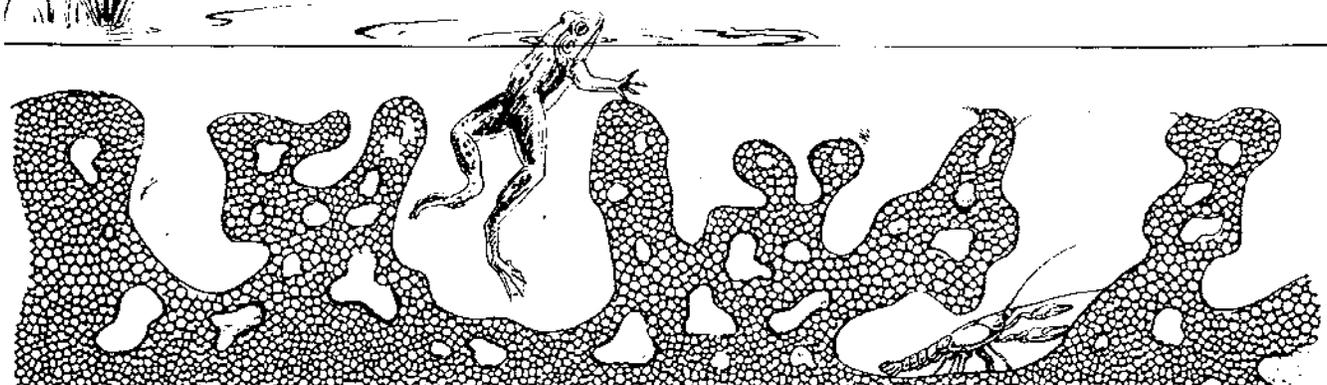


Geology

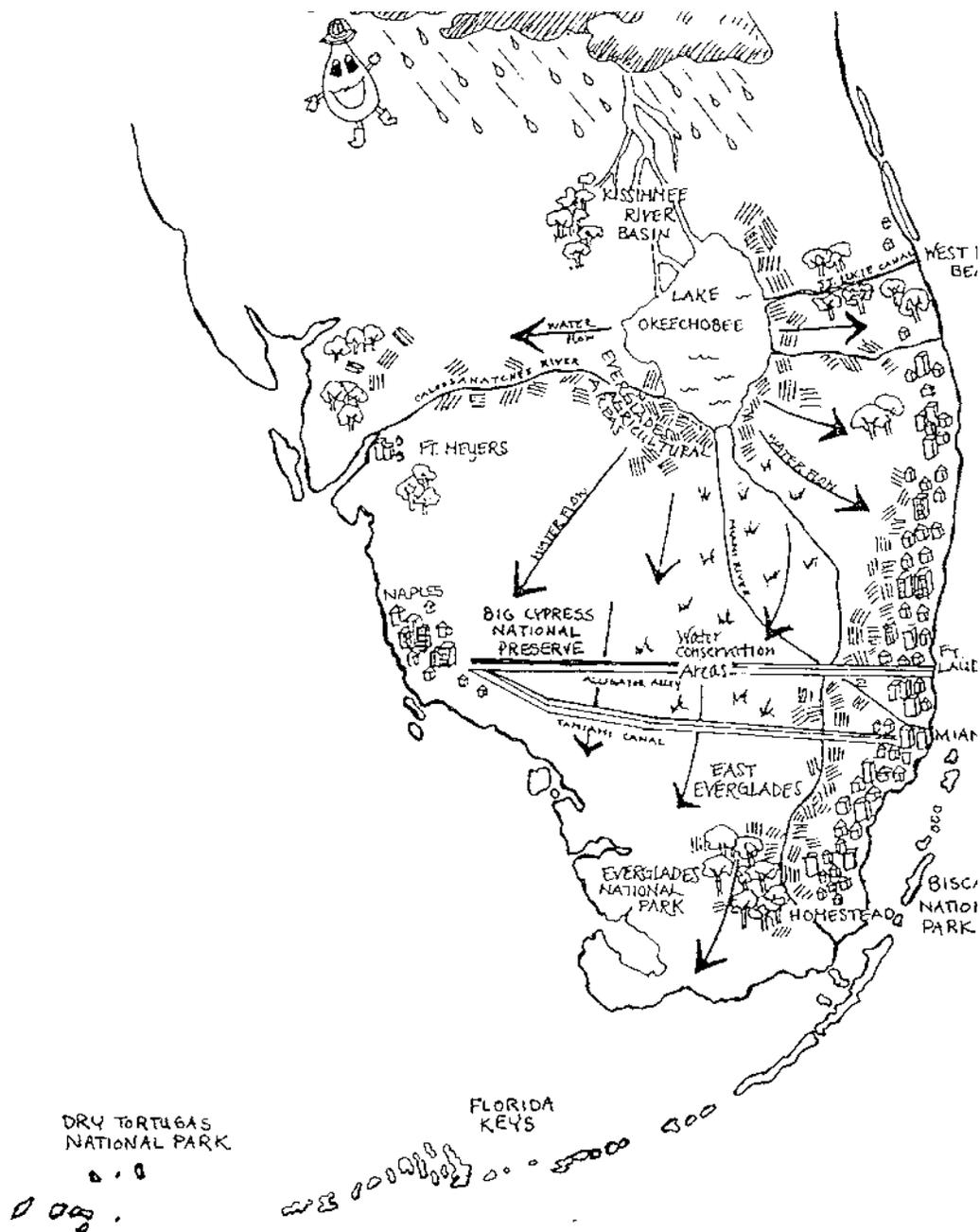
Geology is the scientific study of the origin, history, and structure of the earth. Geology includes the study of the layers of soil, rock, and minerals that make up the earth's crust. South Florida's rock formations are some of the youngest in the country, dating only to about six million years ago.

The flatness of South Florida reflects the fact that through most of its days a shallow sea has covered it. Over the last few million years, as global climates changed and glaciers advanced and retreated, Florida has been alternately submerged and exposed with the changes in sea level. At one point about 100,000 years ago, a 25-foot-deep sea covered South Florida! Underneath this sea, the coral reefs of the Keys and the limestone beneath Miami and much of Everglades National Park were being formed. Limestone is largely made from accumulations of shells and other skeletal materials of marine organisms. Examination of a limestone rock pile may yield shells from this once ancient sea.

Larger deposits of limestone were laid along the east coast of Florida, forming a higher "rim." This rim is known as the Atlantic coastal ridge and extends into Everglades National Park. Over time, South Florida's landscape was shaped into something that resembles a saucer, slightly tilted to the south and west. This tilt or slope is no more than a few inches to the mile, yet it played an important role in channeling the water flow more or less toward the southwest. All of this set the scene for the development of the freshwater wetlands we know as the Everglades, which once occupied the width of southern Florida. This shallow marshy river drifted slowly in a southwest pattern for 120 miles from Lake Okeechobee to the sea. The Everglades were created by the flat, tilted shape of the land, along with the abundant rainfall (about 60 inches/year), and the presence of slightly impermeable soils. Decaying algae and marsh grasses formed marl and peat soils which, in some places, filled pockets and accumulated on the rock. These soils slowed down the water seepage into the limestone, leaving standing water during much of the year. Water seepage into the limestone is very important as it is the source of our drinking water. Although the majority of water flowed to the southwest, to form the Everglades, there were also dozens of natural outlets to the east. These outlets were in the form of open rivers such as the Miami River, high-water rivers like the South Dade finger glades and underground "rivers" in the limestone which bubbled up in Biscayne Bay. Many canals dug in the 1950s by the U.S. Army Corps of Engineers follow the courses of these former streams which emptied into the Atlantic.



The limestone of South Florida has many small holes which allow water to move through it. When it rains, the water seeps downward into the rock, until all the air spaces are saturated (filled with water). The upper surface level of this underground water is called a table - the water table. This surface level, or table, can rise or fall depending on the amount of rainfall seeping in to fill the rock. Fresh water wells in South Florida need to be drilled deep enough to reach this water. If we have a dry season, the water table may go down, and the wells can go dry (no longer reach the lower water). This can also happen if we use too much water. The underground rock mass that holds water is called an aquifer. The limestone rock underneath South Florida which contains water is called the Biscayne Aquifer. It is the source of fresh water for all of South Florida and the Keys. The Everglades provides a natural way for rainfall to seep into, and recharge or refill the aquifer.



Hydrology

(South Florida's Water Story)

Hydrology is the science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Past Everglades

To understand the Everglades today, you must first understand what it was like in the past—before humans changed it. Most people do not realize that the Everglades is actually a river system. Marjory Stoneman Douglas, a famous Florida environmentalist tried to teach people this concept in her book, *The Everglades: River of Grass*. She called it the river of grass because throughout much of the shallow river grew an unusual plant called sawgrass. In some areas, you could barely see the water because the sawgrass was so dense.

The story of the Everglades river begins near Orlando. There, the rainfall and springs filled lakes and creeks. The water emptied into the Kissimmee River, which in turn, emptied into Lake Okeechobee. When Lake Okeechobee was filled, water flowed out into small streams at the south end of the lake. It spread across the wide open flat land in a shallow sheet of slow moving water that traveled $\frac{1}{4}$ mile per day. The Everglades river was born! The Everglades river was a few inches deep, but up to 50 miles wide and 100 miles long, ending its journey in the Gulf of Mexico. There, the shallow, fresh water river mixed with salt water to create a brackish estuary, rich with marine life such as shrimp, lobster, crab, and fish. The Everglades river, or wetland, was once home to millions of creatures. It was perhaps best known as the home of the American alligator and huge flocks of wading birds (by some accounts numbering up to 2.5 million at one time). Fish, turtles, alligators, and other aquatic species were abundant. They provided a source of food for the Seminole and Miccosukee people who lived in the Everglades. Because their population was small, what they harvested from the Everglades had little impact.

Present Day Everglades

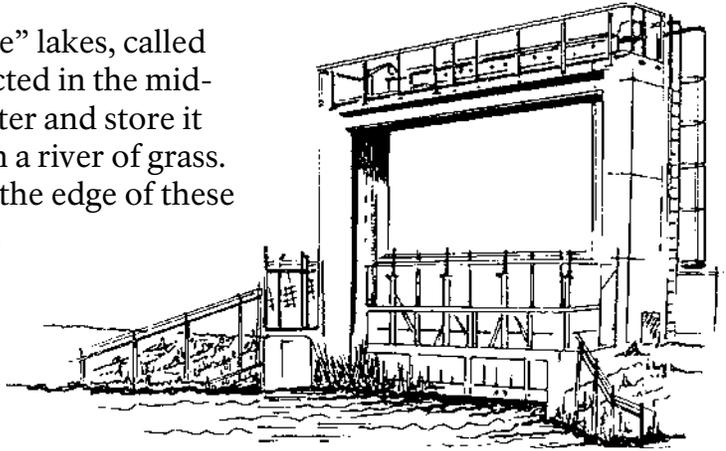
Today, the Everglades is no longer a free-flowing river. The only part that truly resembles this “original Everglades river” is found within the boundaries of Everglades National Park and Big Cypress National Preserve, and is only $\frac{1}{10}$ the size of the original wetland.

A levee (dike) now holds back the waters of Lake Okeechobee. The levee and canal system were originally built in the 1930s as flood protection for the people living south of the lake. Prior to the levee construction, thousands of people died and homes were destroyed from hurricanes and subsequent flooding. With the levee around the lake providing flood protection, not only were homes safe but it was also discovered that the area was composed of rich, muck soils ideal for agriculture. Here, thousands of acres of sugar cane and sod are now grown annually.

Not only has flood protection changed the water flow, but when European settlers first came to South Florida, they viewed the Everglades as a wasteland. They did not understand its

importance to the region's watershed and wildlife. They began to drain the land to create dry areas for farming and for their homes. As more people moved here, more areas were drained. Today, five million people live in South Florida, and 1800 miles of canals drain most of the shallow river. This increase in population had another effect: on the high ground areas along the Atlantic Coast, pinelands and hammocks were destroyed to make room for houses, and to grow tomatoes and other crops. Cities sprang up, requiring water for the people and water for irrigation to grow food. This increased demand accelerated the depletion of freshwater in the limestone aquifer - our source of drinking water! In Florida, when fresh water volumes underground are reduced, salt water seeps into wells, contaminating them.

