallow soil. Very little productive soil forms over the coral rock that forms the keys.

Insects

There are many animal species on the islands of the park, but the most common animals are insects. The most common insect encountered on the island is the mosquito of which there are several species. It is the female mosquito that sucks blood. The male and female feed on plant juices but the female needs blood to form eggs. The number of mosquitoes on the island is dependent on the temperature and amount of rainfall. Mosquito eggs are laid in stagnant water where after a few days they hatch. The life span of a mosquito is approximately thirty days.

At dawn and dusk when there is no breeze on the island the no-see-ums can be a problem. These tiny insects are known by many names such as sand flies, midges, punkies and flying teeth. They are generally called no-see-ums because at less than 1/10 of an inch long they are usually felt before they are seen. They breed in wet areas where it takes approximately a week for eggs to become adults.

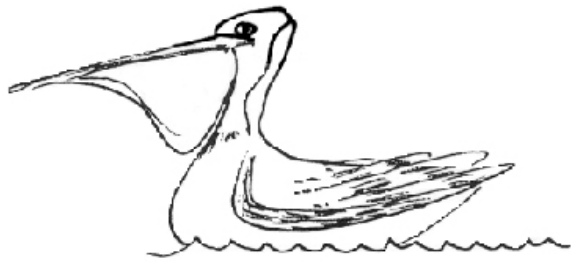
Mosquitoes and no-see-ums may be annoying to humans, but they are an important part of the food chain. Fish and frogs eat them both in their larval stages and as adults they are food for dragonflies, birds and bats. Ninety percent of no-see-ums are eaten by other animals.

Scorpions are found on the islands in the park. Turning over rocks along the shoreline may expose them. The scorpions in Biscayne are not particularly venomous, but the sting does hurt.

In the Florida Keys there are over one hundred species of butterflies. On Elliott Key it is possible to find butterflies every month of the year. They use torchwood, wild lime, passion vine and many others plants found on the island as food sources. The Schaus Swallowtail butterfly is listed as an endangered species and is found on Elliott Key. Development threatens many of these insects by destroying food sources, and insecticides used to control mosquito populations also kill butterflies.

Birds

Many birds are found year-round in the park. The most commonly seen are the pelicans, cormorants, gulls and royal terns. During the spring and fall, the bird population seemingly explodes. Biscayne National Park is in the flight path for many migratory birds. Many of the birds that spend summer months in the continental US and Canada winter in Central or South America. The islands provide a place for these birds to rest, feed and find fresh water. Insects and fruiting hammock plants are essential food sources for these birds.



Mammals

Many who go to islands expect to see a lot of animal species given the lush hammock. There are many animals, but the vast majority are insects. There are only four mammal species on Elliott Key: raccoons, black rats, marsh rabbits and red-bellied squirrels. Conditions are such that it is likely there are other rodent species on the islands, such as the Key Largo wood rat, but they have not been documented. All animals found on islands had to have a means of reaching those islands. They had to swim, fly or were brought by humans. On an island, the gene pool is reduced. Environmental pressure can easily wipe out a population if there are no new individuals migrating to the island.

Raccoons are abundant and should be taken into consideration when camping. Irresponsible campers have trained these animals to know that food can be found in a campground. All food must be secured at all times of the day, and it is illegal to feed the wildlife. Feeding raccoons is unhealthy for them in many ways. Marshmallows and many of the foods they consume are not good for them. Young raccoons need to learn to find food on their own rather than learning to beg.

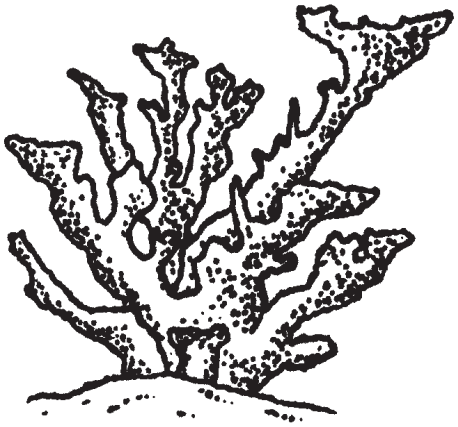
The red-bellied squirrel is not a native of Elliott Key. J. Arthur Pancoast, a weekend resident of Elliott Key, introduced two pairs of red-bellied squirrels during the first half of the twentieth century. This type of squirrel is native to Eastern Mexico. They adapted well and their descendants were found on the island at least until hurricane Andrew in 1992.

The status of the red-bellied squirrel and marsh rabbit are uncertain on Elliott Key. It is very unlikely that any of these animals will be seen. Hurricane Andrew had a serious impact on their populations and it is uncertain how many remain.

CORAL REEFS

East of the islands is the living coral reef. The reef found in Biscayne National Park is the northernmost portion of the Florida Reef tract. Coral reefs cover less than 0.2% of the ocean floor but 25% of all marine life can be found there. Reefs have been described as the rainforests of the sea.

Corals require specific conditions in order to survive. The temperature of the water must be between 68-86 degrees Fahrenheit. Water clarity is essential for the algae living in symbiosis with the coral. In order to photosynthesize, sunlight must be able to reach the coral. There must also be a food source for the coral. Although not located near the reef, the mangrove shoreline and bay to the west of the reef are important to the health of the reef. Many of the creatures that spend their adult lives on the reef use the mangroves and bay as a nursery. Mangroves catch much of the runoff from the land, keeping the water clear. In addition, water is filtered by sponges in the bay and on the reef. Each ecosystem is interdependent as water flows through the park.



