



## Shark Valley Day Program Teacher's Guide



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## Acknowledgements



This guide is dedicated to those teachers who share their sense of wonder with their students.

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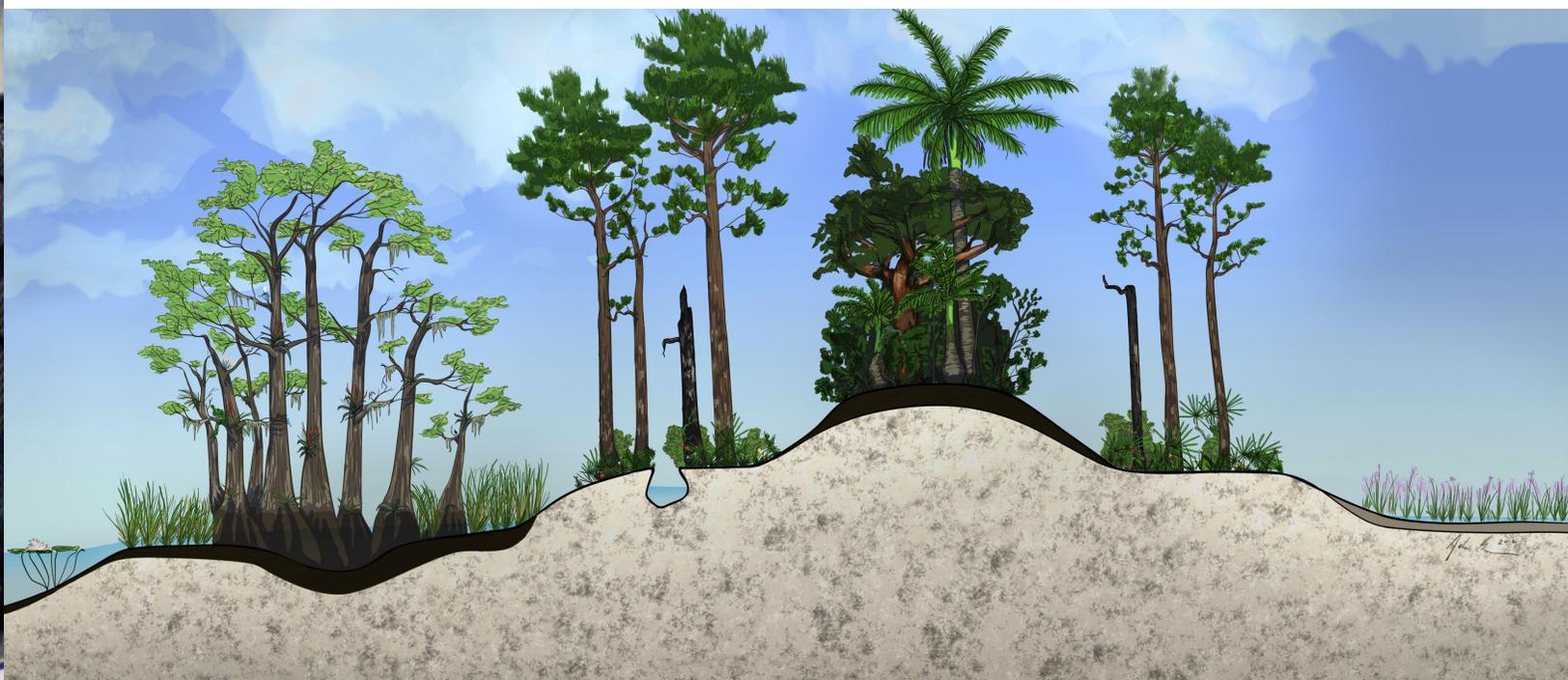
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## Everglades Environmental Education

### Everglades National Park

Everglades National Park (NP) was established in 1947 to protect the natural habitats of the Everglades Ecosystem. Everglades became the first national park to be created not for the grandeur of its landscape, but for the richness of its biodiversity. This globally significant 1.5 million acre national park is also designated as a World Heritage Site, an International Biosphere Reserve, and a Wetland of International Significance. Today, South Florida is home to one of the world's largest ecosystem restoration efforts, which seeks to maintain the region's abundance of life with properly managed water flow through the ecosystem's watershed.

### Environmental Education

In 1971, Everglades NP began offering educational programs in partnership with local school districts. From humble beginnings grew one of the largest environmental education programs in the National Park Service. With four core programs and additional curriculum resources, Everglades NP hosts over 11,000 students annually.

#### Everglades Education Program

##### Day Programs

*Shark Valley for 4th grade*

*Royal Palm for 5th-6th grades*

##### Camping Programs

*Hidden Lake for 5th-6th grades*

*Loop Road for 5th-6th grades*

For information about our programs, guest speakers, in-school teacher workshops, curriculum resources, and loan materials, visit our website:

[www.nps.gov/ever/forteachers](http://www.nps.gov/ever/forteachers)

## EVERGLADES ENVIRONMENTAL EDUCATION PROGRAM



These curriculum-based programs are offered in close partnership with local classroom educators and are aligned with the Next Generation Sunshine State Standards.

Educators attend a workshop, organize a field trip, teach their students about the Everglades, co-lead an adventure in the park, and then follow up with reflective classroom activities. The support of these teachers allows the program to have a much greater impact than park staff alone could impart.

#### Program Goals

Park staff, teachers, and school administrators share responsibility for the Everglades Education Program. These partners have agreed upon the following goals:

- Acquaint the students of South Florida with the habitats of Everglades National Park including the hardwood hammock, the freshwater slough, the sawgrass prairie, and the pine rocklands.
- Develop in students an appreciation for their total environment, both natural and human made.
- Develop in students an understanding of Everglades National Park's value to the web of life in South Florida.
- Motivate students to actively participate in solving South Florida's environmental problems.

# Shark Valley Day Program 3

Although these goals may not be achieved in their entirety during a single trip, classroom lessons can make even one park visit a significant step toward educating students as caretakers of South Florida's natural resources.

This guide will help you prepare for a field trip to the Shark Valley area of the park. Use it as a reminder for material covered during the teacher workshop, a review of the habitats, and a reference for classroom activities and additional resources.

Thank you for your willingness to become a trip leader! We hope visiting your national parks will be a lifetime adventure.

## Shark Valley Day Program

The general plan of the field trip remains the same from year to year. However, circumstances such as high water, mosquito levels, warm or cold weather, and the program emphasis of each individual ranger, result in some variability. The rangers will communicate the expectations and schedule for the day's events to the teacher. (Please see page 4 for a typical field trip schedule.)

Approximately one month before your visit, the education staff will contact the lead teacher to confirm the details of your visit. Please be sure to inform him/her of any changes in teachers or group size.

Two park rangers will be waiting for a bus with up to 58 students. When you arrive, rangers will board the bus, introduce students to the National Park System and mission, and briefly review the day's schedule and establish program expectations. During a portion of this introduction, all teachers and chaperones will meet with one ranger to pack lunches on the tram, review the role of adults on the trip, and discuss any safety or logistical concerns for the day.