Three huge reservoirs, or "human-made" lakes, called water conservation areas were constructed in the mid-1950s to trap most of the Everglades water and store it in the form of shallow lakes, rather than a river of grass. Levees and floodgates were built along the edge of these areas to move water in time of drought, and to prevent flooding. The water conservation areas also recharge the limestone aquifer as the river had done in the past. Some of the water from the water conservation areas is allowed to flow into Everglades National Park. On occasion, sections of the levees called "flood gates," are opened along the Tamiami Trail. The amount, timing and distribution of water flow is now controlled by people, not nature.

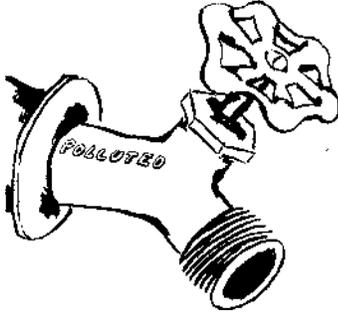


Remember, the water management practices of the past were based on the limited knowledge of the resource at that time. As the knowledge grows, so too does the understanding of the resource and the ability to better manage water practices. The scientific community of South Florida is trying to recreate conditions of the original Everglades river. They want to restore the water flow across the land into Florida Bay and the Gulf of Mexico as closely as possible to its historic pattern. There are many challenges to achieving this goal.

Water Quantity, Timing, and Distribution

The Everglades river or wetland provides water, food, shelter, and space for all of the creatures that live there. These creatures have evolved over thousands of years to survive in this shallow river. During the winter dry season, the river slows to a trickle. Many areas dry up except for the alligator holes and the deeper water channels (sloughs). In the gator holes and sloughs, large numbers of fish become concentrated during the dry season - providing rather easy meals for alligators and birds. This is the time of year when many birds nest because food is plentiful for their young.

Since the early 1960s, however, human release of water into the park has not always copied what "mother nature" would have done. The quantity, timing, and distribution of water releases can have serious consequences for humans and wildlife. To reduce flooding, much of the fresh water in South Florida is diverted by the canal system and ends up being dumped



into the Atlantic Ocean. This reduces the amount available for use by the growing population. Dumping fresh water to tide also reduces the amount of water recharge to the aquifer, which increases saltwater intrusion into our source of drinking water. Finally, it reduces the sheet flow through Everglades National Park - not only affecting plants and wildlife here, but also reducing the amount of fresh water which enters Florida Bay. On the other hand, too much water released into the park during the winter dry season, can flood nests and make it difficult for wildlife to find the seasonally concentrated food sources they depend on.

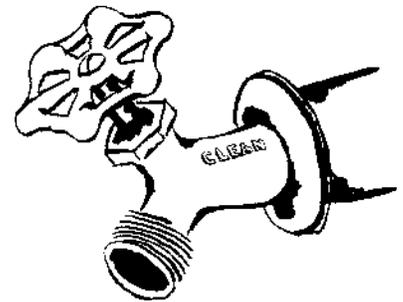
Water Quality

Scientists and rangers at Everglades National Park are also concerned with the quality of the water being let into the park from water conservation areas. These areas contain water that has flowed through large agricultural areas. This water can have high amounts of fertilizer, which contain nutrients like nitrogen and phosphorus. Increased amounts of these nutrients can change the types of plants living in the Everglades and, ultimately, the food chains found here. There is serious concern that polluted (nutrient loaded) water entering Everglades National Park could cause periphyton and sawgrass to be replaced by other plants, thus altering this last natural remnant of the original Everglades. Efforts by farmers, private and government agencies, and local citizens to restore the water to its original quality must be continued.

Future Everglades - Why Should You Care?

The Everglades “ain’t what it used to be” as old timers might say, and neither is Florida. With the human population increasing at a rate of over 900 people a day, and the current concerns about water quantity, timing, distribution, and quality, one of the greatest threats to the survival of Everglades National Park is the increasing demand placed on a limited supply of fresh, clean water. Today, only a small fragment of the natural system exists within Big Cypress National Preserve and Everglades National Park. Unless these park areas get the water they need, this last remnant of natural Florida will not survive. Water conservation, better water management, and control of urban growth, appear as three logical solutions to this problem. If the proposed solutions are not practiced, we could expect to lose several things:

1. We would lose a natural recharge system for water wells serving South Florida and the Florida Keys. Salt water will pollute wells as it seeps into them from the ocean. Drinkable fresh water will become more difficult and more costly to find.
2. Marine species may not survive in Florida Bay. If the bay becomes too salty because of a lack of fresh water, shrimp, lobster, crab, and fish populations may decline dramatically throughout South Florida and the Florida Keys. The cost for scarce seafood would skyrocket and the fishing industry would suffer.
3. Without water for the Everglades, many species will abandon the area or die out. This would make our lives unstable, and a little less rich. Each time a species becomes extinct, we lose a source of potential medicine, food, beauty, inspiration, and a fellow passenger of spaceship earth.



Three ways we can all help is by paying attention to our water use, by not polluting, and by educating others. Conserving and not wasting water will mean there is more to go around. Similarly, if we keep the water clean, we will have more for everyone to use. Simply by reducing our use of harsh chemical cleansers we can reduce the chance of polluting the water system. For more information on ways to conserve water, or keep it clean, see the references and agency contacts in the “Resources” section. Finally, by teaching others about this unique Everglades ecosystem which we all depend on, we can help spread the word for its protection.

Follow-up

South Florida National Parks are presently working with many partners throughout Florida: the Miccosukee Tribe, U.S. Army Corps of Engineers, South Florida Water Management District, Dade County Department of Environmental Resource Management, Florida Department of Environmental Protection, National Marine Sanctuaries, the Governor’s Office, and environmental groups, to name a few. Their goal is to return the water flow to its historic patterns of quality, quantity, timing, and distribution.

To fully explain the Everglades water system or hydrology in a few pages is impossible. Please refer to the resource materials and bibliography in Section 9 to supplement this complicated story. The publication entitled *Dade County Environmental Story* has an excellent section about the Everglades (“When the Well Runs Dry”).

South Florida Habitats



A habitat is an animal's home. It can be any size as long as it provides enough food, water, shelter, and space in the proper arrangement for the animal to survive. Since food, water, shelter, and space are determined by the association between the plants and the amount of water available in an area, the habitats described here correspond to the "ecosystems" on the national park map, which have been labeled as separate ecological units in terms of their plant communities and hydrology. Many animals in South Florida use more than one of these ecosystems (habitats).

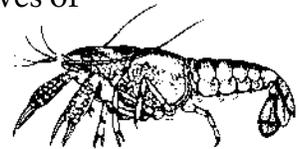
The interior land mass of South Florida is known as "the Everglades" and the "river of grass" because much of the southern part of the state was covered by a slow-moving river of water dominated by sawgrass. However, this freshwater, grassy wetland contains much more than just sawgrass, and South Florida contains much more than just wetlands. South Florida has a combination of habitats unique in the world. It includes: sawgrass prairies, freshwater sloughs, cypress communities, bay heads, hardwood hammocks, and pinelands. In addition, where the freshwater river flows into the sea, there is a vast estuary with mangrove forests and seagrass beds. Extending off the coast of South Florida are tropical islands and a marine environment which includes one of the largest coral reef systems in the world. All of these habitats make up the mosaic of South Florida, and examples of them are preserved within our four national parks: Everglades National Park, Big Cypress National Preserve, Biscayne National Park and Dry Tortugas National Park. The following is a brief description of the freshwater wetland, high ground, and saltwater communities that students should be familiar with.

Freshwater Wetlands

Often called "the glades" and referred to by Marjorie Stoneman Douglas as "the river of grass," at one time were fifty miles wide and extended from Lake Okeechobee to the mangrove estuary. This area was covered by water flowing in a southwesterly pattern at about 1/4 mile per day. Today, less than half of these wetlands remain. Included in these wetlands were sawgrass prairies, freshwater sloughs and cypress communities.

Sawgrass Prairie or Marsh

In fact, sawgrass is not a grass at all, but rather a sedge that gets its name from the tiny sharp saw-like teeth attached to the leaf blade. The sawgrass prairie, approximately two feet deep, begins a slow drying process in the late fall and throughout the winter. Sawgrass prairies are usually dominated by sawgrass, but contain a mix of other wetland plants depending on the length the area is underwater each year (hydroperiod). The prairie floods each summer during the rainy season. When the water level rises, an algal mat (periphyton) begins to grow. Once the periphyton begins to float, it supports many complex food webs. Also important to the food webs in the sawgrass prairie is detritus; the decaying layer of stems and leaves of aquatic plants. Tiny creatures feed on the algae mat and detritus. In turn, small fish and frogs feed on these creatures. The fish and frogs are then food for birds, mammals, reptiles, and larger fish. The decaying algae and plants form marl and peat soils, which slow down the water seepage into



the limestone, leaving standing water above ground. As the water level drops during the winter dry season, small pools of water remain in the river of grass, trapping thousands of fish and aquatic invertebrates. These small pools provide an excellent feeding area for migratory birds that spend the winter in South Florida.

Freshwater Slough

The wide, deeper channels of water within the “river of grass” are called sloughs (pronounced “slew.”) Sloughs are the main avenues for water flow through the Everglades, and form deeper marsh communities. Water lilies float on the surface. Anhingas swim in the dark waters. Sloughs are special places in the Everglades and Big Cypress landscape because they hold water even during the South Florida winter dry season (except during extremely dry years). In the dry season, animals swim, crawl, walk or fly from other habitats to be near the life-sustaining waters of the slough.

There are two major sloughs in Everglades National Park. The largest is Shark River Slough, which empties into the Gulf of Mexico and Florida Bay. The smaller Taylor Slough empties directly into Florida Bay. Historically, the rising wet season water levels in the two sloughs caused their waters to meet and flow together (overland sheet flow). Today, because canals divert the water, that connection no longer exists. One of the goals of Everglades restoration is to re-introduce the natural sheet flow.

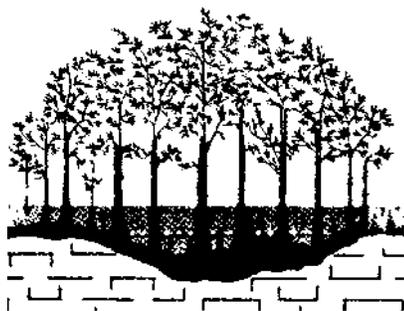


anhinga

Cypress Communities

The cypress tree is a deciduous (shedding its needles each fall) conifer, closely related to the redwood and sequoia trees of California. The seeds grow in muddy areas, but as they become trees, they can survive in standing water. The base of the tree, called a buttress, can be as much as six feet across. This helps the tree’s root system support itself in the somewhat shallow soil in which it grows. This tree has “knees”! The knees are actually a part of the root system extending above the water near the base of the tree. Scientists are unsure of their function, but theorize that they help with structural support of the tree, or aid in gas exchange.

Cypress trees can be found in several areas. Growing in the open sawgrass prairie, the trees appear to be dwarfed, but may, indeed, be older than much larger trees growing in different areas. Sometimes a group of trees take the shape of a “cypress dome.” These domes have a slightly lower elevation and are almost circular in shape. The larger trees grow in the center, creating a “dome.” The greatest concentration of cypress trees occurs in the cypress slough. These large channels contain deeper and perhaps richer soil. Large cypress sloughs are found in the Big Cypress National Preserve. The water in the sloughs flows from the north to the southwest. During the summer wet season, the water may be three feet deep. These deep

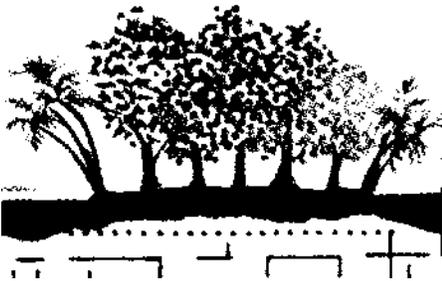


cypress sloughs are home to giant trees that are well-adapted for life in the water. Wood from these giants was prized for its durability and was harvested in the 1930s and 40s. What remains today is second growth. The cypress trees in Everglades National Park and Big Cypress National Preserve are now protected. Miccosukee people are the only group harvesting the cypress tree in Big Cypress National Preserve, using the tree trunks for constructing their homes and for the business of building traditional chickees.