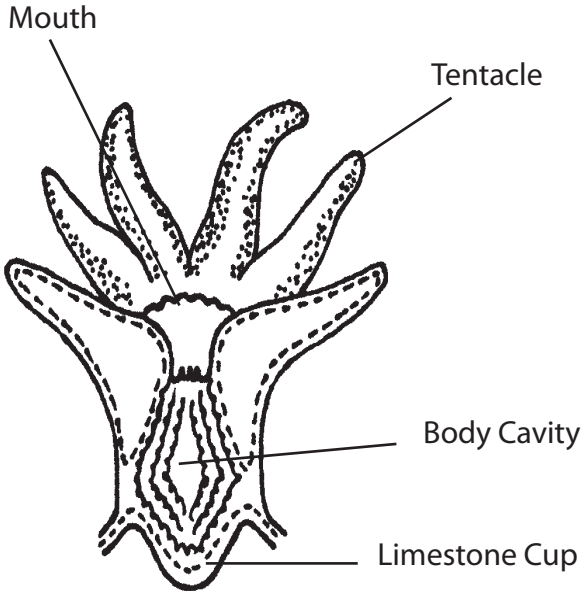
Cnidarians

Jellyfish, corals, anemones and hydroids are all members of the phylum Cnidaria (formerly Coelenterata). Externally, cnidarians appear to be very diverse. Some look like huge underwater boulders covered with unique patterns, some look like soft feathers, rhythmically moving with the ocean current. Still others look like blobs of jelly. Despite these differences, cnidarians have many common features. Cnidarians have cup shaped bodies that are radially symmetrical with a single opening. This opening serves as both the mouth and the anus of the organism. The central opening is encircled by tentacles. Cnidarians are simple organisms without organs. The body is a hollow chamber consisting of three layers: an outer layer, an inner layer, and a middle layer of jellylike material. This chamber serves a dual function of digestion and distribution of food.

Cnidarians are named for their stinging cells called cnidocytes; within the cnidocytes are nettle-like nematocysts. Nematocysts are poison, dart-like microscopic hairs used to capture prey ("cnid" is the Greek word for "nettle"). Most cnidarians are carnivorous. Tentacles covered with nematocysts are strong enough to paralyze creatures such as zooplankton and small fish. The tentacles are used to pull food toward the mouth. Many, but not all nematocysts can be harmful to humans. The Portugese man-o-wars are the most harmful in our waters.

The life cycle of the cnidarian has two phases - the sessile polyp (attached to the bottom), and the free-swimming medusa. Some cnidarians have completely done away with or reduced one of the phases of the life cycle. For example, the medusal stage is dominant in jellyfish and coral never has a medusal phase.

Coral Polyp



There are two types of coral: hard and soft. Hard coral is what builds a coral reef. The coral body or polyp is attached to the surface by a hard limestone skeleton. Hard corals have an algae called zooxanthellae living within their tissues. Zooxanthellae and coral have a symbiotic relationship. The algae photosynthesize, converting sunlight, carbon dioxide and water into oxygen and carbohydrates. These carbohydrates are used to help build the coral skeleton. In return, the polyp provides algae with a protected place to live and carbon dioxide. Corals eat by waving their tentacles in the water and drawing in passing plankton. Feeding takes place at night when predators are of less danger.

Plankton

Plankton, meaning "wanderer" in Greek, are mostly small plants and animals but also include larger organisms such as jellyfish that have weak powers of locomotion. Plankton may be primitive unicellular organisms or multicellular plants and animals. All plankton are dependent upon waves, tides and the currents for transportation. Most of the organic matter in the sea is plankton, and directly or indirectly, nearly all other marine creatures depend on it as a source of food.

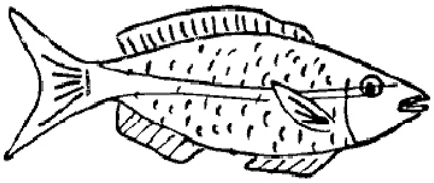
Plant plankton (phytoplankton) is found near the surface where light is available for photosynthesis. Most animal plankton (zooplankton), is also found near the surface where it feeds on phytoplankton.

Phytoplankton is made up of minute, usually unicellular, plants (algae). Phytoplankton are important producers and form the base of the marine food chain. Through photosynthesis, phytoplankton change inorganic nutrients into food and release oxygen into the water. It is estimated that 75 to 80 percent of the organic material and 80 percent of the oxygen on earth is produced by phytoplankton.

Zooplankton are animal plankton. Temporary zooplankton, such as eggs and larvae, are known as meroplankton, and are found predominantly in coastal waters. Meroplankton exist as plankton for only a limited part of their development and later become either a part of nekton (all animals capable of swimming powerfully and purposefully) or benthos (plants and animals living on or in the bottom of bodies of the oceans). Being planktonic for part of their lives allows these animals to disperse into new areas.

Fish

Fishing is one of the most popular activities in the park. Within Biscayne's waters there are 325 known species of fish ranging from edible to ornamental species. There are over 25,000 recognized species of fish in the world and as knowledge of our marine communities increases, so do the numbers. They represent half of all known vertebrate species. The body structure of fish can vary greatly depending on the habitat and behaviors of the fish.