Once introductions are completed, students will disembark the bus and line up. After a quick restroom break, the group will assemble on the lawn with their teachers, chaperones, and rangers. One ranger will lead an activity to introduce the theme of the program and explain the schedule for the day. To load the tram, the ranger will divide the group between the front and back tram cars with one workshop-certified



Purple Gallinule

teacher for each. With the teacher's input, the ranger will facilitate seating arrangements while assigning the adults to sit in center seats throughout the tram.

One ranger will drive the tram while the other ranger serves as the guide throughout the 15-mile trip. The workshop-certified teacher assigned to the back tram car is able to communicate student responses and questions to the ranger by utilizing a dry-erase board.

The tram will stop at the observation tower, for a short picnic lunch. Restrooms are available during lunch at the base of the observation tower. The rangers will then divide the group to get a bird's eye view from the Shark Valley observation tower and explore inside the hardwood hammock. Please follow the ranger's schedule to ensure that the tram returns for a timely bus departure. On the return trip, students will have the chance to observe more wildlife and review the day's lessons.



# 4 Day Trip Schedule

## Schedule

The following schedule represents a typical trip. However, keep in mind that changes in weather, wildlife, and/or transportation may require schedule adjustments. Flexibility is essential to having an enjoyable visit to the park.

### 8:30 am - 10:00 am Travel to the Park

Along the way, you can point out sights that relate to the park story such as canals, isolated stands of pine trees, agricultural fields, and new housing developments. You may also want to review vocabulary words and ecological concepts, or assign a scavenger hunt or similar activity for seatmates to complete during the bus trip.

### 10:00 am - 10:15 am Meet Park Rangers at Shark Valley

After a brief welcome to Everglades National Park, one ranger remains on the bus and talks to the students about expected behavior. The other ranger meets with the teachers and chaperones just outside the bus to review the plan for the day and unload lunches.

### 10:15 am - 11:45 am Ranger-Guided Tram Tour

After leaving the bus, the students take a quick restroom break and rejoin the rangers. One ranger leads an introductory activity, and then everyone boards the tram. With the ranger, the students explore aspects of the Everglades watershed and observe wildlife in their natural habitats.

### 11:45 am - 12:10 pm Lunch

Everyone eats lunch together, sitting on the grass with their ranger. The students, teachers, and chaperones are responsible for leaving the area clean.

### 12:10 pm - 12:45 pm Tower and Hammock Exploration

Each ranger will pair up with a group of students, a workshop-certified teacher, and chaperones. The ranger leads the group to the top of the observation tower for an activity. For the second stop, the ranger takes half the group for a short hike into the hardwood hammock while the workshop-certified teacher leads an observation activity.

### 12:45 pm - 1:25 pm Return Tram Trip

On the return trip, the ranger encourages students to observe and identify flora and fauna and then concludes with a review of the Everglades ecosystem.

### 1:30 pm Bus Leaves the Park

(12:30 pm if school has early dismissal)



# Teacher Responsibilities 5

## Ranger for a Day

Teachers participating in the Shark Valley day program should plan on leading a group (usually 12-18 students) on a trail. The ranger will lead the other half of the class and will coordinate the activities of both groups. Mandatory workshops prepare teachers for the adventure.

As themes and plans vary somewhat from field trip to field trip, rangers will begin by engaging the entire class in an activity to set the focus for the day.

## Planning Checklist

As you prepare for your day trip, please consider the following:

### Your School's Field-Trip Policies

Teachers are responsible for making sure that all school system regulations are followed regarding parental permission slips, travel authorizations and insurance, etc.

### Chaperones

One adult (chaperone or teacher) per ten students (a 1:10 ratio) is required by Everglades National Park. Chaperone guidelines, in English and Spanish, are included on page 9 of this guide for teachers to copy, distribute, and review with them.

### Nametags

For safety and courtesy, the rangers prefer to address students and adults by name. Even a single piece of masking tape with a participant's first name written on it in big letters works well. If you choose to make name tags as a pre-visit activity, be sure they are legible and do not fall off easily.



### Lunch

School lunches or bag lunches with disposable items are best. Before leaving school, please label and organize the lunches by class to save time. Having lunches marked and organized for easy distribution will decrease the time spent passing them out and increase the time exploring the park. The lunches must be able to fit into an area under the last bus seat. This space is about the same size as a box that holds copy machine paper.

One cooler per class is permitted for cold drinks. Remember, you will be out in the heat for 3-4 hours; if the school packs the lunches, we suggest you include water, juice, or cold drinks other than milk. If students pack their own lunches, remind them to bring an additional drink for lunch.

As a reminder, no one from the trip is allowed to use the vending machines at Shark Valley. Food and drinks to purchase are not available at the picnic site.

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## Pre-Visit Preparations



Students and chaperones are responsible for leaving the picnic area clean.

### What to Wear

Long pants, socks, and closed-toed shoes are required for both students and adults. Shoes should be comfortable for walking. No shorts, dresses, cropped pants, sandals, flip-flops, or open-toed shoes are allowed. Warm weather can make shorts and sandals tempting, but they are not permitted for safety reasons; long pants and proper footwear protect participants from biting insects and poisonous plants.

### Inclement Weather

If rain or cold weather is in the forecast, please communicate with parents that

students should come properly dressed to be outside all day. Layers work best and can always be left on the bus if they are not needed.

### Items To Leave Behind

Students are not permitted to bring cell phones, cameras, binoculars, electronics, video games, or money. These items distract the students and prevent them from fully experiencing the Everglades with their own senses. If you would like pictures of your field trip, please designate one chaperone as the class photographer. Picture taking should not interfere with the learning experience or the schedule. Since the busy schedule of the day program does not allow time to visit the gift shop, money is not needed.

### Insect repellent

Insect repellent is usually only needed during the fall months. One or two bottles per class should be sufficient. If mosquitoes are a problem, the rangers will adjust the schedule to spend less time in the hammock habitat.

### Pre-Visit Preparations

Before your visit, be sure to discuss the rules, found on page 13, with your students.

When hands-on learning in the park reinforces concepts covered in the classroom, students have a more powerful learning experience. See pages 10-11 for suggestions on preparing your students for their visit.

# Pre-Visit Preparations

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## Required Workshop

In order to connect the field trip experience to learning objectives, the Everglades Education Program employs team teaching. Teachers are expected to incorporate the field trip with pre- and post-site lessons in the classroom. During the field trip, teachers lead part of their class on the trail. To help teachers prepare for their park visit, park staff conduct mandatory one-day workshops onsite at the field trip location. At the workshop, teachers will:

- Learn about the program's logistics, schedule, and park rules.
- Acquire a familiarity with the habitats, wildlife, and trails that their students will experience on the field trip.
- Gather ideas for leading their students on the trail.
- Participate in curriculum-based activities that can be used for pre-site classroom preparation.

One teacher per class must attend the workshop before bringing students on the field trip. Typically two classes attend together, so two workshop-certified teachers are needed for the program. Other teachers or adults participating as leaders in the program are also welcome to attend. Day program teacher workshops are six hours and are usually held on teacher workdays twice a year in October or November and January. Professional development credit hours may be available for participating.