Wherever cypress trees are found, you are likely to see bromeliads, orchids, and other epiphytes (air plants) attached to their bark. These plants do not harm the tree. They are able to gather nourishment from the air and only use the tree bark as an anchoring place. Many of the same animals that inhabit the sawgrass marsh and the slough use the cypress communities. Alligators and Florida gar fish swim in their waters, vultures perch on their branches, black bears claw crayfish from the sloughs, and an occasional Florida panther leaves impressive paw marks in the wet marl. In the winter dry season, the cypress sloughs provide food for wading birds- herons, egrets, ibis, limpkins, and wood storks. If you are lucky, you may see a mink, wild turkey, deer, or a bald eagle.

High Ground Communities

Scattered throughout the freshwater wetlands are tree islands. In addition, along both east and west coasts of South Florida are elevated ridges. These high ground areas are typically drier for longer periods of the year than the adjoining wetland, and are usually described by the dominant type of tree (see below) in them. Tree islands and ridges add value to the surrounding wetlands by adding habitat diversity. They provide dry resting places and protective cover for wildlife. They may also serve as roosting and nesting sites for birds.



Bay Heads

Bay heads are the most common type of tree island seen in the Shark River Slough. Trees growing in the bay heads primarily include: red bay, which has an aromatic smell and can be used as a spice; sweet bay magnolia, which has a pretty cream-colored flower; cocoplum, which has rounded leaves and an edible fruit; and wax myrtle, whose berries have a waxy coating that when melted down, can produce

fragrant candles. Bay heads occur on mounds of peat (decayed organic matter) soil that are one to three feet above the surrounding marsh. Often this peat soil fills depressions or cavities in the limestone bedrock. The origin of bay heads is a mystery, but some may have been started by alligators. When alligators dig holes in the muck, over the years wetland trees can take root where the alligator has piled up soil. From the air, the trees would look like a ring around a central pond.

On the perimeter of bay heads are shallow moats. It is thought that acids from decaying plants dissolved away the encircling limestone, creating a deeper and less densely vegetated area of marsh. It could also be that alligators patrolling the edges of the tree island, keep the area clear of soil and vegetation. In any case, if a fire were to come through the marsh, the moat would help keep the fire from entering the tree island. Alligators seem to be closely associated with wetland tree islands - whether they helped create the island, or are just using one for a den or nest. Alligator holes are often located within tree islands and provide a refuge in the dry season for fish, snails, turtles, and other animals. In turn, birds, river otters, and snakes will come to the alligator hole to find food. (Note: Another type of tree that takes root in disturbed areas like alligator holes are willows - which prefer lower and wetter elevations than the bay head plants. This type of tree island would be called a "willow head.")

Hardwood Hammocks

The word hammock is used to describe a dense, jungle-like forest with a variety of trees. Hardwood refers to the prevalence of broad-leaved trees (versus pines, which are softer wood). North of Miami, hardwood hammocks are dominated by temperate species like live oak, red maple, and hackberry. South of Miami, hammocks are predominantly tropical species such as mahogany, gumbo limbo, coco-plum, and wild tamarind (see the end of this section for descriptions of four of the interesting trees of the hammock). Seeds or spores of tropical plants arrived upon Florida's shores in the currents of the Gulf Stream, on the winds of hurricanes, or in the bellies of birds from the Caribbean. Hardwood hammocks occur on elevations that seldom flood during the summer rainy season. In South Florida, hammocks can be found within marshes, pinelands, mangrove swamps, and on the Florida Keys.

The tall trees inside the hammock create a shaded wonderland, allowing small patches of sunlight to filter through the canopy. The high humidity and shade of this environment provide the perfect growing atmosphere for ferns and air plants. The ground underfoot is soft and spongy from the accumulation of decades of fallen leaves. Native people, including the Calusas who lived here long ago, often set up camp in the cool, shady hammocks. The habitat is an attractive one for people. Many of the hammocks that once dotted the Atlantic Coastal Ridge have been destroyed by humans, who changed the vegetation as the city grew.



Gumbo Limbo



Sabal Palm

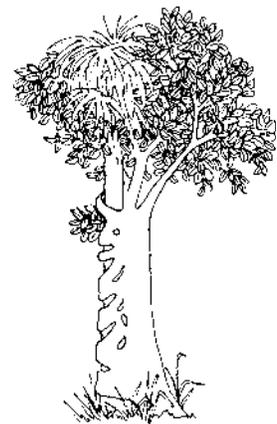
A further threat to hammocks is fire. Fire may help other plant communities in the Everglades, but it can destroy a hammock. Luckily, the high humidity and low level of understory fuels can help prevent fires from entering the hammock. Hammocks which occur as tree islands in the Everglades marshes are protected by a natural moat - made by acids from decaying plants dissolving the limestone. The moats hold some moisture during the dry season, which helps protect the hammock plants from fire.

Just as the trees are tropical, so are some of the animals found in South Florida hammocks. Zebra butterflies patrol the air. Tree snails, close relatives of snail species that live in Cuba, thrive here.

In addition to the tropical animals, hammocks provide habitat for bobcats, panthers, raccoons, mice, rabbits, foxes, owls, lizards, snakes, and song birds. There may also be plenty of insects, including mosquitoes!

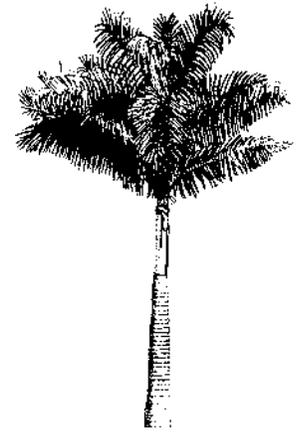
Interesting trees to look for in the hammock:

Gumbo limbo tree- A bright red, peeling, smooth bark gives this tree excellent identification marks. It is sometimes called the "tourist tree"



Strangler Fig

since the red peeling bark resembles a sunburned visitor, unaccustomed to the intense South Florida sunshine. The dark green leaves are in compound sets of five. It extends its root system into the limestone sink-holes of hammocks, where it grows. When strong winds, like those of a hurricane, topple the tree, it will often resprout from a broken branch that has fallen onto the ground. It is especially widespread and common in the West Indies and it also grows in Central America. There, the cut limbs are used as fence posts, which often start growing into a living fence!

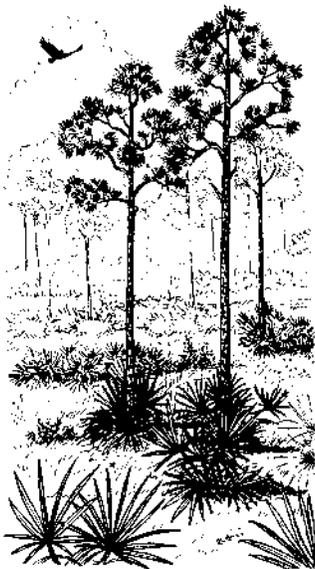


Royal Palm

Sabal palm- This palm is the state tree of Florida and is also called the cabbage palm. It gets its name from the center, or heart, of the palm. When harvested and cooked, it tastes like cabbage but it should be noted that this practice kills the tree. It was survival food for many early Florida pioneers. The palm fronds are woven and used as roofing materials for traditional Miccosukee homes called chickees. Raccoons, opossums, and birds feed on the palm seeds. Today many of the Sabal palms are disappearing from the wild because developers are digging them up to use for urban landscaping.

Lysiloma- *Lysiloma* is a smooth-barked tree with light green, compound leaves. The greenish-yellow, powder-puff flowers that appear in the summer provide food for a number of flying insects, while the lichen growing on the tree's bark is food for the liguus tree snail.

Strangler fig- Life for this tree begins like most trees, as a seed. After the red fruit is eaten, it is carried away in the belly of a bird and digested. After digestion the seeds are usually deposited in the crevice of another tree, not on the ground. The strangler fig seed sprouts in the crevice and sends out a thread-like root that travels down the trunk of its host, eventually making it to the rich, nourishing earth below. The strangler fig starts to grow, eventually squeezing the host tree out of the way and taking over its spot in the limited space of the hammock. The dark green leaves are alternate, and the fruit, originally green, ripens to red. White sap oozes from the leaves and branches when cut.



Royal palm- This majestic tree grows to 100 feet tall. Its gray trunk resembles a cement pillar. Pileated woodpeckers drill holes in its trunk and use it for nesting. The park's most visited area was named for this giant, and is the best area to view the trees. You may also see them planted along streets and medians. The royal palm is one of eight tree-size palms native to South Florida, where they are protected from the killing effects of northern Florida's occasional freezing temperatures. Although not native to the Florida Keys, many royal palms have also been planted there.

Pinelands

Historically, pinelands covered the elevated, limestone ridge along the east coast of South Florida, where Ft. Lauderdale and Miami are today. Due to habitat destruction, pinelands remain on only a small

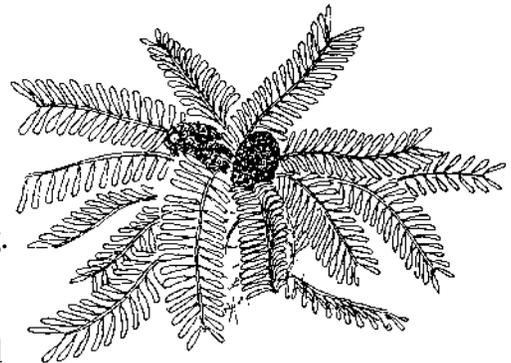
percentage of the total mainland area of South Florida, and are considered an endangered ecosystem. Today, pinelands can be found along the main park road through Everglades National Park and on elevated patches of limestone in Big Cypress National Preserve. Pineland elevations vary from being underwater 2-3 months of the year, to being dry year round. The terrain of the pinelands is rough and rugged where years of erosion have unevenly shaped the limestone bedrock with holes and cavities, making walking difficult. Throughout the jagged surface are small pockets of soil where the pines are rooted.



Pinelands contain a high diversity of plant species, but the dominant plant in the pinelands is the slash pine. Slash pine got its name from the once common practice of extracting sap from the trees by cutting diagonal slash marks in the trunk. Sap draining from the cuts was collected in buckets (similar to maple sap collecting to make syrup) and used to make turpentine and other products. In Miami-Dade County, a common name for the special variety of slash pine growing here is the Dade County pine. Most of the pine trees in Everglades National Park are second growth. The original trees were harvested in the 1930s for use in the booming construction industry. Many of the older homes in Miami-Dade County were made from this lumber. The large amount of resins stored in the older trees made the wood very dense so it is termite resistant and difficult to drive a nail into.

One condition essential to the survival of the pine forest is fire. Fire gives life to the pineland community by removing the hardwood trees that would shade out the pine seedlings. Pines produce cones each year. High up in the branches, the cones open each fall to release seeds. Pine seeds have a papery wing attached to them that allows for wider distribution by the wind. They flutter down from the parent tree and if deposited in an open space, will germinate and begin a new life. Historically, the regularly occurring wild fires in the Everglades limited the amount of hardwood trees growing in pinelands. The hardwood trees cannot survive a fire (they are fire intolerant). The pine on the other hand, is able to survive a fire. It is a fire tolerant species. Its thick, multi-layered bark provides built-in protection. When fire comes through the forest, it burns only the outer layer of the pine tree bark. Plus, the needles and cones of the pine are held high up in the tree, away from the heat of the low spreading flames. Without fire to control the spread of hardwoods, pinelands would eventually become hardwood hammocks.

Growing among the pines are many other fire tolerant plants including sabal (cabbage) palms, saw palmettos, small shrubs, and an array of wildflowers. The fern-like coontie plant is one of the more famous residents of the pinelands. The Miccosukees and early settlers collected the roots and processed them into starch for bread making. Coontie is the only plant on which the endangered atala butterfly will lay its eggs. Pinelands provide habitat for many other invertebrates - scorpions, beetles, ants - as well as animals such as mice, rabbits, raccoons, panthers, deer, snakes, lizards, foxes, bobcats, hawks, woodpeckers, owls, and song birds.