Sharks are the most interesting fish among students. Depending on species, sharks vary in size from eight inches to fifty feet long. The internal skeleton of a shark is not made of bone but rather cartilage. Rays are also cartilaginous fish. As predators, teeth are incredibly important to sharks. They are continually developing new teeth to replace those lost while feeding. Most sharks eat other fish but there are a few species that do eat mammals. The Great White Shark eats seal and dolphin. The largest of all sharks, the Whale Shark, eats some of the smallest creatures in the sea. It feeds on plankton and small fish. Sharks are predators and serve an important role in the food web. Without sharks to thin the population, fish and mammals eaten by sharks may increase in numbers therefore depleting their food supply. The number of sharks is kept in check by low birth rates. Humans are not food for any shark species. When sharks attack humans it is thought that they are mistaken for animals that they normally eat or for being too close to a food source.

The most common fish caught by students with nets exploring the seagrass beds are killifish, trunkfish, seahorses and pipefish. There are many more fish within the seagrass beds, but most of them are too quick for students to catch with a net.

Sea Turtles

There are seven recognized species of sea turtles in the oceans of the world. Of these there are five that spend time in Florida's waters: loggerhead, green, hawksbill, leatherback and kemp's ridley. Sea turtles are reptiles and breathe air although most of their life is spent at sea. Eggs are laid on land and after entering the water it is only the females that come back to shore to lay eggs. Males never return. Not a lot is known about the life of sea turtles while they are at sea. All species of Florida's sea turtles are on the threatened or endangered species list. Human actions often have a negative impact on these animals. Sea turtles have been known to ingest large quantities of trash mistaken for food. A floating bag looks a lot like a jellyfish. Learning about sea turtles and some of the challenges they face is a good way to help protect them.

Fragility of the Reef

Coral reefs are highly sensitive ecosystems and require very specific environmental conditions to survive. As a result, reef ecosystems worldwide are facing many threats. A long-term study of the Florida Keys National Marine Sanctuary reported a 37% decrease in stony coral between 1996 and 2000. There are both natural and human-caused threats to our reefs that are of concern to researchers. Global warming has increased seawater temperature and in turn has stressed many coral colonies. Overfishing of reef species has disrupted the balance. In some areas of the world dynamite and cyanide are used as fishing techniques particularly to collect ornamental fish for aquariums.

Reefs also suffer from the actions of those on land. Soil runoff from deforestation and chemicals and fertilizers from crops eventually end up in our oceans. Trash presents problems for many of our marine animals and coral itself is often collected for sale.

CULTURAL HISTORY OF BISCAYNE NATIONAL PARK

Native Americans

Archeological evidence shows that the earliest aboriginal inhabitants of the South Florida Peninsula visited the Biscayne Bay area 10,000 BP (Before Present). Evidence is found along the upland areas adjacent to current park boundaries. At that time Biscayne basin was a freshwater marsh or lake. Around 4,000 BP, the rise in sea level (the result of retreating glaciers) inundated Biscayne basin with seawater and created the keys that we see today. The inundation of the ancient coastline likely obscures the material remains of the Native Americans that inhabited the Park during the Paleolithic (12,000 – 9,500 BP).

Identified Native American remains in the Park span the entire Formative Period (2,500 BP - 500 BP) portraying intensive, long-term settlements that reflect the pre-historic connection between humans and marine resources. South Florida archeologists distinguish Formative period remains as Glades I (2,500-1,250 BP), Glades II (1,250 – 800 BP) and Glades III (800 BP – 1513 AD). In 1513, Juan Ponce de Leon referred to Glades III Native Americans inhabiting the Miami area as the Tequesta. Glades sites are reflected in shell middens located on Sands Key and Soldier Key. A notable Glades site, the Totten Key Complex, consists of a shell midden, an earthern midden and a rock mound. During the 18th century, the Miccosukee and Seminole began colonizing South Florida. Historians have noted strong Seminole presence on northern Biscayne Bay during the late 19th century, however their relationship to the marine resources of the Park are only now being investigated.

Highlights in History
Adapted from Biscayne National Park Historic Resource Study
by David Cullison and Jennifer Brown

Spanish Exploration and Wrecking Industry (1513-1921)

In 1513, Spanish explorer Juan Ponce de Leon discovered a chain of rocky islets off the coast of Florida that he called Los Martires (the Martyrs). These were most probably the keys between Key Biscayne and Key Largo. The explorer also notes a bay that stretched between the reef and the mainland; the bay was most likely Biscayne Bay. However, the Spanish never established permanent settlements in the Florida Keys. Nevertheless, Spanish ships utilized the area intensively after de Leon's discovery of the Straits of Florida. This channel lies between the mainland and the Bahamas and the Gulf Stream flows through it. This route provided the quickest route from the Gulf of Mexico to the North Atlantic Ocean and was the preferred route for ships returning to Spain filled with New World treasures.

Although the Straits of Florida provided the fastest route to Europe, the passage was also dangerously narrow, particularly given the limited navigational aids available to sailors prior to the nineteenth century. As evidenced by the archeological shipwrecks found within the park, many ships wrecked in and around the Florida Keys during this period. Two significant historic wrecks located in the park are the Nuestra Senora de Populo (a Spanish treasure galleon wrecked in 1733) and the HMS Fowey (a British fifth-rate warship sunk in 1748).