Teachers who attend a workshop will be certified to bring students during the current year and the following school year. As long as you participate in programming at least once every two years, you will not need to attend

another workshop. If you miss two years in a row, you will need to attend a workshop for a refresher on logistics, activities, and any new information.

Please note that each Everglades Environmental Education Program (Royal Palm, Shark Valley) requires a different workshop. Workshop enrollment is arranged when submitting a trip reservation form or by contacting the Everglades Education Office.

## Program Registration and Scheduling

Information about our programs and online registration can be found on our website at [www.nps.gov/ever/forteachers/](http://www.nps.gov/ever/forteachers/). Field trip registration typically begins in late August just before students return to school. Check the website during the summer for the

exact date and time. Trip reservations are filled on a first-come, first-served basis, and are finalized in early October. Program reservations fill up quickly, so we recommend that teachers visit the website prior to registration to learn what information they will need.

After submitting a program request, park education staff will contact the lead teacher to establish a date for the trip. Although we make every attempt to grant the requested date, being flexible increases the likelihood of securing a field trip. A waiting list is maintained in case of cancellations.

Day programs are offered Monday through Friday from late October through April, with the exception of federal holidays. For groups that have



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## Pre-Visit Preparations

an alternative schedule for standardized testing, consider scheduling a trip during the FCAT testing period. Confirmation letters with program details must be signed by participating teachers and the school administrator and returned promptly. Please be sure to inform our office of any cancellations or changes in teachers or group size.

### Transportation

Each school must arrange and pay for its own transportation to and from the park. Most schools use district-approved bus transportation. Some schools choose to transport children in private vehicles. Whichever method you choose, it must meet all school district safety regulations and care should be taken in safely packing and stowing lunches.

The South Florida National Parks Trust has been raising funds to help schools offset their costs for transportation to the park. Some bus funding may

be available to schools in need and can be requested when registering for a program date. For those schools receiving assistance, the park will notify the contracted bus company of the reserved dates. The maximum number of people allowed on a bus is 64 (58 students and 6 adults). Field trip participants, including adults, may not follow buses in private vehicles.

In order to cover afterschool routes, buses typically must leave the park no later than 1:30 pm (or 12:30 pm on Wednesday). To maximize your time in the park, plan to depart from school as early as possible in the morning.

### Chaperones

Chaperones are an integral part of the field trip experience. They provide support to the park ranger and teachers as well as guidance for the students. Please encourage chaperones to assist in maintaining discipline and to be on the lookout for potential safety haz-

ards. Like students, adults must wear long pants and closed-toed shoes. We ask that adults refrain from using cell phones or vending machines and from smoking in front of the students. Chaperones should be reminded to be active participants in all program activities. When the adults are actively engaged and modeling attentive behavior, the students will follow. We encourage teachers to print copies of the chaperone guidelines, provided in English and Spanish, and review them with chaperones before arrival.

Chaperones may be parents, school staff, or other responsible adults. Chaperones are chosen by the lead teacher with a minimum of one adult for every ten students (1:10 ratio) and with a maximum of eight adults total. Too many adults can be a distraction during the visit, but a minimum is required to maintain a safe learning environment. Having a chaperone stand-by list ready in case of last minute cancellations is always recommended.





## Chaperone Guidelines

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

### Be an active participant.

Joining in on the activities allows you to interact with and set a good example for the students.

### Students will need your guidance during lunchtime and cleanup.

By jumping 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 as the students. You will also be asked to help enforce rules. This includes wearing long pants, socks, and shoes at all times, respecting plants and animals (no harassing or removing), and showing respect for others.

### Assisting with safety is one of the primary chaperone duties.

By watching over your group, you will help to ensure 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 in the Everglades! The students pick up on how you react—if you are having fun, they will too.

## Guía para los Acompañantes

Gracias por ofrecerse como acompañante voluntario para el programa educativo del Parque Nacional de los Everglades. Usted es una parte muy importante de nuestro programa. Necesitamos su ayuda y cooperación para que la excursión a los Everglades sea todo un éxito.

### Sea un participante activo.

El tomar parte en las actividades le permite tener contacto con los estudiantes y darles un buen ejemplo.

### Los estudiantes necesitarán su ayuda durante el almuerzo y la limpieza.

Al ofrecerse para 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 que se les exige a los estudiantes. En ocasiones se necesitará su ayuda para hacer que estas reglas se cumplan que incluye el uso en todo momento de pantalones largos, medias, y zapatos, respetar las plantas y los animales (no se permite molestar ni sacar plantas o animales del parque), y respetar a las demás personas.

### Ayudar con el cumplimiento de las reglas de seguridad es uno de los deberes principales de los acompañantes.

Al cuidar de su grupo, usted hará su parte para que todos tengan un paseo seguro y sin peligros.

### Guíe el proceso de aprendizaje.

Por favor, ayude a mantener la atención del grupo concentrada en lo que el guardaparque o el maestro enseña y aliente a los estudiantes a contestar las preguntas.

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

# 10 Classroom Activities

## Before Your Visit

This section provides suggestions on classroom activities and techniques to get you started in planning lessons to integrate the Everglades into your overall educational goals. Of course, we encourage you to use your imagination in building your lesson plans.

## Pre-Site Activities

Pre-site preparation conducted by classroom educators prior to field trips is a crucial part of the program. If students learn about the Everglades before the trip, they will have the opportunity to make tangible connections with what they previously learned. Additionally, the ranger will be able to build on their prior knowledge instead of covering the basics.

## Post-Site Activities

Follow-up classroom activities that allow for reflection on the experience are a great way to wrap up programming. We encourage teachers to conduct activities that allow students to share their experience and express their new awareness with others. Artwork, displays, reports, and essays are all great ways to keep students thinking and learning about their backyard national park.



## Classroom Activities

The Everglades homepage [www.nps.gov/ever/](http://www.nps.gov/ever/) makes a great starting point for information about all aspects of the park. To assist you with classroom-based lessons, Everglades National Park has several curriculum guides with activities developed and tested by educators for more than twenty years. These activity guides are available on the park's website at [www.nps.gov/ever/forteachers/curriculum/materials/](http://www.nps.gov/ever/forteachers/curriculum/materials/).