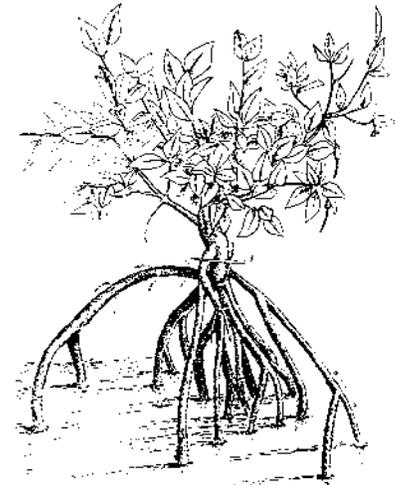
Coontie

Saltwater Communities

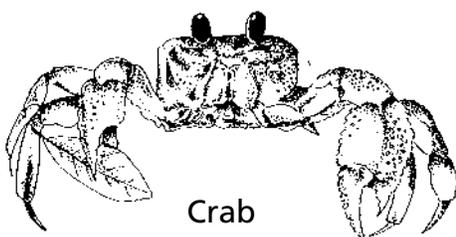
A significant percentage of South Florida national parks are under saltwater. Much of that area includes shallow inshore waters such as Florida Bay, Chokoloskee Bay, and Biscayne Bay, as well as the shallow salt waters surrounding the Dry Tortugas. Florida Bay, the largest of the bays, is an 850 square mile shallow (average depth is 4-5 feet) estuary south of the Florida Peninsula, where the Everglades “river” drains into the ocean. It contains a rich environment diverse with life, and is an important “nursery” for many marine species. The saltwater communities of South Florida may contain mangrove forests, coastal prairies or coral reefs.

Mangrove Forest

The mangrove forest gets its name from its three most common residents - the red, black, and white mangrove trees, which tend to grow in zones from the saltwater inland. On the forest’s outer fringes are the water-loving red mangrove. It is easily recognized by its “walking” stilt-like roots. It can survive growing in saltwater because of two important adaptations: its salt tolerance, and the ability of its seeds to germinate and begin to grow while still on the parent tree. It has small, yellow, waxy flowers and produces seeds that look like miniature cigars. These seedlings float and then lodge themselves and take root at the first opportunity, whether it be directly under or miles away from the parent tree. Black mangroves tend to grow inland from the red mangroves and have root projections called pneumatophores that must be exposed to air. Therefore, these trees are best suited to areas with a tidal change that allows for their roots to breathe. The white mangrove is found toward the interior of the mangrove forest where the ground is higher and drier. Even further inland, but not called a mangrove, is another common resident of the mangrove forest - the buttonwood tree.



Mangrove air.



Mangrove leaves play an important part in the nutrient cycle of the estuary. When a mangrove leaf falls into the water, within forty-eight hours it becomes part of the underwater food chain. As bacteria, fungi, protozoans, or nematodes consume the leaves, a byproduct called detritus is formed. In turn, fish, shrimp, lobster, and snails feed on the detritus. Of course, larger fish and shellfish then feed on these small

fish and snails. At the top of such a food chain are some truly impressive creatures, including sharks, tarpon, and crocodiles. In addition to being a critical food source, the mangrove estuary system is a valuable nursery ground for shrimp, fish, and other sea life as the mangrove roots and seagrass beds provide cover and food for their young. The estuary also provides a mix of fresh and saltwater which many juvenile marine organisms require before being able to move out into the higher salt concentrations of the ocean. The productivity of the system depends on the right amount of fresh water flowing from the interior Everglades.

During the drying winter months, thousands of wading birds come to South Florida to feed on the concentrated abundance nature has to offer. It is here, in the mangroves, that many of

these birds find suitable roosting and nest sites, flying in to the drying marshes to feed. Since the mid-1970s, the wading bird population has declined in the park. The reasons for the decline lie, in part, with human changes to the hydrologic system. Increased water in the dry season will disperse the fish that the birds so desperately depend on to feed their young. Reduced amounts of fresh water in the wet season raises the salinity levels of the estuary to detrimental levels.

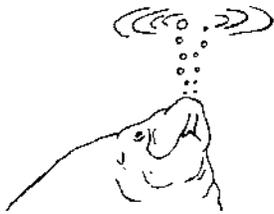
Some of the other animals that live in the mangrove estuary include Atlantic bottlenose dolphin, who hunt for schools of silver or striped mullet; the American crocodile, who feeds on fish along the mangrove shorelines, and like the loggerhead turtle, lays its eggs on the beaches and on shell mounds; as well as some of the more unusual marine organisms like sponges, pipefishes, seahorses, sea cucumbers, horseshoe crabs, conchs, and oysters.

Coastal Prairie

Mixed in with the mangrove forests are open areas of grasses, shrubs, or scattered trees. These openings in the mangroves are usually from some sort of disturbance - hurricane, fire or human-made. Still saline, they are mostly open and sunny areas which might contain sparse mangrove and buttonwood trees, and low growing plants such as saltwort (a yellow-green, ground cover), sea daisy, glasswort, and sea purslane.

Seagrass Beds

Vast meadows of seagrasses, most notably turtle grass, carpet the bottom of the inshore waters surrounding the tip of South Florida, as well as the shallow waters at Dry Tortugas. They are not primitive algae like the seaweeds, but are more advanced flowering plants. For example, turtle grass produces dainty, cream-colored, pink-spotted flowers which develop into pea-sized fruit.



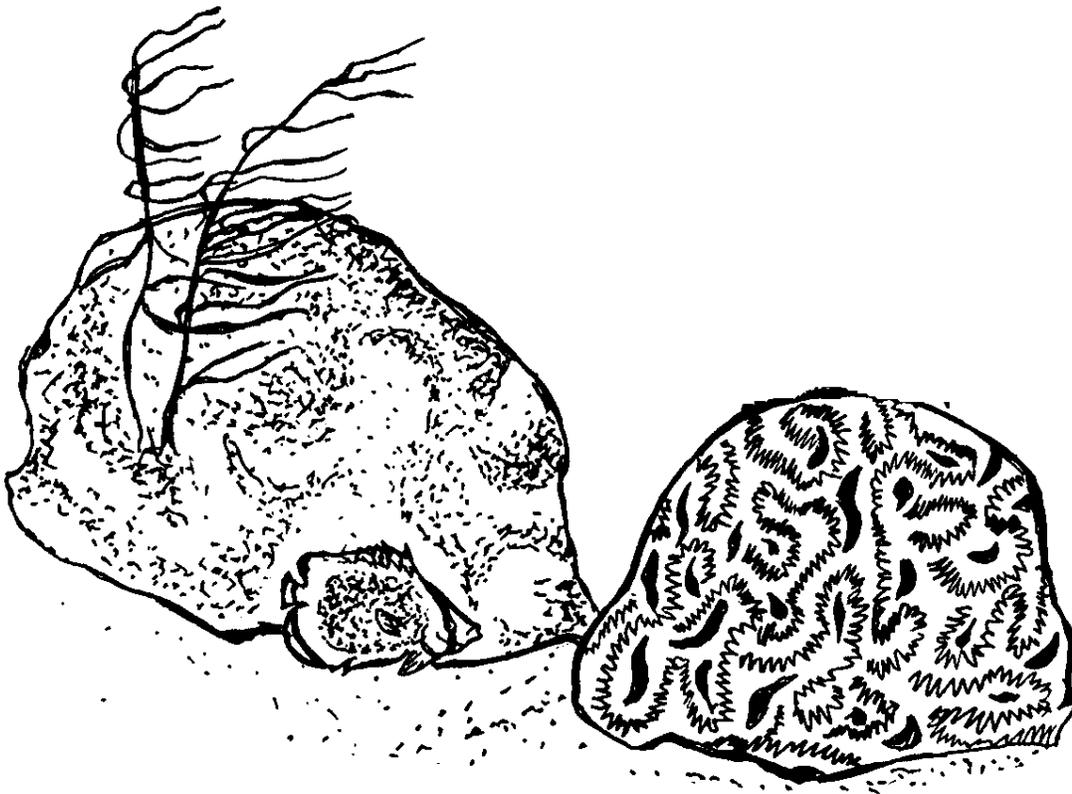
Seagrass beds are important to marine ecosystems in many ways. Some creatures, like green sea turtles and manatees, feed directly on seagrasses. Most animals, however, are more dependent on the dozens of species of algae which grow on seagrass blades. The algae are eaten by tiny marine organisms, which in turn are consumed by larger predators. Like the mangroves, as seagrasses decompose, detritus is formed and is eaten by shrimp, lobsters, crabs, mollusks, worms, and small fish. These are then eaten by even larger predators.

Park researchers are concerned because thousands of acres of seagrass have died in Florida Bay. This die off has seriously affected other members of the food chain. Increased salinity of the bay caused by diverting fresh water from the Everglades is suspected of weakening the seagrass, making it susceptible to invasion by a fungus. Hypersalinity is also suspected of decreasing reproductive success in some marine animals. Restoring the Everglades fresh water may be a key to preserving these marine species. Our efforts to preserve the quality of these waters will ensure the survival of the diverse life that makes seagrass beds so magnificent.

Coral Reefs

The actual builders of these fringing reefs are small primitive animals called polyps. Over centuries, polyps accumulate in living colonies that form the reef's rigid structures so often misconstrued as rocks. The reef complex supports a wealth of marine life. Multicolored sea fans sway gently in the currents. Sea anemones thrust their rose and lavender tentacles upward in search of food. Lobsters, anticipating danger, wave their antennae. Sponges dot sandy bottoms, and staghorn coral clusters simulate underwater forests. Most obvious among coral reef inhabitants are the colorful reef fishes. Vivid, boldly-patterned reds, yellows, greens, and blues work as camouflage, identity, warning, and courtship messages. Predatory fish include amberjacks, groupers, wahoos, tarpon, sharks, and barracudas.

Not only are reefs colorful, supportive ecosystems, they are also very fragile. Fish and animals can be injured and killed by trash in the water. Illegal fishing removes key breeding stock from the population. Boats running aground on coral reefs can destroy years of polyp development. Touching coral may open the way for disease. Some of our actions can cause great damage - park managers enforce regulations to ensure a balanced ecosystem for future generations. Please use forethought and care to help preserve and protect our fragile reef systems.



Fire and Hurricanes

The natural Everglades was shaped not only by the geology and hydrology of South Florida, but also by natural disturbances like fire and hurricanes. Park managers and scientists study the effects of disturbance on the ecosystems of South Florida to better understand how they affect the plants and wildlife.

Fire in the Everglades

In 1960, there was a true story circulated about a little bear cub who survived a forest fire in New Mexico. While fire raged below him and destroyed his forest home, the cub survived by clinging to a treetop, from which he was rescued. Although badly burned, he was nursed back to health and named “Smokey.” Soon “Smokey Bear” became the national symbol to stop all fires from burning on wildlands.

Today, most scientists agree that the “Smokey Bear” approach to wildfire isn’t entirely correct. Not all fires on wildlands are harmful. Although fire can change the landscape, it is also a natural part of a healthy ecosystem. For example, in the Everglades lightning causes dozens of wildfires annually, but only a few become large fires. Before humans lived in South Florida, wildfires would burn until rain put them out, or until the fire ran out of good dry fuel. A fire starting in sawgrass will burn away layers of dead and living grass until it reaches the edge of a wet slough or stream. The ashes from the dead grass become a type of fertilizer, adding nutrients to the soil. This fertilizer helps new sprouts of sawgrass grow from underground roots that were protected from the fire. Young sprouts of sawgrass are tasty treats for deer and other animals.