Due to the valuable cargo on ships leaving the New World, a wrecking industry emerged to assist sailors in salvaging their cargoes. The wreckers recovered goods from dying ships and helped refloat ships that remained seaworthy. In return, the wreckers received a percentage of the value of the property saved. Native Americans, Spaniards, Bahamians and Americans established temporary salvage camps in the Florida Keys. Although not documented, it is likely that the keys within Biscayne National Park provided sites for many of these camps. There is stronger evidence that the 19th century wreckers opened their homes to care for shipwrecked crews and passengers.

Additionally, salvaged cargo was taken from the shipwreck and temporarily stored on the keys before it was transported down to Key West to be adjudicated in Admiralty Court. Centers for wrecking activities were located in Havana, Cuba and New Providence, Bahamas. In 1825 operations moved to Key West. The change occurred because the United States congress passed a law requiring that all wrecks salvaged in American waters be brought to an American port for adjudication. As a result, many Bahamians moved to the Florida Keys, turning the area into a well-known center for wrecking.

The wrecking industry began to decline in importance between 1852 and 1878 with the increase of insurance agents in the local area and use of ship to shore radios. Whoever was at the site of the wreck first became the wreck master and was in charge of the salvage mission. When insurance companies previously had their nearest agent in New York it would take them too long to travel to the wreck site.

Commodore Monroe was one of the first local agents in the area, employed by the American counterpart of Lloyds of London called the American Bureau of Shipping, (ABS). With the use of ship to shore radio he was notified quickly if one of his company's ships was in trouble. The ship's captain was able to hold off the wreckers already on site while the insurance company's local agent traveled to the grounded vessel to take over as the wreck master. By having local agents in charge of "lightening the load" they were able to retain more in the hands of the insurance companies and less in the hands of wreckers. In addition, the replacement of sailing vessels with steamships in the late 1800s contributed to the industry's decline. The wreck of the Alicia on Ajax Reef, near Fowey Rocks Lighthouse, in 1906 provided the last great opportunity for the wreckers of the Florida Keys to profit from the misfortune of sailors. The wrecking era on the Florida Reef ended quietly in 1921 with the closure of the Wrecking License Registry.

American Settlement (1822-1926)

Although wreckers and other groups had utilized the keys as temporary camps for many years, no permanent settlements existed on the keys when the Spanish relinquished Florida to the United States in 1821. In 1822, the United States established a Navy base at Key West, causing a population increase and in 1828 the town of Key West was chartered.

Immigrants from the Bahamas, known as "Conchs," were the largest group to settle in the Florida Keys during the early- to mid-nineteenth century. This group formed the backbone of early society of the keys, from Key West to Elliott. The outbreak of the Second Seminole War in the 1830s forced settlers on the upper keys and on the mainland south to Key West.

At the time of the Civil War, Key West was the only city in southern Florida. Florida seceded from the Union in 1861 and the lower half of the state contributed little to the war effort. Although the proximity to the ports of the Caribbean and the many secluded islands and streams along the coast might have provided refuge for Confederate blockade-runners, the lack of overland transportation routes to the north made smuggling goods through the state impractical. The only notable incident related to the Civil War that occurred within the park was during the flight of the Confederate cabinet after General Robert E. Lee's surrender at Appomattox Courthouse. John C. Breckinridge, Confederate general and secretary of war and former vice president of the United States, fled down the east coast of Florida. His group entered Biscayne Bay on June 7, 1865, spent one night anchored off Key Biscayne, ate on Elliott Key, spent the second night anchored in the bay and then passed through Caesar's Creek and on to Cuba.

Agriculture on the Keys (1860-1926)

Early settlers valued the hardwood hammocks of the keys for the mahogany trees and some logging was done. Later, hammocks were

viewed as worthless and many acres were cleared by burning for crops. Pineapples were brought to Key West from Mexico in 1860. The plants grew easily on the coral islands, taking root in small crevices, and were believed to require no fertilization and little care. By 1890, growers had established pineapple plantations along the keys from Matecumbe to Elliott. The keys produced all of the pineapples grown in the United States until around 1884, when they were introduced in the Indian River area of Florida.

Elliott Key was the center of the Biscayne Bay Keys farming community. It had a population of about ninety people and a one-room school, general store, packing house, cabins for farm workers and houses. About fourteen families, most of Bahamian descent, lived on Elliott Key during this period. In addition to growing pineapples on the bay side of the island, families supplemented their incomes by wrecking and harvesting marine life from the bay.

Captain Abner Sweeting, Sr., with his wife Cornelia and their children in 1918

Before 1896, pineapples were loaded onto schooners and shipped north to east coast markets like New York City and Baltimore. After the completion of the Florida East Coast Railway to Miami in 1896, keys' farmers sent the fruit to Miami for shipment north by rail. At the height of pineapple cultivation on the keys, Plantation Key produced the largest number annually, with Elliott Key a close second.

The Asa Sweeting family were among the earliest homesteaders on Elliott Key. They sailed from the Bahamas to Key West in 1866 and moved to Elliott Key in 1882. They claimed 154.4 acres and by 1887 the family reported that they had cleared and cultivated 30 acres on the island, planting a variety of fruits and vegetables. The family eventually planted 100 acres, with pineapples and key limes as the primary crops.