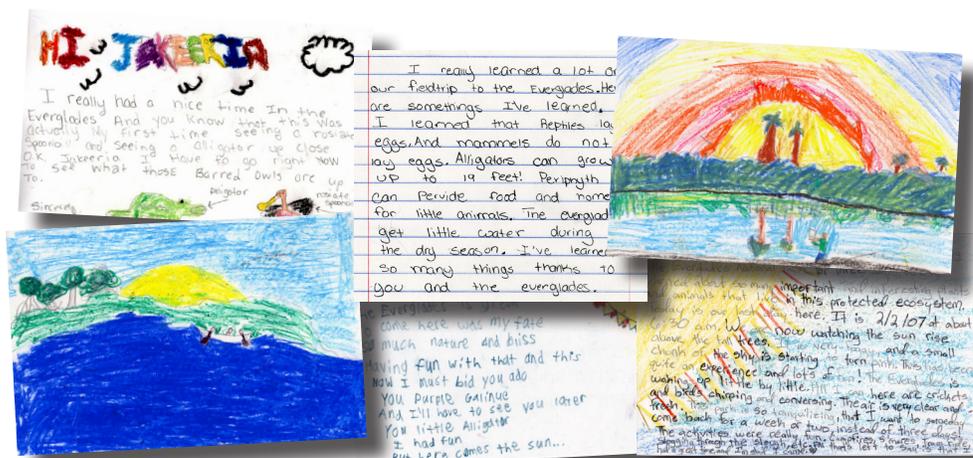
## Predict, Observe, Explain

This strategy can be used in the classroom to predict what wildlife you will

see on your field trip and in which habitats certain animals will be found. Record your predictions on the board or in notebooks. Observations can be made during the trip, and then discussed and compared to predictions afterwards. Were the original predictions accurate? What predictions can you make about wildlife activity at different times of the day and year? How about the future? Will habitats and wildlife populations change over time? What other evidence could you use to make more accurate predictions?

## Plant and Wildlife Identification

Classification and identification are fundamental ecology skills. A variety of excellent materials are available online, from the Everglades Association, and through your school media center. Bird, plant, and fish identification cards will be available at the park in your teacher backpack. Pre-site classroom practice in describing a bird's beak, a leaf's shape, or the shape and color of a fish will prepare your students to amaze themselves in the field.



## Creative Writing

Students who write reports on specific plants and animals before their field trip look forward to observing their research topic in real life.

## Literature, History and Storytelling

Biographies of Marjorie Stoneman Douglas, Rachel Carson, John Muir and other conservation figures are available for students. Other books such as *The Lorax* by Dr. Seuss have themes that relate directly to parks and wildlife. The rich body of Native American literature and storytelling, found for example in *Keepers of the Earth* by Michael Caduto and Joseph Bruchac, provides imaginative multi-cultural material. Connecting the field trip visit to the experience early explorers may have had when they visited the same landscape makes an excellent tie-in to Florida's history and settlement. Fic-

tional stories such as *The Missing Gator of Gumbo Limbo* by Jean Craighead George can also bring the Everglades to life. See page 24 of this guide for a list of media and web resources.

## Reflective Thinking

Research shows that students must be given an opportunity to assimilate what they have learned in order to move that information to long-term memory. In the interest of merging FCAT strategies with Everglades curriculum, many teachers use writing assignments as a post-site reflective exercise. Writing letters to friends, family, or community leaders is an activity that reinforces the concept that national parks belong to all citizens. Art projects or writing poetry (examples from *Sawgrass Poems* by Frank Asch) allow students to express the powerful experience they have when they visit the

park. Letters or artwork from students to the ranger also enable us to assess the effectiveness of our programs.

## Role Playing

Role playing activities can be especially powerful for all learners. The Everglades Activity Guide for Teachers includes several role playing scripts, but creating your own with your class takes learning to another level.

## Photos and Videos

Photos and videos are available through the "Photos & Multimedia" section of the park's website at [www.nps.gov/ever](http://www.nps.gov/ever). The "For Teachers/Materials for Loan" section of the website offers a Media Library and Traveling Trunk for teachers to borrow and use in their classrooms. The Everglades Association also has a variety of videos for sale in visitor centers or online at [www.evergladesassociation.org](http://www.evergladesassociation.org).

## Everglades in the Media

National Parks and nature are common in advertising, a testimony to the sometimes subconscious value we place on natural areas. Collecting advertisements featuring animals and nature can serve both as a basis for social science as well as science lessons. Having students gather articles about Everglades restoration and other related current events connects their community to the park.

## Online Resources

National Parks offer a variety of materials for teachers and students. Virtual visits, electronic field trips, and WebRangers provide technology-based experiences. Visit [www.nps.gov](http://www.nps.gov) and [www.webrangers.us](http://www.webrangers.us).



# 12 *Evaluations*

## Evaluations

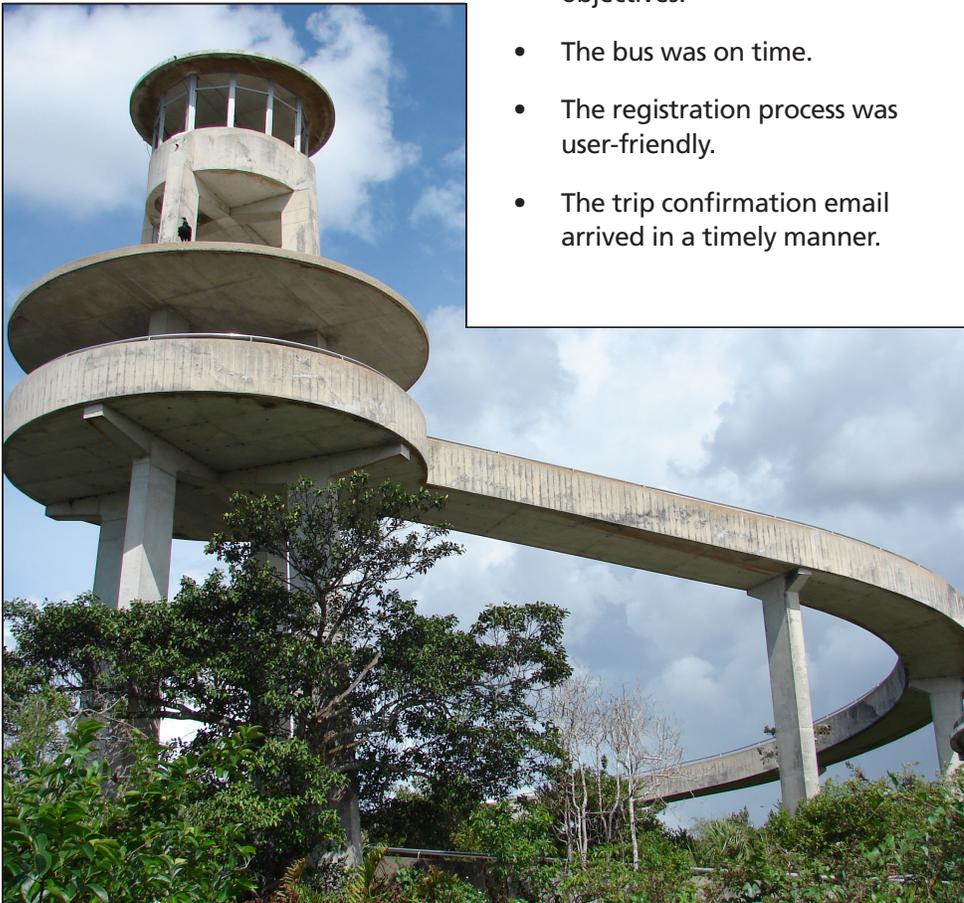
In an effort to continually improve our programming, both the ranger and the teacher exchange evaluations after the day program. The following points are listed on the evaluations, but there is also space provided for general comments. Specific suggestions and honest comments, both on what worked and what did not, are welcome. If at any time you would like to discuss a concern about the field trip program with a supervisor, please contact the Everglades Education Office at (305) 242-7753.