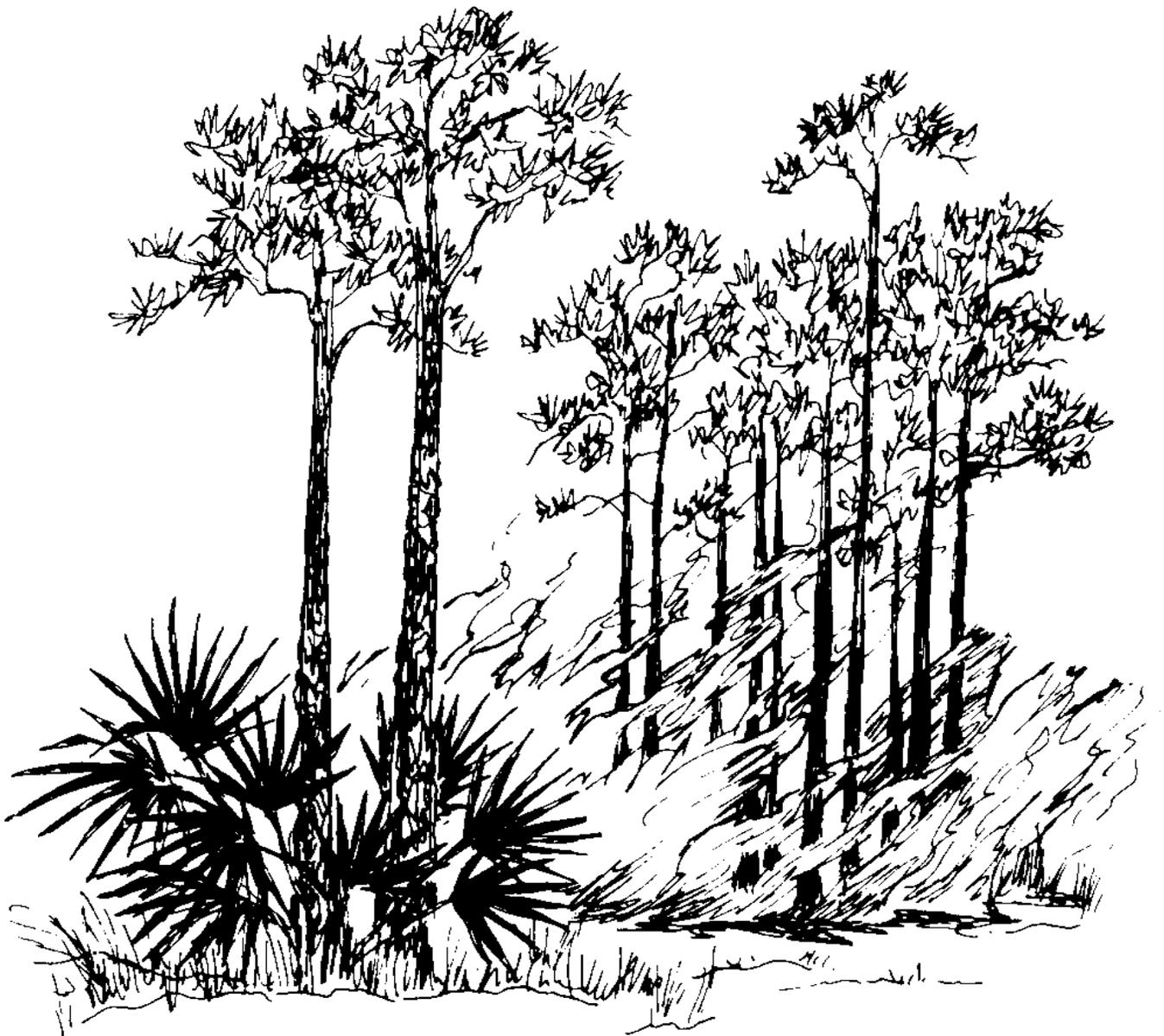
In pineland areas, many plants, are fire-resistant. The slash pines are protected by layers of insulating bark. Under tall pine trees, the fire removes other “invading” plants that shade out young pine trees. Fire opens up areas to receive the sunlight necessary for the young pines to sprout and grow. Without carefully managed wildfires, some species of plants would die, and so would the animals that depend on them. When natural fires do not occur frequently enough and “invading” plants shade out the young pines, rangers come in and intentionally set fire to certain areas to allow new growth to take place. These carefully controlled, intentionally set fires are called prescribed burns.

Fire is as natural as lightning or thunder, when it is started by nature and not by careless humans. Fires started by careless humans, or wildfires threatening lives or property, are usually put out. Any fire, no matter the origin, whether it be caused by lightning, prescribed burn, arson, or accidental fire, can do a lot of good, a lot of harm, or neither. It depends on many factors. Scientists studying fire and its affects on the environment are trained to make informed decisions. Always remember, as Smokey said, “Don’t Play With Fire,” and “Be Careful With Fire.” Only you can prevent **unwanted** wildfires!

Hurricanes

As with fire, hurricanes are a natural element in the shaping of South Florida's landscape. The season for hurricanes is from June - November (the wet season), with the peak being between mid-August and November. Hurricanes bring salt water inland over coastal shorelines. They also can bring heavy rains and winds, causing flooding and snapping off tree tops. Although the effects of hurricanes on wildlife and plants is still being studied, it is believed that the rains and the storm's high tide may "flush" out shallow inshore waters, carrying away accumulated sand and debris. Trees like the gumbo limbo seem to be adapted to hurricanes, since their branches can break off and resprout when they fall to the ground. Animals seem to have many ways to survive the storm- burying into the ground, flying out of the area, or taking cover.

Just as with fire, hurricanes have been occurring in South Florida for thousands of years and the plants and animals living here are adapted to survive in a hurricane-prone environment.



Native Peoples



South Florida has been inhabited by people for thousands of years. Village and encampment remains of the Tequesta and Calusa peoples have been found along the major rivers, as well as the coastal islands. Unfortunately, little is known about these people and their descendents. Native peoples currently living in South Florida are the Miccosukee and the Seminole. The story of their journey to the Everglades is told here.

The Miccosukee originated from the Lower Creeks of the Georgia and Alabama region. The Lower Creeks were a group of various tribes that lived together in peace and spoke Mikasuki. The tribes lived in their ancestral lands until the Europeans arrived in the 1500s. With the arrival of the English, French, and the Spanish came diseases and greed for the land. The Miccosukee's world as they knew it was about to be destroyed.

To escape contact with the Europeans, the Miccosukee moved down into Florida. They were familiar with Florida due to previous hunting adventures. The tribe was able to settle down within the Apalachee Bay region. Here the tribe lived in a large "family" village. The tribe grew corn and hunted. They were able to live in peace until the beginning of the 1800s with the ending of the American Revolution.

White settlers looking for the land of plenty pushed their way into Florida. In 1821, the United States was able to convince Spain to sell Florida. The tribes of Florida now had to deal with the United States, which at that time believed Native Americans were "in the way of progress." Fighting soon began with the new settlers. The various tribes that moved into Florida got together to fight the intruders. This grouping of tribes which included the Miccosukee later became known as the Seminoles. The Seminoles also adopted runaway slaves, which did not help their relations with the slave owners of the South.

Due to increasing fighting between the native peoples and the settlers, the United States sent in soldiers to negotiate a treaty. The U.S. wanted to centrally locate all the native peoples into one area which resulted in the treaty of "Moultrie Creek." The Seminoles did not give their consent for the treaty to be signed. They viewed this as an act of trickery which led to the famous "Seminole Wars."

The Miccosukee and the Seminoles fought two wars with the United States. The First Seminole War was in 1822-23, with the treaty of "Moultrie Creek." This war was about being forced out of their lands and being made to live on a reservation in Central Florida. The Second Seminole War dealt with increased settlement within and around the reservation and the Indian Removal Act. By the 1830s, there was not enough "free" land left to be settled. What was termed "free" land was being used by the native peoples of that region. The United States devised a plan that would solve the "Indian problem." The Indian Removal Act of 1830 was passed by Congress as a way to rid the East of Native Americans. The Act stated that all Native Americans had to move west of the Mississippi River. The Seminoles and the Miccosukees were not going to

leave and stayed to fight for their land. The Second Seminole War lasted from 1835 to 1842. From 1855 to 1858, the Seminoles fought deportation to the West and loss of land and tribal unity. The Miccosukees hid from soldiers within the Everglades, which prevented them from being deported.

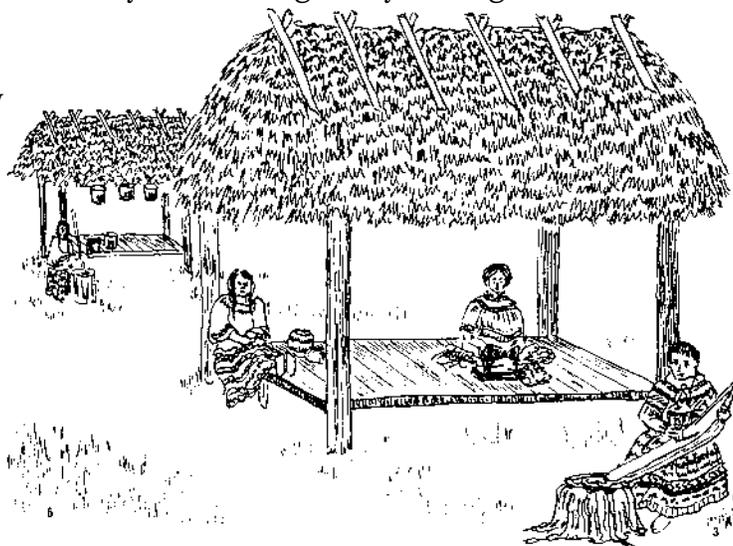
Adaptation was the key to the Miccosukees' survival. They had to learn to live in small family units instead of large villages. The various families within the tribe lived in hammocks and traveled throughout the Everglades in dugout cypress canoes. Corn, their main staple, was hard to grow, so they relied on native fruits such as the coontie and the cabbage palm. The men still continued to hunt game like the white-tailed deer and gar fish and bass. The women planted pumpkin and squash.

The family structure is one of a matrilineal society. This means that name and property belong to the mother's side of the family. The boys played with canoes and bow and arrows. The girls played with canoes and dolls. The dolls would be made out of palmetto fibers. The aunts and uncles on the mothers side helped to raise the children. Storytelling was done by the elders as a means to teach the children the morals of the tribe and to explain the ways of nature. This was also a time to bring families together.

The Miccosukee People lived in chickees. There would be a cooking chickee, a chickee for sleeping, a chickee for socializing and a chickee for eating. The design of the chickees was open-sided with a raised platform that protects the Miccosukee from flooding. Cypress trees were used to make the poles while the roof was thatched with palmetto fronds. Each village would have a small garden. Cooking utensils were carved out of wood, and baskets were woven out of native vegetation such as sweet grass, willow and palmetto fiber.

The women would make clothes for their families. Men wore long shirts and the women wore long skirts, shirts, and capes over their shoulders to protect them from mosquitoes. With the introduction of the sewing machines from the early settlers, the Miccosukee women began to sew wonderful designs. Each design represented some aspect of their environment such as an alligator, frog, fire, and many more. Miccosukee designs are well known within the Indian community. Modern day designs show the creativity of the designer by mixing traditional designs with new fabrics.

In 1962 the Miccosukee became a federally recognized tribe. This gives the tribe the right to be self governing. The tribe does have a reservation with its own governing body called the Miccosukee General Council. This Council is responsible for making laws, insuring traditional values, and establishing working relations with local, state, and federal governments.



Today, there are still tribal members who live in traditional villages and men who wear long shirts. Other members mix modern-day conveniences with tradition, such as men wearing the latest jeans style with a traditional native shirt. The women still wear their long skirts but insect repellent has replaced the cape. The Miccosukee children are taught English as well as Mikasuki. This enables the tribe to keep their native tongue alive, which in turn keeps tradition alive. Miccosukees are a prime example of one tribe's ability to survive any situation that presents itself: from European invaders - to hiding out in the Everglades to escape deportation to the West. The Miccosukee Tribe has always tried to stay true to their beliefs.

Birds of South Florida



Birds are some of the most colorful and interesting creatures that share our world. They belong to a group of animals called “vertebrates” (animals with backbones) and are a special group (class) of vertebrates called “Aves.” All birds have feathers, which distinguishes them from all other animals. Over 400 species of birds have been known to occur in southern Florida. They have many different habitat requirements and often use more than one habitat. Some are seasonal visitors and others are year round residents. Migratory birds travel great distances (South America to Canada, for example) and need places along the long trip to stop, rest, and feed. One natural way of grouping birds is by whether they are associated with watery habitats or land habitats. Some of South Florida’s more common land and water birds are discussed below, as well as current concerns for their survival.

Water Birds

Birds that are associated with watery habitats include waterfowl like ducks and geese, and wading birds such as herons, egrets, ibis, and cranes. It also includes birds associated with marine habitats like pelicans and gulls; shorebirds, such as sandpipers and plovers; and sea birds like the magnificent frigatebird. South Florida’s abundance of freshwater wetlands, coastal shoreline, and tropical islands provides habitats for these birds to find food and shelter. This region is also crucial for birds who depend on these habitats for nesting. It is impossible to cover all the water birds that depend on South Florida habitats, but one group, the wading birds, has had a significant decline in population since the 1920s and is discussed below.