The pineapple boom on the keys collapsed because of leeching of organic materials from the soil and a devastating hurricane in 1906.

Dr. Henry Perrine introduced the first lime trees to the Florida Keys from the Yucatan in 1838, planting some on Indian Key and possibly other nearby keys. Initially, the lime was used only locally by Conchs to flavor foods and for medicinal purposes. After 1913, as limes picked from wild trees in the keys began to sell for high prices, planting in the keys and near Fort Myers increased rapidly.

Lime production peaked in 1923 at more than 40,000 boxes. In 1926, a hurricane devastated the industry by damaging or destroying most of the lime groves in the keys. Competition from growers in the West Indies and Mexico hindered recovery. Florida Key lime production was nil in 1927 and by 1935 had climbed to only one quarter of the 1923 total. Farmers tried growing other crops on the Florida Keys. Sweet potatoes, peaches, tomatoes, coconuts, lemons and sapodilla were all grown for market. Homesteading was not limited to Elliott Key, but would have also included Totten, Adams, and Old Rhodes.

Israel Lafayette Jones, better known as Parson Jones, was a Florida pioneer and one of South Florida's first successful black businessmen of the 20th century. Parson and his wife Mozelle purchased Porgy Key, just south of Adams Key, on July 7, 1897. It was there they raised their two children, Arthur and Lancelot (Garfield), and cultivated their land. Porgy Key was occupied by his family from 1902 to August 23, 1992, the day Hurricane Andrew hit the upper Florida Keys. Additionally, Parson Jones owned part of Old Rhodes Key, bringing the extent of his property to over 250 acres. Pineapples were often shipped to Key West for sale, until the hurricane of 1906 destroyed the crop. Parson Jones then turned his resources towards developing a key lime plantation. In 1916, Parson Jones also purchased Totten Key, apparently to expand his citrus plantation operations. Consequently, his family became one of the largest key lime producers in Florida prior to World War I. The Jones family lived a self-sufficient life depending on the sea for their sustenance along with a few common goods from the mainland.

The Jones Homestead on Porgy Key

Around 1925 Parson sold his Totten Key property for an astounding (at the time) $250,000. While the family was insulated from urban Miami they were not isolated completely. Visitors frequently would stop by the Jones' island home. Parson Jones was also instrumental in establishing the Mount Zion Baptist Church in Miami and historical documents indicate that he was a trustee for a Negro industrial school in Jacksonville.

Lancelot was well known and well liked in the South Florida community. He lived off the land and sea and worked as a sponger and bonefishing guide. Lancelot took influential visitors of the nearby Coco Lobo club, such as Presidents Warren G. Harding, Lyndon Johnson and Richard Nixon on bonefishing expeditions on the shallow waters surrounding his home. A true conservationist at heart, Lancelot was in full support of the designation of Biscayne National Monument which, through subsequent amendments to the Park's enabling legislation and boundary expansions, became Biscayne National Park. He and his sister-in-law sold their share of the land to the National Park Service in 1970 for 1.2 million dollars.

Lancelot also visited school children that were part of the environmental education camps on Adams Key. Lancelot possessed special skills, keeping the students' attention for long periods of time while discussing the lives of sponges, which he brought with him.

Vacation Resort Development (1896-1945)
The completion of Henry M. Flagler's Florida East Coast Railway in 1896 opened southeastern Florida to overland commerce and travel for the first time. As a result, the tropical climate of South Florida quickly became popular with vacationers from the Northeast and Midwest, particularly during the winter months. In 1912, the Overseas Railroad was completed; connecting Jacksonville to Key West and opening the keys to recreational development.

A number of factors contributed to the rapid growth of Miami and South Florida during the early 1900's. The railroad provided cheap, easy access to the subtropical climate. The outbreak of World War I in Europe increased travel within the United States and when the war ended Americans possessed more disposable income than ever before. In addition, the Ford Model-T resulted in an increasingly mobile population. These factors and large-scale advertising all led to the Florida land boom of 1922 to 1926.

Carl Fisher transformed Miami from a small town into a tourist mecca. In 1913, he financed the completion of a bridge connecting the city to a barrier reef across Biscayne Bay. He then secured the approval of the State of Florida and the U.S. Army Corps of Engineers to dredge Biscayne Bay for sand to fill the mangrove swamp island. The resulting resort area, Miami Beach, and its popularity contributed to soaring land prices that extended to the keys in Biscayne Bay.

As Miami Beach grew and prospered in the 1910s and 1920s, Carl Fisher planned additional developments in Biscayne Bay. Dredging operations were relatively inexpensive because of the bay's geological and geographical features. Fisher decided to build artificial islands in the bay using this method. Star Island was the first man-made island built in Biscayne Bay between 1917 and 1945. The five islands along the Venetian Causeway connecting Miami and Miami Beach are also man-made islands.

Developers also planned to build artificial islands and expand shorelines in lower Biscayne Bay. Although most of these projects were never completed, portions of the Coconut Grove and Key Biscayne shorelines were extended and Boca Chita, Adams and Elliott Keys were enlarged.