## Teacher's Evaluation of the Ranger

- The rangers showed concern for the safety of the participants.
- The rangers behaved and responded appropriately to students.
- The ranger-led program was easily understood, engaging, and age-appropriate.
- The rangers communicated appropriately with teachers and chaperones.
- The rangers facilitated a positive learning experience.
- The rangers were well prepared.
- The program met my teaching objectives.
- The bus was on time.
- The registration process was user-friendly.
- The trip confirmation email arrived in a timely manner.

## Ranger's Evaluation of the Teacher

- Pre-site class preparation on the Everglades Ecosystem was evident.
- Class behavior and responsiveness to ranger staff was appropriate.
- Most of the group wore name-tags, were properly dressed, and did not bring prohibited items such as cameras, binoculars, phones, etc.
- There was a chaperone for every 10 students.
- Lunches were organized for easy distribution.
- Students and teachers took charge of clean up after lunch.
- There was compliance with the bus regulation of a maximum of 65 passengers.



Coralbean

## Safety, Rules, and Emergencies

### Safety

Our program has a number of rules and protocols to ensure that everyone has a safe visit and that the park and its inhabitants are protected. Providing a framework of rules during a pre-visit discussion will make enforcement during the field trip much easier. Please share the following with your students before you leave school.

### Protect Our National Park

Remind your students and chaperones that in a national park, collecting or damaging any plants or animals is prohibited.

### Respect...

- ...the wildlife. Feeding or harassing animals in the park is illegal. Remember that these are wild animals. Maintaining a safe distance of at least 10 to 15 feet between people and animals is recommended. In addition to protecting

### Emergencies

Park rangers carry radios and can request emergency medical assistance. If a student in your group is injured or falls ill, notify a ranger immediately. For minor injuries, you or the ranger may use the first-aid kit from the teacher backpack. If a child is not feeling well, assign an adult chaperone to stay with him or her. Instead of calling 9-1-1 for an emergency in the park, dial 305-242-7740 for our 24-hour Park Communication Center.

ourselves, this also protects the wild nature of the animals.

- ...the plants. Picking flowers or breaking off leaves damages the plants. Collecting pine cones, feathers, rocks, or other natural objects is not allowed in Everglades NP or any national park.

- ...the right of others to enjoy Everglades National Park. Loud noises and disruptive behavior may disturb wildlife or other visitors.
- ...each other. When the ranger or teacher is talking or a student is answering a question, everyone should listen.
- ...the adults. Remind students to always stay with their group. Each group should be led by a teacher or ranger, with an adult chaperone at the end.

### Leave No Trace

Except for one water bottle each, we ask students to leave all belongings on the bus. This helps keep our trails clean. Likewise, after lunch, your group is responsible for picking up all pieces of trash and crumbs. Food, sugary drinks, and gum are prohibited on the trails.



# 14 *Creepy Crawlies*

## 'Gators and Spiders and Ants... Oh My!

It is common for even experienced outdoor people to arrive at the Everglades expecting swarms of nasty animals and aggressively poisonous plants. The reality is a lot less glamorous. Yes, Everglades has alligators, crocodiles, four species of venomous snakes, an abundance of spiders, and plants that can cause an unpleasant skin rash. Nevertheless, more than a million people visit the park each year and experience no ill effects. Students often thrive on a hint of danger. Understanding the creatures and plants that present a hazard to humans will help you build upon students' natural curiosity.

### Alligators

Since it is illegal to feed alligators in Everglades National Park, they do not associate humans with food. In less frequented areas, they often retain the natural caution of wild animals, moving away as humans approach. In high

visitor use areas such as Shark Valley, alligators become accustomed to the presence of people. Do not, however, make the mistake of viewing these animals as tame. The distance between an alligator and an observer should never be less than twice the alligator's total length. Alligators are strong and agile animals. Always treat them with respect.

### Crocodiles

Rare and shy, crocodiles prefer brackish water areas. You will not see crocodiles at Shark Valley because it is a freshwater habitat. Crocodiles do frequent Flamingo as well as the remote area 15 to 18 miles downstream from Royal Palm, where Taylor Slough flows into Florida Bay.

### Fire Ants

These ants thrive in disturbed areas, building large sandy mounds that dot lawns and trail edges. Field trip par-

ticipants need to watch their feet, as stepping on an ant mound will bring forth a parade of angry ants with a painful bite. Fire ants are one of the many invasive, non-native species in South Florida. Non-native means they were imported from somewhere else and invasive means they are spreading rapidly. Invasive species—whether insect, plant, animal or fish—often lack the natural biological controls that keep them in check in their native environment. Several invasive species, including Brazilian pepper (a large shrub), Burmese pythons, and African jewelfish are dramatically altering the ecology of some parts of the Everglades.

### Scorpions

Scorpions are common in the pine rocklands. They move through the leaf litter hunting at night, but spend their day under logs or under tree bark. The good news is that scorpions eat insects, including cockroaches! As their bite is painful to humans, students take care to only put their hands where they can see them.

### Snakes

There are 26 species of native snakes in the Everglades, but only four are venomous. The most commonly seen snake on this field trip is the brown water snake, a nonpoisonous variety with blotchy brown skin, typically observed sunning itself along the trail and tram road. Because snakes feel vibrations from the ground with their bodies, they are likely to move away from the thunderous footsteps of an approaching school group. Most school years pass without a single sighting of a venomous snake on any of the Shark Valley day programs.



Cottonmouth

## Spiders

Spiders are found everywhere on earth, but are especially common in warmer climates. All spiders kill their prey by injecting venom. They then use juices from their digestive glands to liquefy the insides of the prey before sucking it into their mouths. Spiders dine mostly on insects. None eat humans, so biting a human is a desperate attempt at self-defense since it wastes precious venom. The two North American spider species considered to be poisonous to humans are the brown recluse and the black widow, but neither have been seen by participants on this field trip. On the other hand, students will have an excellent opportunity during their visit to examine the webs of common orb weavers such as the golden silk orbweaver and the orchard spider.



Golden Silk Orbweaver

## Bees and Wasps

Fuzzy bumblebees, shiny black carpenter bees, and slender bodied-wasps can all be seen in the park on a day program. The insects in this group have stingers, but are unlikely to use them

unless they feel trapped. Most bees are busy visiting flowers, and, like spiders, only sting in self-defense.

## Poisonwood and Poison Ivy

Poison ivy grows as a small herbaceous plant or vine. It is quite common along the trails, especially in the shaded hardwood hammocks. Its relative, poisonwood, is a shrub-tree native to the American tropics. Poisonwood thrives in the hardwood hammock and pine rockland habitats. Your Everglades trip provides an excellent opportunity to teach students how to recognize these plants.

Both poison ivy and poisonwood have oils on the leaves and twigs that may cause an allergic reaction. Like most allergies, not everyone is equally affected, nor is the reaction immediate. Usually the rash takes a few days to develop. Washing exposed skin with

cold water and soap is often enough to prevent or reduce the irritation. Since school groups must stay on the trails, students who wear long pants, and exercise caution about what they touch, are not likely to make skin contact with these plants.