Wading Birds

The warm, shallow, and vast Everglades “river” attracted wading birds to this region for thousands of years. Sixteen different species of wading birds live in the Everglades. All have long legs for wading into the water to catch their food. They often use multiple habitats, i.e. roosting (forming social nesting colonies) on mangrove islands and feeding inland in shallow drying ponds. In the 1800s, the well-known naturalist and artist, John James Audubon, wrote during a visit to South Florida, “We observed great flocks of wading birds flying overhead toward their evening roosts... They appeared in such numbers to actually block out the light from the sun for some time.”

The **white ibis** is one of the most common wading bird found in the Everglades. Unlike many wading birds that prefer to eat fish, the ibis dines primarily on crayfish. This white bird has a long, slender, curved beak that is used to probe the mud in search of food. Ancient Egyptians believed the ibis to be the reincarnation of their god, Thoth, the god of Wisdom and Learning.



white ibis

One of the most common herons encountered on a visit to the park is the **green heron**. A relatively small wading bird, the antics of this “fisherman” are fun to watch. Slowly stalking in shallow water, or perching on a low tree branch, its dart-like jab at a fish is rarely off target.



Other wading birds you may encounter on a visit include the great white heron, great blue heron, great egret, snowy egret, tri-colored heron, little blue heron, cattle egret, reddish egret, black-crowned night heron, yellow-crowned night heron, least bittern, glossy ibis, and the very colorful roseate spoonbill.



In the 1930s approximately 250,000 wading birds nested in the Everglades. In the spring of 1990, scientists estimated as few as 2,200 wading birds nested in Everglades National Park. Ninety percent of the nesting wading bird population is gone. Two reasons are believed to have accounted for this dramatic decrease in the members of the wading bird community - fashion and the draining of “swampland.”

In the late 1800s, fashionable ladies’ hats were adorned with lacy feathers called plumes. These were taken mostly from herons and egrets. Plume hunters would often shoot the adult birds during nesting season and leave the helpless young chicks to die. Plume hunting has been illegal for many years (thanks to actions from concerned citizens), but by the year 1900, only a few thousand herons and egrets remained.

The draining of interior South Florida has had a detrimental effect on the wading birds. All creatures, including birds, need food, water, shelter, and space to survive. Draining the water from the wetlands destroyed their food source. As the habitat was altered, many bird populations declined or never returned to the Everglades. The wood stork, now an endangered species, is an example.

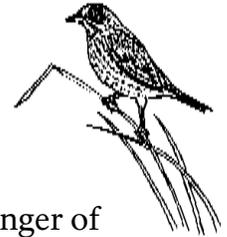
The **wood stork** is a large, long-legged, wading bird about 35 - 45 inches tall with a wing span of 60 - 65 inches and an unusual way of feeding. With its beak held in the water, the wood stork shuffles its feet. As a frightened fish swims away from its feet, it bumps into the bird’s beak. The sensitive beak feels the vibration of the fish, and clamps down on it within a fraction of a second. (This movement is believed to be one of the fastest of any vertebrate.) The wood storks’ method of feeding is best in the dry season when water levels drop and the fish are concentrated in the few remaining water holes. This is also the best time for wood storks to raise their young. Unfortunately, modern water control programs do not time the water releases to the historical pattern the wood storks (and other wading birds) require. Too much water released in the dry season will cause fish concentrations to disperse. Too little water in the dry season will destroy the fish these birds depend on for raising their young. The impacts to wildlife of the altered water flows in South Florida can also be seen in some of our land birds.



Land Birds

Land birds spend their lives in drier areas of the park, like the tree islands (hammocks) or pinelands, but can also be seen flitting around in the mangroves and prairies. Land birds can be divided into groups such as birds of prey, woodpeckers, owls, and songbirds. Like the water associated birds, not all land birds nest here (just over 70 species breed in southern Florida). Nor do they all remain here year round. Colorful, migratory warblers are some that are seen only during the winter months. Everglades year round residents include the red-bellied woodpecker and songbirds like cardinals, blue jays, and meadowlarks. One year round resident, the Cape Sable seaside sparrow, is in danger of becoming extinct.

Cape Sable seaside sparrow



This endangered sparrow builds its nests in marsh grasses. The nests are easily flooded out if water rises during their nesting season (winter dry season). Increased rainfall from 1995-1998 caused South Florida water managers to release excess water into Everglades National Park during the dry season, threatening the sparrows' nests. Luckily, the sparrow, like the wood stork, is protected under the Endangered Species Act (see the "Endangered Species" section). Biologists, park managers, and water control managers are working together to protect this bird's habitat. The sparrow, like the wood stork, is an example of what can happen to wildlife when humans alter habitats. They are also examples of how important it is to understand the needs of wildlife in order to protect them. Two of our birds of prey show us that some species' populations can rebound strongly if people are sensitive to their needs.

Birds of Prey

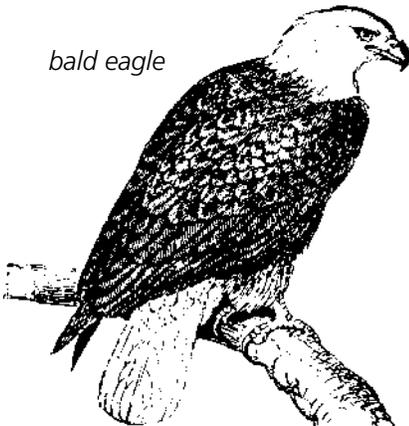
The term, "birds of prey," describes birds that catch their food by using a hooked beak and claws. Hawks, owls, eagles, kites, and falcons are all considered birds of prey. The most common hawk seen in the Everglades is the **red-shouldered hawk**. This very vocal bird swoops down to feed on lizards and snakes. The most common owl is the barred owl. If you hear an owl hooting late at night in South Florida, most likely it is a **barred owl**. "Who cooks for you-- who cooks for you all" is one common "English" translation of this call.



barred owl

A bird of prey you are likely to see along the mangrove island areas of South Florida is the osprey, a land bird that dives into the water to catch fish. There are also about fifty pairs of bald eagles (land birds who also feed on fish) that nest along the mangroves in Everglades National Park. The bald eagle is a success story. Our nation's symbol was considered an endangered species until just recently. Eagles nationwide were not successfully reproducing because certain pesticides (chemicals people used to kill insect pests) got into the food chain. The eagles ate the chemicals when they ate fish (fish were contaminated when the chemicals got into the water). Affected by the pesticides, eagles laid eggs with shells that were too thin, and most of the eggs never hatched. By banning these harmful

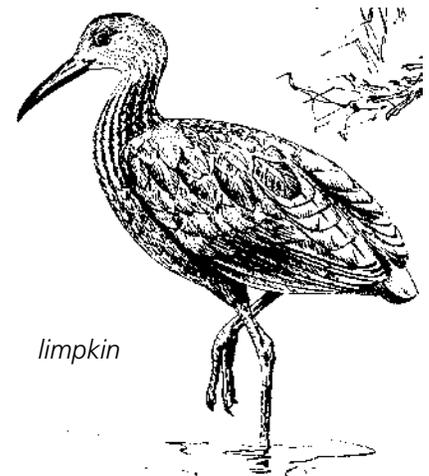
bald eagle





pesticides, the chemicals in the environment have been reduced, and the eagle population has come back. Similarly, Arctic peregrine falcon populations were extirpated due largely to pesticides. Today, these falcons have increased in number so they are listed as “threatened” rather than “endangered,” and may be seen wintering or migrating through South Florida. By understanding the impacts peoples’ actions were having on the eagles and the falcons, and by making laws to protect them, we were able to help them.

Today, the snail kite is an endangered bird of prey. The population of the snail kite was only about thirty-six birds in the early 1960s. This bird does not have a varied diet. In fact, it feeds almost exclusively on the meat of the large, brown, aquatic apple snail (see “Invertebrates” in this Natural History section). Any changes to the snail population affects the snail kite. It is believed that the improper flooding of areas drowns the pearl-like snail eggs before they hatch, and draining of prime snail habitat kills the adult snails. Recognizing that the snail kite was in trouble and listing it as an endangered species provided special protection for the snail kite. Today its population is about 1300. Researchers are still studying the kite and the apple snails to discover how best to continue protecting both.



The Everglades has been designated a “Wetland of International Significance” for its critical role in protecting South Florida’s important wildlife habitat. Together with Biscayne National Park, Big Cypress National Preserve, and Dry Tortugas National Park, Everglades is monitoring bird populations for indications of the health of this habitat. Endangered species like those discussed on the preceding pages, are signs of the condition of our environment. Since many birds in South Florida migrate, it is important that we protect enough areas along their migration routes, as well as their winter and summer homes, to ensure their survival.

Reptiles



Reptiles are vertebrate animals whose body temperatures change with their surroundings (“cold-blooded”). South Florida, with its semi-tropical climate, is an ideal home for these creatures. Various reptiles are found in all four of our South Florida national parks. Just within Everglades National Park, there are over fifty species of reptiles, including twenty-six snake species, sixteen turtle species, and several lizard species. Each one has an important role to play in the environment. Listed below are a few of the more common of these animals. For more information, refer to the references in the “Resources” section of this guide.

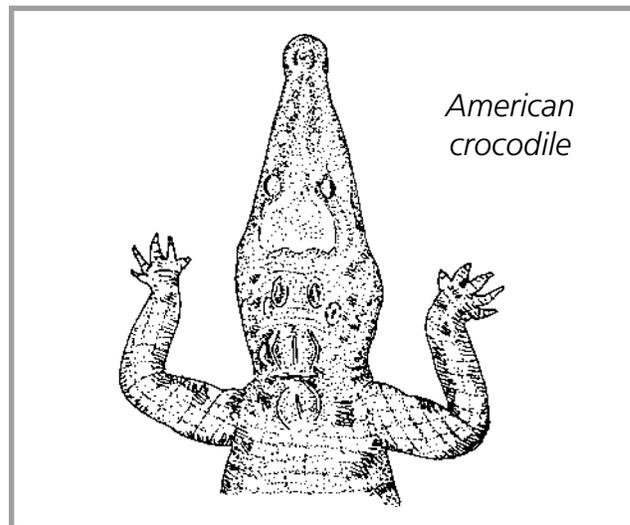
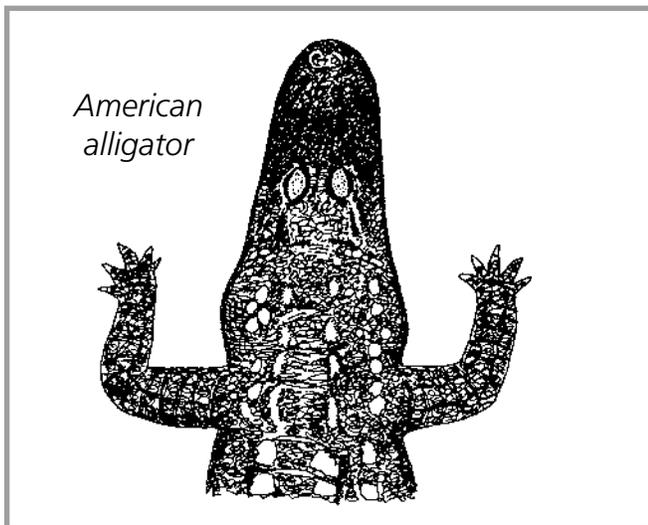
Crocodylians

The most famous reptiles in South Florida are the alligators and crocodiles. They belong to the group crocodylians which contains eleven other species found in other parts of the world. South Florida is the only place in the world where the American alligator and the American crocodile are found living together.

The **American Alligator** is the “king of the Everglades.” Without the alligator, the Everglades might not survive. During the dry season (December through April), alligators dig out pockets, or holes, in depressions in the limestone. “Gator holes” are one of the few places in the park where there is standing water during the winter months. These holes become home to many insects, turtles, fish, and wading birds. During the summer wet season, these same animals are scattered throughout the “river of grass.”