More ambitious plans for the construction of artificial islands off Coconut Grove and on the Safety Valve shoals failed. The result of dredging and the creation of man-made islands in Biscayne Bay during the first half of the twentieth century was dramatic; it has been estimated that about 20% of what had been open water in the upper bay in 1877 was filled, while another 20% had been dredged.

While the popularity of Miami as a vacation resort drove development activities in Biscayne Bay, it also fueled change on the existing keys. Destructive hurricanes and exhausted soils had brought the decline of agriculture on the keys by the 1920s and the rapid development of the Miami area eventually ended their agricultural use. The advent of the motorboat made the keys easily accessible to residents and visitors in the Miami area and some wealthy individuals began to purchase keys to build weekend retreats. The development of these retreats sealed the fate of agriculture on the keys.

In 1904, Henry Flagler opened the first fishing lodge and resort facilities in Biscayne Bay on Soldier Key. The club was an extension of his

famed Hotel Royal Palm, located in Miami; a steamer made daily runs between the hotel and the island. Twelve years later, Fisher and two partners established a vacation lodge on Adams Key, the Cocolobo Club. The lodge was located on Caesar's Creek as an offshoot to Fisher's Miami Beach development. Fisher brought prospective buyers to the Cocolobo and took them fishing and acquainted them with the beauty of the Florida Keys. Many wealthy men became members of the club; however, membership declined during the Great Depression and the key was sold to Gar Wood. Mr. Wood eventually disbanded the club and maintained the key as a private retreat.

The Cocolobo Club

In the early 1900's Carl Fisher, a wealthy Midwestern industrialist, took what most people saw as a swampy peninsula and envisioned a "city beautiful." By 1913, Fisher started creating Miami Beach.

In 1917, Fisher purchased Adams Key and began building the "Cocolobo Club". Fisher had low ground filled on the south side of the island and built a two-story clubhouse. This clubhouse consisted of ten bedrooms, a kitchen, card room and an adjoining dining house. Water came from a 70,000 gallon concrete cistern in the rear of the clubhouse. Electricity came from batteries and, later, from a generating plant. Near the clubhouse was a separate structure for recreational activities, commonly referred to as the "casino." The use of the term casino during this period did not denote any official use for gambling. Also built was a two-story caretaker's house and a small "duplex" used as servants' quarters. All the wooden structures were built out of Dade County pine.

Carl Fisher established the club as a hideout for wealthy people who wished for seclusion and quiet. Membership started out with wealthy and influential guests such as Harvey Firestone, C.F. Ketterling of General Motors, Frank Seiberling of Seiberling Tires, Warren G. Harding, and T. Coleman DuPont. Membership dwindled after the 1929 stock-market crash and the troubles that accompanied the Great Depression. Fisher finally sold the club and Adams Key to Gar Wood, a wealthy inventor and speedboat racer. After a period of time, Wood disbanded the club and kept it as a private retreat until he sold it to a group that included U.S. Senator George Smathers, Thomas Wakefield, and Nixon confidant C.G. (Bebe) Rebozo. This group spent a large amount of money in maintenance and renovation of the facilities. A number of presidents have been guests or members, including Harding, Hoover, Johnson and Nixon.

Adams Key was acquired by the Federal Government with the establishment of Biscayne National Monument in 1968. The main clubhouse was destroyed by fire in December 1974. The duplex was torn down and replaced with an elevated building. Both this new building and the original caretaker's house are now residences for park rangers. Before Hurricane Andrew destroyed it in 1992, the casino building was the environmental education classroom.

Adams Key, part of Biscayne National Park, is a day-use area for park visitors. From January until April every year, fourth through sixth grade students are able to camp on the island and learn about this very special environment.

More Resort Development

Developments emerged on other keys as well. On Elliott Key, Dr. John C. Gifford subdivided and sold twenty-acre lots stretching across the key, from bay to ocean. Buyers built weekend residences and fishing camps on the lots. Charles Brookfield operated a fishing camp, the Ledbury Lodge, on Elliott Key during the 1930s. Stiltsville began as a private club in the shallow waters south of Key Biscayne in the late '30s. Over the next three decades, between

sixteen and twenty residences arose on bay bottom parcels leased from the State of Florida.

Throughout the early twentieth century, the only route between the upper keys and the mainland was by water. The Overseas Railroad, completed in 1912, had bypassed the upper keys, leaving the mainland at a point south of Elliott Key. Local residents began to demand construction of a road in 1929, when the "Upper Keys Improvement Association" published a pamphlet proposing a road from Key Largo to Elliott, using ferries to cross over Broad and Caesar's Creeks. The road was not built, perhaps due in part to the stock market crash in the same year.

From the 1930's to the 1950's, the number of absentee landowners expanded on the keys. Promoters revived development plans for the Biscayne keys in the late 1950's; again, the centerpiece of the proposal was the construction of a road to connect the keys with the mainland.

Supporters discussed several possible routes; some envisioned a causeway over the shallow waters, others wanted to construct a causeway from Key Largo or over the Safety Valve from Key Biscayne. Property owners and other proponents envisioned extensive residential and resort development on the keys and on filled land. In addition, they also considered the construction of an oil refinery on the adjacent mainland, near the Convoy Point area.

Despite these efforts, Dade County officials decided not to pursue the construction of a causeway to the islands. The county advised landowners that they would have to finance and build the road themselves if they wished to connect Elliott Key to the mainland. Property owners on the island responded by seeking to incorporate and the city of Islandia became a municipality in December,1960.