Although these plant species sometimes irritate humans, they are woven into the Everglades' web of life. The fruits of poisonwood and poison ivy are both eaten by birds. Poisonwood berries are, in fact, a preferred food of the rare White-Crowned Pigeon.

When teaching students about the hazardous plants and animals of the Everglades, we encourage you to emphasize respect rather than fear. As you and the adult chaperones teach by example, students will appreciate the value and enjoyment offered by the natural outdoors.



Poison Ivy

# 16

## *The Life Blood*



### **Water**

Water is the lifeblood of the Everglades and the staple of our existence. We're in this together—both the Everglades and our South Florida community rely upon the availability of clean fresh-water. Consequently, it is important to understand where this precious resource comes from.

### **The Water Cycle**

Thunder, lightning, and heavy down-pours are telltale signs of summer in South Florida, and evidence of a water cycle in motion. Heat from the sun causes water to evaporate from lakes, rivers, and the ocean. Warm temperatures also induce plants to release additional water vapor through a process called transpiration. As all this moisture rises, it cools and condenses, eventually gathering into tall stacks of clouds. When conditions are right these clouds will become thunderheads that can release surprising amounts of precipitation. South

Florida averages 50-60 inches of rain per year. More than 70% of this rain falls during the wet season from May through October. While some of this water helps replenish lakes, rivers, and streams, some will also percolate underground where it is stored within layers of limestone bedrock beneath.

### **Limestone**

A mantle of limestone underlies all of South Florida. This limestone is a sedimentary rock formed over millions of years during periods when the area was submerged beneath the ocean—as evidenced by the occasional



Limestone

impression of shells, corals, and other marine life found embedded in the rock. This limestone is formed through the cementing of calcium carbonate found in both sand and the remains of various marine organisms. Limestone is a permeable, soft rock that weathers over time through exposure to the elements. Consequently, limestone bears cracks, holes, and pockets to varying degrees which, in some cases, can absorb and hold water much like a sponge.

### The Aquifer

Layers of limestone with different capacities to store water work together to create aquifers below ground. The Biscayne Aquifer—one of the most permeable in the world—lies under most of southeastern Florida and absorbs water over its entire surface. This subterranean aquifer is the sole source of fresh water for nearly all people in southeastern Florida and is routinely replenished by the River of Grass.

### The Original Everglades Ecosystem

The Everglades ecosystem is a large watershed that originates with a chain of connected rivers and lakes near the city of Orlando in central Florida. In this region, the Kissimmee River Basin—heavy summer precipitation combines with surface water creating a cascading accumulation of flow that slowly journeys south.

This flow of water empties eventually into massive Lake Okeechobee, the vast lake that serves as the liquid heart of the Everglades ecosystem. Local Indians christened this lake “Okeechobee” a word that literally means “big water.” The seasonal inflow of water—combined with precipitation from overhead—historically flooded the relatively shallow



lake, sending water spilling over its southern bank. This floodwater would slowly weave its way south in a shallow sheet flow, through an expansive, sawgrass-dominated marsh known as the Everglades. This “River of Grass”, as it has become known, flows eventu-

ally through the coastal mangrove forest before emptying out into Florida Bay and the Gulf of Mexico. As the fresh and salt water mix they form a brackish water estuary, a nursery rich with marine life including crab, lobster, shrimp, and fish.

# 18

## *The Valleys*

### What is a slough?

As in most rivers, the waters of the Everglades flow largely within the confines of broad, shallow channels called sloughs. These “valleys” of the Everglades landscape contain water year-round, save for exceptionally dry years. Shark River Slough, the main avenue of water flow through Everglades National Park, traverses the length of the park and empties into the Shark River and eventually the Gulf of Mexico. Along the way, the water nourishes Shark Valley, a broad expanse of freshwater marsh bordered on the east and west by ridges of higher elevation. This valley is home to a number of plants and animals adapted to life in the River of Grass.

### Sawgrass Marsh

Sawgrass dominates the marshes of Shark River Slough, and Everglades National Park protects the largest stand of sawgrass in North America. Botanically, sawgrass is actually a member of the sedge family and not a true grass at all—as evidenced by its distinct edges. (“Sedges have edges.”) The abundance with which it is found



American Alligator

reveals that few animals will feed upon it. True to its name, the edges of each blade of sawgrass are armed with sharp teeth, providing effective protection from hungry herbivores and omnivores. Nonetheless, ducks have been known to eat the seeds, and white-tailed deer have been known to browse on new growth. The tender, white growth bud of sawgrass, though quite small, is equally edible to people.

During the wet season, as sawgrass marshes flood with water, fishes and apple snails move beneath the surface among the sawgrass stalks. The snails crawl out of the water periodically to lay clumps of white, pearl-sized eggs on the sawgrass blades, just above the water line. Brownish-green algal mats, called periphyton, float on the water surface. These algal mats are comprised of different species of algae



and a variety of microscopic animals. Then the dry down begins...

## Periphyton & Drought

Between November and April every year, South Florida enters the dry season—a prolonged period of sparse rainfall and drier conditions. During this time, residents of Shark Valley rely upon periphyton for their survival. Many small animals including insects, fishes, and frogs lay their eggs in the mats, which provide shade, moisture, and shelter. Although the animals that lay these eggs may die, their progeny will live on, hatching out and eventually spreading across the sawgrass with the return of the wet season.

Periphyton not only provides protection for new generations of aquatic life, but also serves as the base of the Everglades food chain. Eaten first by fishes and apple snails, these smaller organisms will in turn be fed upon by birds, which may then be eaten by even larger predators. Periphyton also releases oxygen into the water and builds soil as it decays.



Periphyton

## Alligator Holes

Scattered throughout the sawgrass marsh are numerous alligator holes—depressions in the limestone that can be as small as a bathtub or as big as a swimming pool. Alligators deepen

their holes, ripping out vegetation and moving mud toward the edges, creating a mud bank for coastal plain willow trees to grow. Over successive years, this growth can become thick, creating a small island of willows around the

## Flying High

Flying high above the sawgrass marsh, the endangered snail kite may be spotted searching for a meal. This rare bird is an obligate feeder and, as such, is entirely dependent on one sole source of food. Apple snails, a freshwater species with a rounded brown shell, comprise 99% of the snail kite's diet. The apple snail is most likely to become a snail kite's dinner when it comes to the surface of the water to breathe. The snail kite dives down and swoops up the snail in its talons. It transfers the snail to its beak, alights on a perch, and plucks out the meat. The apple snail is also an important food for limpkins, ibises, and alligators.



Snail Kite



alligator hole, often referred to as a willowhead.

During the rainy season, animals easily move back and forth between the gator hole and the sawgrass marsh habitats. As water levels begin to recede with the arrival of the dry season, aquatic life will increasingly

concentrate in and around gator holes where water is still available. Fishes, turtles, and snakes swim in to survive. Egrets, herons, and other wading birds drop in to feed. Even deer, raccoons, bobcats, and other mammals stop by for a drink. Overseeing all this activity is the ever-present landlord.