At one time an endangered species because of overhunting and loss of habitat, the alligator has now made a comeback. They are common throughout the fresh water marshes of the park, and occasionally enter the brackish waters of Florida Bay. Once poaching (illegal hunting of wildlife) was controlled, alligator populations rebounded quickly. Despite their recovery, “gators” are still protected by law because of their similarity in appearance to the American Crocodile which is still endangered. The biggest threat now comes from habitat destruction. Loss of wetlands in South Florida makes the gators even more dependent on the habitats preserved within the national parks. However, because the parks depend on artificially controlled water levels outside their borders, their protection is not assured. Female alligators usually begin building nests in mid-June. The nest mounds are usually built on slightly higher banks, or on the edge of small tree islands called bayheads. If excess water is released into the park in late June, many of the nests flood and the developing eggs drown. Restoring the water flow in South Florida to its historic patterns will help protect the alligator.

The best time to see alligators in the park is during the winter dry season. At that time, they gather near the deeper water holes. All sizes and ages, from ten-inch “babies” to an occasional ten-foot-long adult, can be seen lounging on the bank along the Anhinga Trail. Alligators are critical to the survival of Everglades National Park. Without “gator holes,” many animals would not make it through the winter dry season. Unless enough water is released at the right time of the year, alligators will not be around to create these “gator holes.”



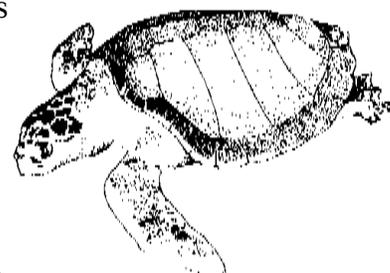
The American Crocodile is a lizard-shaped reptile that ranges in length between nine inches (at hatching) to fifteen feet. The crocodile is slimmer than the alligator and has a longer, more tapered snout. The crocodile feeds primarily on fish, although it is an opportunistic feeder and will eat almost any animal that comes into its territory. Crocodiles in Florida inhabit the coastal mangrove swamps, brackish and saltwater bays (including northern Florida Bay), creeks, and coastal canals.

Most crocodiles, and their habitat from Biscayne Bay northward, have been lost due to human development along the coast and Keys. Crocodiles will survive in South Florida as long as there is proper protection of their habitat.

Turtles

Of the turtles found in the Park, most live in the fresh water marshes and ponds. The ones you are most likely to see include the Florida red-belly, common along the Anhinga Trail, the peninsula cooter, which is often seen at Shark Valley, and the striped mud turtle, found in fresh water marshes, ponds and solution holes. The Florida softshell turtle is another turtle often seen at Shark Valley and along the Anhinga Trail. While walking on a trail through the pinelands or a hammock, you may see a Florida box turtle crawling along. You may even come across one that has been fire-scarred or lost one of its legs. The only other land turtle found in the park is the gopher tortoise, and you are likely to see it only if you visit the most southwestern section of the park called Cape Sable. On Cape Sable, you might also see a diamondback terrapin basking along the shoreline. This species likes the brackish water of the mangrove estuary.

At one time, turtles were quite common in the marine environments of Florida Bay, the Dry Tortugas and Biscayne Bay. Today, there are fewer marine turtles because their nesting sites have been disturbed. The hawksbill turtle, Atlantic Ridley turtle, leatherback turtle, and green turtle are all endangered species. The leatherback turtle nests within Biscayne National Park. The green turtle as well as the loggerhead turtle nest on the islands of Dry Tortugas National Park. If you are walking the beach at night and see any one of these marine turtles nesting, do not disturb them; they are all protected species.



Snakes

Many of the snakes found in South Florida are adapted to survive in the water. The **striped crayfish snake** is considered the best swimming snake in Florida, but you're not likely to see one unless you look carefully among the marsh plants in the northern part of Everglades National Park. Much more common is the **brown water snake** which is the most frequently seen snake along the Anhinga Trail. People often mistake it for the poisonous Florida cottonmouth which is found in the same area. The water snake, if cornered or mistreated, will bite - but it is not poisonous. While most of the snakes living in or near the water are adapted to a fresh water environment, some, like the cottonmouth and mangrove salt marsh snake, can survive in the mangrove swamps and saltwater marshes.



Many snakes are beautifully colored; standing out in their surroundings, while others are drab colored and blend in perfectly with their background. Some of the most beautiful snakes in the park belong to a group called the rat snakes. The **Everglades rat snake** is brilliant orange with four dark stripes; the **corn snake** has reddish blotches with a black border in a background of grey, tan, yellow, or orange; the common **yellow rat snake** has four black stripes on a bright golden yellow background. They are very good climbers and may be seen climbing a tree to get to eggs in a bird's nest. They also feed on small rodents, frogs, and toads, which they constrict, or squeeze, to death. Another brightly-colored snake is the very poisonous **eastern coral snake**. With its red, yellow, and black rings and black snout, its coloration warns predators, "Stay away from me, I'm dangerous." The black snout is the coral snake's most distinguishing feature. The coral snake is found in hardwood hammocks and pinelands under leaves, rocks, and logs. Both the **scarlet** and **scarlet king snakes** imitate (mimic) the coral snake in appearance and are found in the same habitat. All three species have red, black, and yellow rings, but the scarlet and scarlet king have red snouts. Another difference is that in the coral snake, the red and yellow rings touch. The scarlet and scarlet king snakes have their red and yellow rings separated by black.

Snakes are found in nearly every habitat in the Everglades. They range in size from the poisonous **dusky pygmy rattlesnake**, seldom more than two feet long, to the threatened **indigo snake**, which can grow to be over eight feet long. Some are brilliantly colored, some may be poisonous, but many help balance the rodent population. Each one has an important role to play in the South Florida environment.

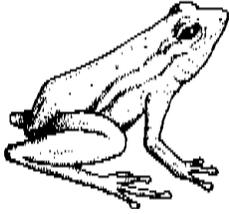
Lizards

The native **green anole**, which many of you know as the chameleon, was once very common throughout the Everglades. Now, it is being gradually replaced in the pinelands and hardwood hammocks by the exotic brown anole which is native to Cuba. The **Florida reef gecko** is the only native gecko found in Florida. Though more commonly associated with coastal communities, it is also found in the hammocks and pinelands under rocks and leaves, and is the smallest lizard in North America (2 - 2-1/4 inches). **Island glass lizards** are common in fresh water marshes and pinelands that are flooded during certain times of the year. During high water and after fire, you may see them along roads that are next to their habitats. They may be up to two feet long. Several exotic species (see "Exotics"



at end of this section) of lizards have been able to adapt to the Everglades environment. These exotics often compete for food, shelter, and territory with native lizards. Many exotics are pets that have escaped or have been released into the wild. You can help protect the native lizards by not releasing exotic pets anywhere in South Florida. Remember, “Don’t Let it Loose!”

Amphibians



Amphibians like reptiles, are “cold blooded.” Amphibians are animals who commonly spend the first part of their life in the water, breathing through gills. As adults, they may still live in the water but use lungs to breathe. They include frogs, toads, and salamanders. Many are common, but are more often heard than seen because they are out only at night (nocturnal) or are very well camouflaged. The eighteen species of amphibians found in the Everglades include the smallest frog in North America, the little grass frog.

Frogs and Toads

No more than 5/8" long, the little grass frog is the tiniest frog in North America. Often, people think they are seeing a baby frog when they sight this species. It is found clinging to sawgrass a few feet above the water. Although it is seldom seen, you can hear its breeding choruses at night during the summer. The sound of two marbles clicking together, then becoming faster, could be cricket frogs which can be heard at Shark Valley throughout the year. These and many other species of treefrogs- clinging to trees, buildings or blades of grass- are amphibians commonly encountered on a visit to South Florida.

If you come to Everglades National Park’s Main Visitor Center during the summer, you are likely to hear large choruses of oak toads. They are found in hammocks, pinelands, and wet sawgrass communities and are often active during the day. The pig frog’s grunt-like call can be heard night or day, year round, at the Anhinga Trail and at Shark Valley. It is found throughout the fresh water marshes of the park and is related to the bullfrog. Pig frogs are edible, and are sometimes hunted for “frog legs.”

Much attention and research is being focused on amphibians around the world, because they are disappearing at an alarming rate. Since amphibians have permeable skin which allows them to exchange air, they are susceptible to pollution from the air as well as the water. Scientists are concerned that the disappearance of amphibians may be due to a global cause. Since frogs have been around since the time of dinosaurs, their decline may be a sign that there is something wrong with the global environment.

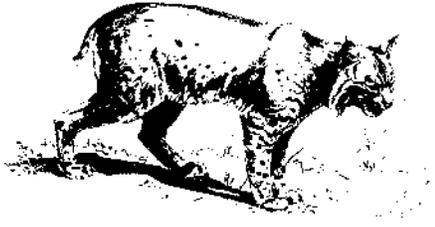
Amphibians are an important part of the food chain in South Florida. Birds, snakes, and lizards depend on them for sources of food. The eggs and tadpoles may be food sources for many wetland predators like fish. South Florida’s national parks help to protect habitat for these members of the food chain.



Salamanders

The Everglades dwarf siren is a salamander known to be found only in the Everglades. When a plant or animal is found in only one particular place in the world, scientists say it is *endemic* to that place.

Mammals



South Florida is home to an interesting variety of mammals. Mammals are distinguished from other vertebrate animals, such as birds or reptiles, by several unique features. They are covered with hair or fur over much of their body and the females have mammary glands that produce milk for their young. Over forty species of mammals are found in South Florida. Many species commonly associated with drier habitats of forest and fields have adapted to the semi-aquatic environment which constitutes much of the Everglades. White-tailed deer are commonly seen wading through the sawgrass prairie, or a bobcat may be foraging for food in the mangroves.

Land Mammals

There is only one representative of the rabbit family frequently found in South Florida national parks. The **marsh rabbit** is common in higher fresh water marshes, pinelands, and coastal prairies. It is not uncommon to see the marsh rabbit swimming, for it has adapted to its “wet world.” Cottontails do occur in the park, but very infrequently. **Raccoons** and **opossums** are creatures common to most habitats. These creatures are omnivores with varied diets, although



the raccoon primarily eats turtle eggs and small aquatic animals. The opossum is the only marsupial (pouched) animal in the Everglades (and in North America).

Bobcats and **black bear** are also found in Everglades. While bobcats are seen fairly often, bears are less common.

The **mangrove fox squirrel** or **Big Cypress fox squirrel** is found only in southwestern Florida. It is a beautiful animal, varying in color from black to gray to orange, but they almost always have a black face and a white nose. These squirrels make nests in trees, but come down to the ground to look for food. They eat seeds from pine and cypress cones, palm fruits, mushrooms, and insects. Never very common, this squirrel has become very rare, mostly due to habitat destruction. It is now listed as a threatened species by the State of Florida.

Its cousin, the **gray squirrel** is also infrequently seen in the Everglades. A few are occasionally seen near Royal Palm Hammock.

The **gray fox** is a shy animal that usually hunts at night. In the Everglades it lives in hardwood hammocks and pinelands. The diet of the fox includes small mammals, birds, reptiles, insects, and plants. Gray foxes, unlike other types of foxes, are sometimes seen climbing trees. They are able to climb up the trunk, leaping from limb to limb. The gray fox likes bushes, and makes its den in the ground under roots and in the hollows of trees.

Streamlined **river otters** are sometimes observed in the spring at the Anhinga Trail, at Shark Valley, and in the Big Cypress/Loop Road area. They are long, shiny, brown, seal-like animals which are often called the playboys of the “Glades.” Their webbed back feet allow them to swim quickly through the water and they are usually seen feeding on turtles, fish, and an occasional baby gator.



Otters, like all plants and animals in national parks, are protected. In the rest of Florida, however, otters are still hunted for their winter hide which is used to make coats.

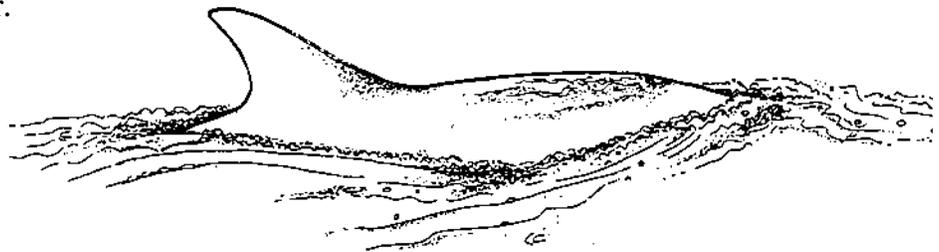
White-tailed deer are the same as those found throughout the eastern United States, but are smaller here because they do not need an extra layer of fat to protect them from the winter cold. The “glades” deer bed in hammocks when they are not feeding in the open sawgrass. Fawns are born in the spring months and are white-spotted for camouflage.