Birth of a National Park

The city quickly met with opposition in its efforts to build a causeway. Conservationists organized to seek national monument status for the largely undeveloped keys in lower Biscayne Bay and received a favorable report from a National Park Service study of the area in the mid-1960's. In 1965, conservationists secured the support of the Hoover Foundation and the tide of local public opinion turned toward preservation rather than development. In late 1967, the Islandia city government, feeling the battle was nearing a close, approved the bulldozing of a 120-foot-wide strip down the center of Elliott Key. The road ran north-south and became known as "Spite Highway." Also, the county filed a lawsuit because the road passed through a county park without authorization, destroying 6.3 acres of vegetation.

In 1968, Congress held hearings to consider the creation of a national monument in the area. During the hearings, Islandia Mayor Ralph A. Fossey testified that twelve to fifteen people lived on Elliott Key and approximately twenty-four structures stood on the island. Despite the vocal opposition of Fossey and some other island landowners, Congress approved the creation of Biscayne National Monument. President Lyndon B. Johnson signed the bill into law on October 18, 1968. The bill authorized the National Park Service to spend $425 million over five years to buy and develop the 164-square-mile park. In 1974, the boundaries of the monument were expanded and in 1980 they were expanded again and the monument was redesignated Biscayne National Park. The park now encompasses 172,000 acres.

THREATS TO BISCAYNE NATIONAL PARK

There are several human threats to the integrity of Biscayne National Park. Below is a list of some of these threats as identified in the park's general management plan.

- Leaching of hazardous chemicals from adjacent landfills into the bay.
- Decreased water quality.
- Coral reef damage caused by boaters anchoring in and running into coral heads.
- Propeller scarring of bay bottom and seagrass beds by recreational and commercial boaters.
- Removal of coastal mangroves, dredge and fill operations, or other disruption of coastal wetlands for residential and industrial development.
- Disruption and decrease of overland flows of freshwater due to the creation of the South Florida Water Management District's drainage canal and salinity barrier system.
- Chemical and organic pollution of the bay and wetland waters by agricultural and urban wastes originating adjacent to the park.
- Potential oil spills from commercial shipping on the Intracoastal Waterway, Hawk Channel, and offshore shipping lanes.
- Increased air pollution caused by urban and industrial expansion in the region surrounding the park.
- Continued spread of exotic plant (Australian pine, Brazilian pepper, seaside mahoe) and animal species (Cuban tree frog, Mediterranean gecko, Norwegian rat), which displace native vegetation and wildlife.
- Potential depletion of native fish and invertebrate populations due to sport and commercial fishing and lobstering.

VOCABULARY

adapt To adjust to particular conditions.

algae A group of plants often found in water or damp places. Algae have chlorophyll, but lack true stems, roots and leaves. Pond scum and seaweed are examples.

anole A small lizard sometimes called a chameleon. Like true chameleons, they can change their color (from green to brown or grey).

aquatic Pertaining to water

aquifer A water-bearing bed of gravel, rock or sand capable of yielding considerable amounts of water to wells or springs.

arachnid Spiders belong to this classification of animals. Scorpions, daddy-long-legs and mites are also arachnids. Spiders have eight legs and insects have only six. A spider has two main parts to its body and an insect has three. Many insects have wings and almost all have feelers or antennae. Spiders have neither wings nor antennae.

bay A small body of water set off from the main body or a part of a larger body of water that cuts into a shoreline, forming a curve.

benthos Organisms dwelling either in or on the bottom of bodies of water.

bio-degradable The ability of a substance or material to break down by the action of living organisms.

biology The scientific study of living things.

bio-luminescence The production of light by living organisms. This occurs in deep-sea creatures as well as some insects in our hammocks.

botany The scientific study of plants.

calcium carbonate (CaCO) A mineral important in the development of coral reefs, mollusk shells and some algae.

camouflage An organism's ability to blend with its surroundings thus protecting it from predators.

carnivore An organism that eats meat.

climate The average condition of the weather in a particular region over a period of time.

community A group of plants and animals living in a particular environment, working together to fulfill their individual needs.

conservation The wise and careful use of our natural resources.

consumer A user of goods and services; in a food chain, an animal that must depend upon plants and/or other animals for its energy.

continental shelf A flat, projecting extension of land submerged beneath a shallow sea.

coral polyp An animal having numerous tentacles and secretes a skeletal cup in which it lives.

coral reef A community of millions of coral polyps growing together and the solid limestone resulting from their consolidation.

crepuscular Active in the twilight.

crustacean An animal of the class Crustacea, such as a crab or lobster, that has a hard exoskeleton.

decomposer A physical element, or organism, that causes other organisms, or physical elements, to break up and/or rot. Mushrooms for example, help to decompose dead logs.

detritus Organic debris from decomposing plants and animals.

diurnal Active during the day.

diversity A term referring to variety or differences in the natural world. Biological diversity refers to variety in living things; species diversity refers to variety among different species; genetic diversity refers to the variety within a single species and ecosystem diversity refers to differences in living communities.

ecology The study of the inter-relationships of organisms and their environment.

ecosystem The interaction of the biological community (all living things) and the physical environment (water, air, minerals, etc.).