### **The Landlord**

Alligators are the landlords of their gator holes and they often collect rent! Although alligators are cold-blooded and may appear sluggish, they can move very quickly for short distances. They generally feed between dawn and dusk, but will typically eat only about once per week. Alligators are opportunistic feeders and will eat insects, snails, fishes, amphibians, birds, mammals, and other reptiles. When temperatures fall below 73 degrees, however, alligators will seldom eat.

### **Nesting**

Alligator courtship begins in spring and may include bellowing, head slapping, snout touching, and bubble blowing. After a male alligator mates, he moves on and may mate with additional females. It is the female alligator that builds the nest mound, usually in June or July. The nests are made from vegetation, with typical clutch sizes in Everglades National Park totaling 30 to 50 eggs. As this vegetation rots, the resulting heat serves to incubate the eggs within the nest. Female alligators stay relatively close to their nest sites for two months, providing protection until their hatchlings emerge. Occasionally, red-bellied turtles will also lay their eggs within an alligator nest, taking advantage of the mother's watchful eye. Despite maternal protection, only one or two alligators from each clutch will make it to maturity because of the inevitable dangers they face as they grow. Those lucky few that make it to adulthood will rule the valley as monarchs of the sawgrass marsh.

### **Bayheads and Hammocks**

Though Shark Valley is constrained between two ridges of higher elevation to the east and west, the presence

of alligator holes is evidence that the valley floor is not uniformly flat. Just as some areas are deeper than the surrounding marsh, “mountains” of various sizes exist here as well.

Scattered throughout the sawgrass marsh are conspicuous stands of trees. Just as willows growing around alligator holes form willowheads, different trees will capitalize on small rises in topography to take root. Red bay, swamp bay, and cocoplum—all trees capable of withstanding periodic flooding—will often grow together on slight outcroppings of limestone to form bayheads. At only a few inches higher than the surrounding marsh, bayheads flood fairly frequently throughout the wet season.

If bayheads are the hills of Shark Valley, then hardwood hammocks are truly the mountains. Hardwood hammocks are upland tree islands perched upon ground sufficiently high in elevation so



Barred Owl

that they remain dry year-round. Only a foot or two of additional topography gives rise to a very different habitat dominated by tropical hardwoods, palms, and temperate tree species.

As a result of their closed canopy of broad-leaved trees, hammocks remain fairly humid throughout the year. This excess moisture not only helps protect against the threat of wildfire, but also encourages the luxurious growth of interesting plants. Gumbo limbo is a tropical tree with distinctive red, peeling bark and is sometimes referred to as the sunburn tree. The smooth-barked wild tamarind, or *Lysiloma* tree, is often brightly colored with the growth of various lichens. Strangler figs, air plants, live oaks, and Florida’s state tree, the sabal palm, are also all at home in the hammock, as are a few poisonous plants like poison ivy and poisonwood.

### “Who” hides in the hammock?

Owls, of course! But they aren’t the only ones calling these mountains home. Walk into a hardwood hammock during the wet season and you will see, hear, feel, and become part of the food chain—as you provide lunch for hungry mosquitoes! The hammock is a windbreak, moderating temperature and providing protection and shade for a variety of wildlife species year-round. Upon the colorful bark of the wild tamarind can be found *Liguus* tree snails, the famed “jewels” of the Everglades. During the wet season, they move up and down the trees feeding on lichens. During the dry season, the snails estivate, attaching themselves to a tree branch until a rain shower brings them out to feed. Mammals may also inhabit the hammock, including white-tailed deer, raccoons, opossums, bobcats, and panthers—even people!



Florida Tree Snail

# 22

## People of the Everglades

### A Home Without Walls

How would you survive a life in the Florida Everglades? Archeological evidence reveals that hammocks and the surrounding marsh provided sufficient resources for the indigenous people of the Everglades to thrive. The Miccosukee Indians, who still call the Everglades home to this day, once built their traditional homes on dry hammocks in the area. These chickees were simple frame buildings made from cypress poles and topped with a thatched roof of sabal palm fronds. Miccosukee homesteads typically boasted several structures, each having a different purpose—sleeping, cooking, eating, and storage.

### Food and Transportation

Traditionally, the Miccosukees were hunters. The Everglades provided much of their game including gar fish,



large-mouthed bass, turtles, and deer. The Miccosukee also supplemented their diet with gardens planted within the protection of nearby hammocks, where they grew pumpkin, corn, tomatoes, and bananas. They drank sofkee, a gruel-like drink made from corn, fruit, or other grains.

Travel between their chickees, gardens, and hunting grounds was primarily by dugout canoe during the wet season and by walking during drier periods. Along with poling these cypress log vessels, they would also rig sails to use when the wind was strong enough.

### Unconquered

Today, the Miccosukees are a sovereign, self-governing nation. The majority of Miccosukees live along the Tamiami Trail, just west of the entrance to Shark Valley.

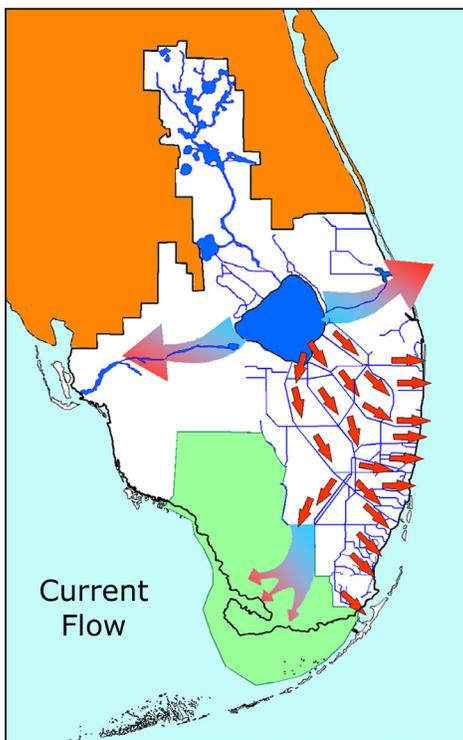
Some traditional practices have given way to more modern conveniences. While chickees are still used for traditional ceremonies, most members of the tribe now live in contemporary homes complete with air conditioning and electric appliances. The canoe has been replaced by the automobile as the main mode of transportation. And as always, the tribe remains completely self-sufficient by operating various successful ventures including craft shops, airboat tours, cattle leases, and a large gaming operation.

Despite this success, the Miccosukee people endeavor to ensure their culture lives on by participating in traditions such as the annual green corn dance ceremony and by speaking their native Mikasuki language.

## Changes

The Everglades has changed dramatically over the past century. While the valleys and mountains persist, the manner in which the water flows through the River of Grass has been altered considerably. The river no longer flows freely, and large swaths of the former Everglades ecosystem have been drained and converted for other uses. Lake Okeechobee—once the liquid heart of the system—has been diked and largely severed from the watershed. Presently, approximately 1,400 miles of canals, levees, and water control structures manage the flow of water to meet the demands of the growing South Florida community, often to the exclusion of the needs of our natural areas. Today only 50% of the original extent of the River of Grass remains.

Everglades National Park endeavors to preserve roughly the lower one-fifth



of the historic Everglades ecosystem, but restoring a more natural flow of clean water to the park is crucial. Along with diminished water quantity into Everglades National Park, water quality has also been affected. As water flows through agricultural areas to the north, it picks up fertilizers which contain nitrogen and phosphorus. The water is also picking up mercury from an undetermined source, excess amounts of which can be toxic.

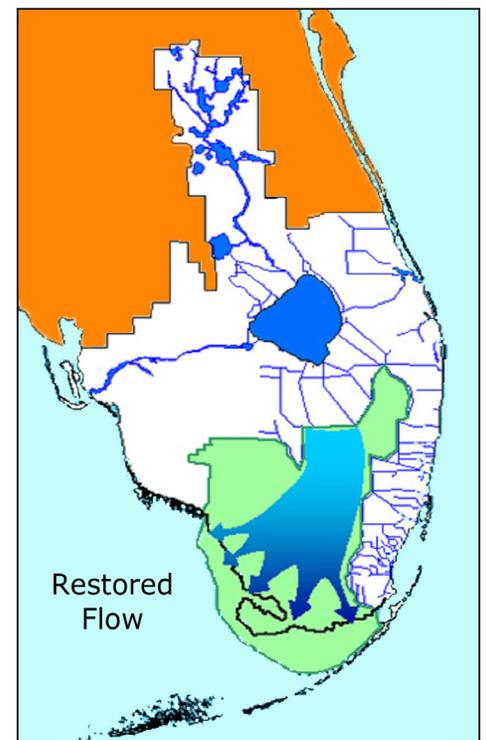
The lack of adequate fresh water, coupled with pollution, has had a detrimental effect on plant and animal communities and their related food chains. The Everglades was once well-known for the huge flocks of wading birds that gathered here to nest during the dry season. Since the 1940s, however, the artificial manipulation of water has compromised the nesting success of several species. Consequently, the population of wading birds in the park has declined by 90%. For every bird you encounter on a tour of Shark Valley, try to imagine a landscape alive with nine more!

## Restoring America's Everglades

Since 2000, multiple federal, state, municipal, and tribal governments have been working together to help balance the management of water to the benefit of both the Everglades ecosystem and the South Florida community. The Comprehensive Everglades Restoration Plan (CERP) is a multi-decade effort to “re-plumb” the water management system in South Florida to better meet the needs of our natural and built systems. Once complete, the project will enhance our ability to store and clean freshwater and move it in accordance with historical distributions and time scales.

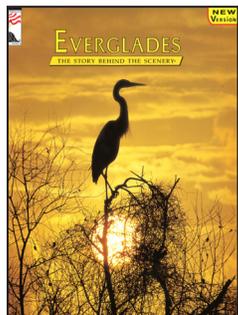
This effort is already underway, and a number of key projects are already being constructed. Tamiami Trail—the road you drove upon to get to Shark Valley—was constructed directly across Shark River Slough in 1928. Along with its associated canal and levee, this road acts like a giant dam that has prevented the passage of water and wildlife through the slough for nearly a century. At present, construction crews have elevated a significant stretch of this roadway and installed a mile-long bridge that will allow for the unconstrained passage of water beneath. Additional bridging is planned for the future which, when completed, will eventually allow the River of Grass to flow more freely.

If successful, this large-scale restoration effort will secure the long-term health of the Everglades not only for the Miccosukee and the people of South Florida, but for the continued inspiration of people around the world.



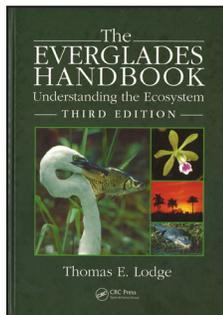
# 24 Resources

The following resources are just a few recommendations for educators and students to learn more about the Everglades.



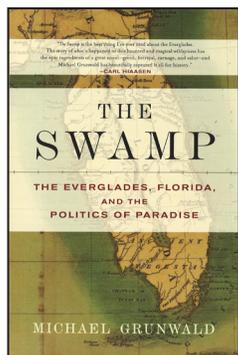
## Everglades: The Story Behind the Scenery

Jack de Golia,  
KC Publications,  
1978



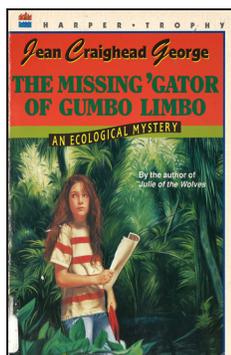
## The Everglades Handbook

Thomas E. Lodge,  
CRC Press, 2010  
(3rd ed.)



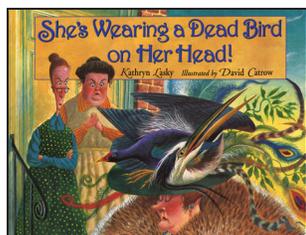
## The Swamp

Michael  
Grunwald,  
Pineapple  
Press, 2006



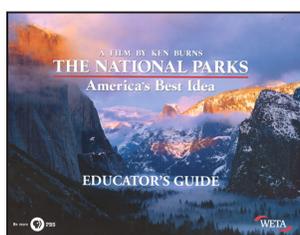
## The Missing Gator of Gumbo Limbo

Jean Craighead  
George,  
Harper, 1992



## She's Wearing a Dead Bird on Her Head!

Kathryn Lasky,  
Hyperion Books, 1995



## The National Parks: America's Best Idea

Film and Educators Guide,  
Ken Burns, PBS, 2009

## Web Resources

### Everglades National Park

[www.nps.gov/ever](http://www.nps.gov/ever)

### Big Cypress National Preserve

[www.nps.gov/bicy](http://www.nps.gov/bicy)

### Biscayne National Park

[www.nps.gov/bisc](http://www.nps.gov/bisc)

### Dry Tortugas National Park

[www.nps.gov/dtrto](http://www.nps.gov/dtrto)

### South Florida Natural Resource Center

[www.nps.gov/ever/naturescience/sfnrc.htm](http://www.nps.gov/ever/naturescience/sfnrc.htm)

### FIU Everglades Digital Library

[everglades.fiu.edu](http://everglades.fiu.edu)

### USGS South Florida Information Access

[sofia.usgs.gov/virtual\\_tour/kids](http://sofia.usgs.gov/virtual_tour/kids)

### South Florida Water Management District

[www.sfwmd.gov](http://www.sfwmd.gov)

### Comprehensive Everglades Restoration Plan

[www.evergladesplan.org](http://www.evergladesplan.org)

### South Florida National Parks Trust

[www.southfloridaparks.org](http://www.southfloridaparks.org)

### PBS Teachers, Exploring the National Parks

[www.pbs.org/teachers/connect/resources/7261/preview](http://www.pbs.org/teachers/connect/resources/7261/preview)



## Everglades Association

[www.evergladesassociation.org](http://www.evergladesassociation.org)

The official cooperating association of Everglades NP, the Everglades Association, operates several bookstores in park visitor centers and also maintains an online store. Purchase orders from schools receive a 10% discount. The Everglades online store has a section for Educators and Children.

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