endangered species A species of plant or animal that throughout a significant portion of its range is in danger of extinction.

environment All those factors, both living and non-living, which make up the surroundings of an organism.

estuary The area of water where a river meets the sea, where river flow meets tide, and where fresh and salt water meet.

exoskeleton Outside skeleton, such as in lobsters, crabs and other shelled animals.

exotic Not native, or something that did not grow in this area before being introduced by man.

extinct A species that has vanished from existence and will never exist again.

fauna Animal life

flora Plant life

food chain Sequence of organisms starting with green plants in which each is food for a higher and more complex organism.

food web The many connected food chains by which organisms of a community obtain their energy.

ground water Water that enters the soil, following rain (precipitation).

habitat The place where a plant or animal lives.

hammock From an Arawak word meaning a "place of dense vegetation." It is an area somewhat higher than its surroundings characterized by hardwood vegetation.

herbivore An organism that eats plants.

humidity The amount of moisture in the air.

ichthyology The scientific study of fish.

insect A classification of animals with an exoskeleton which has three body parts and six legs.

instinct An inborn ability to do something.

intertidal The area on a shoreline between the high and low tide lines.

invertebrate An animal without a backbone, such as an insect.

key From the Spanish word "cayo" meaning little island.

lagoon A shallow body of water partially protected from the open sea.

larva The juvenile, often wormlike form of an insect.

limestone Rock consisting of mainly calcium carbonate; fossilized shells and coral.

mammal A class of vertebrates which have hair and mammary glands producing milk to nourish young.

marine Of or pertaining to the ocean.

marsh rabbit This rabbit is a herbivore and one of only four mammals reported to live on Elliott Key. Actual status of the marsh rabbit on our islands is questionable since hurricane Andrew. It has adapted to the environment by learning how to swim.

migrate To travel with the seasons from one place to another.

mimicry A form of protective coloration, or acting, in which an animal closely resembles another kind of animal or object in its environment. The animal being mimicked usually has toxin that causes predators to avoid it. By imitating the toxic animal, the other animals may keep from being eaten.

mollusk A classification of animals with exoskeltons and shells such as snails and clams.

mosquito Insects are the second step in many food chains in South Florida. Only the female bites, and a drop of blood gives her enough protein to make 200 to 400 eggs. Males eat the nectar in flowers.

national park A federally-funded area maintained in its natural state; public property for the benefit of all.

natural selection A natural process leading to survival for those individuals or groups best adjusted to the conditions under which they live.

niche	The interaction of a specific organism with its environment; the organism's special function within that environment.
nocturnal	Active at night
nursery	An area where the young of a species live for the early part of their lives.
omnivore	An animal that eats both plants and animals.
organic	Made up of living (or no longer living) things.
parasite	Any organism that lives in or on another organism from whose body it takes nutrients.
pelagic	Of or pertaining to the open waters of the ocean.
photo-synthesis	The process by which plants with chlorophyll use the sun's energy (light) to manufacture food (carbohydrates) and release oxygen.
plankton	The word is Greek for "wanderer." Generally microscopic plants and animals that can't swim against the water current. They are an important food source.
pod	A number of animals (such as dolphins or whales) closely clustered together.
pollution	Human caused waste that contaminates soil, air or water.
population	The total number of living organisms within a given area.
predator	Any animal that hunts live animals for its food.
prey	A predator's victim.
producer	An organism that produces or makes food for other organisms. Plants are producers, while animals are consumers.
raccoons	One of the few land mammals living in Biscayne National Park, they do much of their hunting at night. They hunt for turtle eggs, fruits and fiddler crabs. This makes them omnivorous.
recycle	To use over again
salinity	A measure of the quantity of dissolved salts in seawater.
scavenger	An animal that moves around scouting for dead animals to eat.
sea bean	Any of various beans or showy seeds of tropical origin that are frequently carried by ocean currents to remote shores.
sea grass	Marine flowering plants with true roots, leaves and stems. They produce tiny flowers, spiny seeds and energy through photosynthesis. Sea grasses stabilize sediments and are habitat for other marine species.
seaweed	Non-microscopic marine grass

solution hole	A void created in rock by water flowing through or on it. Water has a slightly acidic pH which dissolves the calcium carbonate (limestone) rock. Frequently the hole gets large enough and the roof caves in creating what is referred to as a solution hole.
species	A genetically and adaptively unique plant or animal that is able to reproduce itself and to evolve. For example all human beings are of one species.
stewardship	The careful responsible management of something entrusted to one.
substrate	Any solid object, ground, rock, log, etc. to which any organism may attach or live upon.
symbiosis	Association between unlike living plants and animals in which one or both are benefited and neither is harmed.
territory	An area usually including nesting sites and foraging range that is defended against the intrusion of rival individuals.
threatened species	Describes a species of plant or animal whose populations are not yet endangered, but are showing signs of trouble.
turbidity	Being thick or opaque with matter in suspension resulting from sediment being disturbed.
vertebrate	An animal with a backbone, skull and skeleton of cartilage or bone.
wetland	Land containing much soil moisture or is often saturated with water that is not a lake or river.
wildlife	Living things that are neither human nor domesticated.
wrack line	Marine vegetation cast upon the shore that marks the high tide line.
zooxanthellae	Symbiotic algae that live within the tissue of coral polyp.