The **Florida Panther** is an endangered species that originally occurred throughout most of the southeastern United States. The species was nearly eliminated over the past century due to population growth and predator control efforts. While panther sightings have been reported in some southeastern states, they likely do not occur in any of the eastern states except Florida. The Florida panther is a large, long-tailed, pale brown cat, which may be up to six feet in length. Panther litters usually contain two or three young, and female panthers breed only once every two to three years. They are nomadic animals that have the ability to travel up to twenty miles in one journey. They feed primarily on deer and wild hogs; however, some, particularly the younger cats, feed on smaller animals.

The Florida panther faces many challenges to its survival. The entire population (estimated at only 30 individuals only twenty years ago) is threatened with extinction due to genetic inbreeding, poaching, mercury poisoning, and fatal encounters with traffic on our roadways. State and Federal agencies have worked in unison to minimize these dangers and protect the small population that remains. Using wildlife underpasses, new monitoring techniques, and the introduction of new genetic material, the number of panthers has increased in recent years to over 100 individuals statewide. Today, wildlife managers have the difficult task of trying to maintain a sustainable population of panthers in South Florida’s limited habitat, which continues to shrink each year.

Marine Mammals

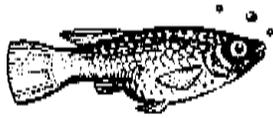
The **West Indian manatee**, or sea cow, is a massive, thick-skinned mammal with paddle-like forelimbs. It is



grey-brown in color, weighs between 790 and 1,190 pounds, and is eight to fifteen feet in length. Manatees inhabit slow-moving rivers, shallow estuaries, and salt water bays where they feed on aquatic vegetation. They are essentially gentle animals and have been used as agents for aquatic weed control. It is thought that about 1300 manatees live in Florida’s waters. The manatee is an endangered species. Its survival is threatened due to injuries from boat propellers, vandal attacks, poaching, getting caught in canal gates, and habitat destruction. Manatees are protected by the Endangered Species Act of 1973, and by the Marine Mammal Protection Act of 1972, although neither law protects them from boat propellers or vandals. For more information on endangered species, see “Endangered Species” at the end of this section.

Another marine mammal that lives in coastal waters is the **Atlantic bottlenose dolphin**. It likes to hunt for schools of silver or striped mullet, and can often be seen along the mangrove shorelines.

Fish



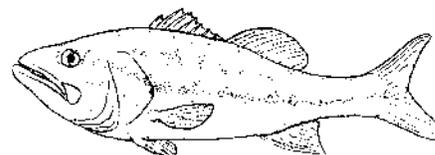
Fish are water-dwelling vertebrate animals that breathe through gills. Because they lack internal mechanisms for raising the body temperature above that of their environment, fish are said to be “cold-blooded.” Some fish live only in fresh water; others only in salt water.

Freshwater Fish

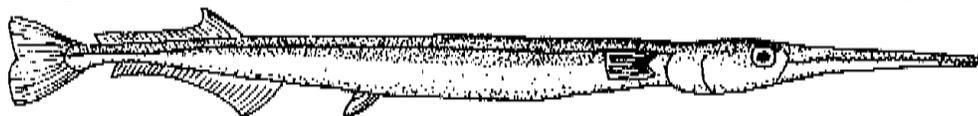
There are thirty species of native fresh water fish in Everglades National Park. They are the main source of food for larger fish, wading birds, and even alligators. Native fish also do a great job of controlling the insect population. During the summer (wet) season, the water level in the park is high and fish are scattered. In the winter (dry) season, the fish move into deeper water and “gator holes,” where standing water is still available.

The **Florida gar** is a long (up to three feet in length), slender, predatory fish with sharp teeth and an armor of thick scales. It is often seen near the water’s surface swallowing air. If unable to rise to the surface for air, it can suffocate. Once gar lay their eggs, they abandon them. Fortunately for the gar, their eggs are poisonous to “warm-blooded” animals, so they are not often preyed upon. **Mosquitofish** are the most common freshwater fish in the Everglades. Once the water level rises (May or June), this two-inch insect-eater rapidly begins to reproduce throughout the park. It is even found in the salt water of Florida Bay. Aquatic invertebrates are its primary food. Birds and larger fish feed on mosquitofish. The **least killifish** is one of the smallest fish species (one inch long) in the United States. Most fish lay eggs, but least killifish, like mosquitofish, bear live young. They are so small, they can only have one baby at a time. It makes up for that by having one baby a day throughout the few weeks of its adult life. A very efficient assembly line! It has to be productive, because the least killifish is a favorite food of birds in the sawgrass and spike rushes. The least killifish feeds on tiny insects and plant material. The **sailfin molly** is a small (five-inch long) live-bearer that lives in both fresh and salt water. It is the only true herbivore (plant eater) of the freshwater fish. Some of you may have one in your aquarium.

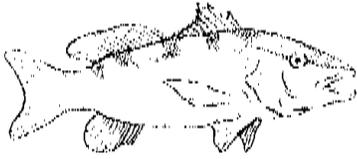
Largemouth bass are a favorite among fishermen. In Everglades National Park, fishing is allowed in some of the fresh water areas. Fishermen should pick up a copy of the fishing regulations at the park entrance station. Scientists have recently discovered that largemouth bass have a lot of the metallic element, mercury, in their bodies. They are not sure where the mercury is coming from, but they do know it is poisonous to humans and wildlife. In some areas, exotic species (see the “Exotics Species” section) of fish are crowding out the bass, competing for limited food resources and available egg laying sites.



All of the fish in the Everglades need clean water to survive. During periods of long drought, up to 90% of the fish in the park may die. If the fish die, there is no food for the birds, and they die as well. You can help. Conserve water, and never release exotic fish from your aquariums into the canals.



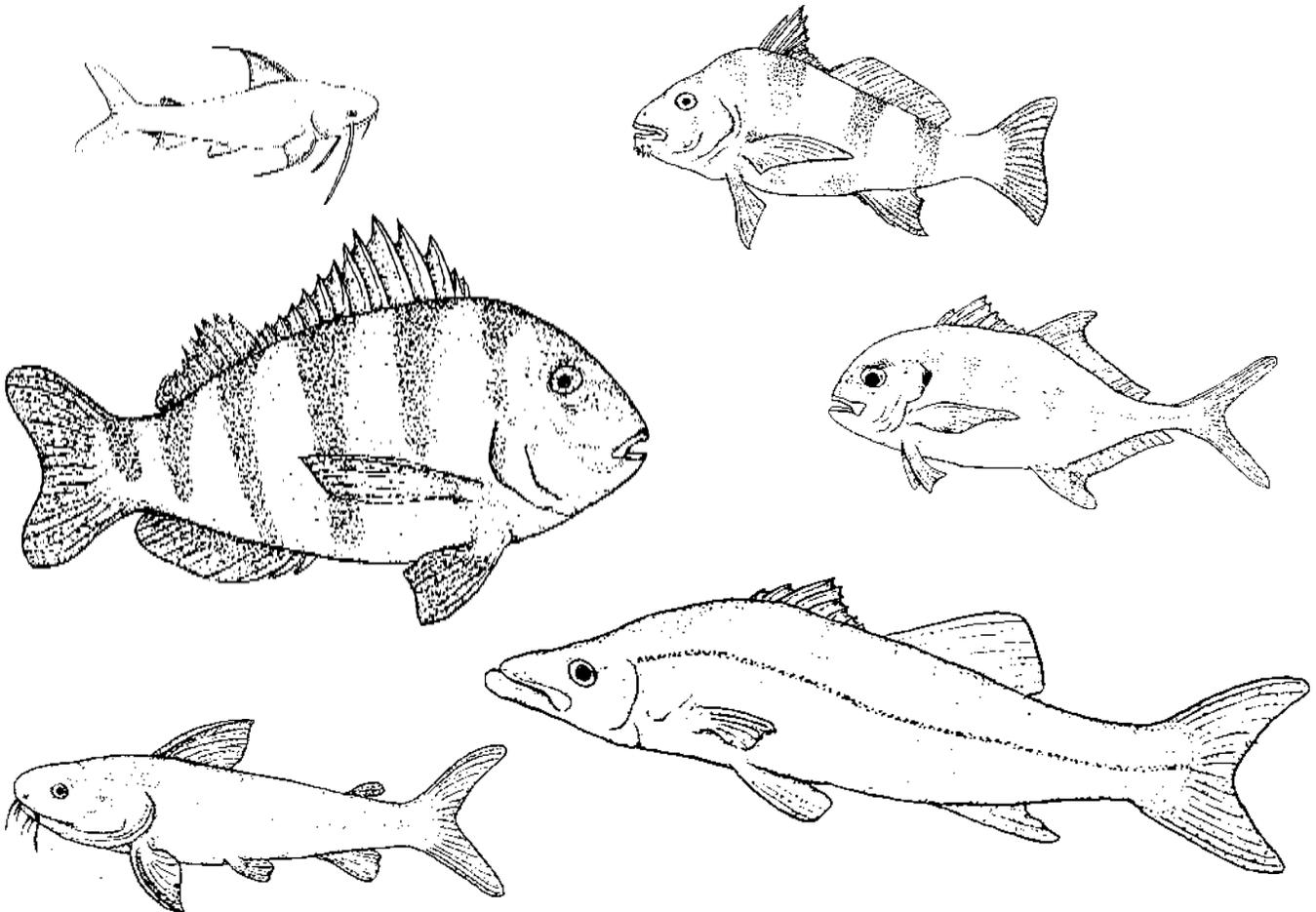
Saltwater Fish



Over 100 species of marine fish have been identified in Florida Bay. Game fish such as **bonefish**, **tarpon**, **snook**, **red drum**, and **seatrout** abound in these rich waters. Without this protected area, a 300 million dollar sport fishery (in and around the Everglades National Park) and a 100 million dollar commercial fishery, adjacent to the park, would be in jeopardy. Commercial fishing is not allowed within

Everglades and Dry Tortugas National Parks. Sport fishing is closely monitored and regulated in all national park areas. These actions are an attempt to protect against overharvesting, to maintain a sustainable breeding stock, and to ensure a balanced ecosystem for future generations. Other species which call this area home include **bonnethead**, **black tip**, **nurse** and **hammerhead sharks**. **Stingrays** hide in the soft mud and feed on mollusks and crustaceans.

Along Biscayne National Park's coral reefs are more than 200 types of fishes. Some of them are flamboyantly colored like the **angelfish**, the **wrasses**, and the **neon gobies**. It's believed that the eye-grabbing colors of the wrasses attract other fish so that they can clean them of parasites and dead tissue (and in return, get a free meal). The camouflaging colors of the **moray eel** help it blend in with the surrounding reefs. One interesting inhabitant of the reef is the sharp-beaked **parrotfish**. It can be seen munching on coral. Not so strange, since along with the rock (which passes through its digestive system), the parrotfish is devouring algae and coral polyps.



Invertebrates



Invertebrates are animals that do not have backbones. They include insects and spiders, but also snails, worms, clams, sponges, crabs, lobsters, shrimp, and crayfish to name a few. Because of their lower position on the food chain, these creatures are critical to the diets of many South Florida fish, birds, mammals, and reptiles.

Snails

Snails are classified within a group of invertebrate animals known as mollusks. Their name means soft-bodied and also includes chitons, clams, octopuses, and squids. The most obvious feature of a snail is its spiral shell. There are many different types of snails in South Florida. A freshwater snail, a land snail, and a marine snail are described below.

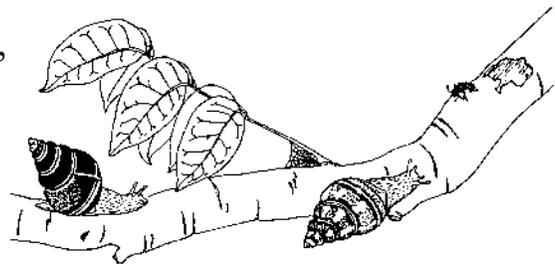
The **apple snail** is found throughout the freshwater habitats of the Everglades. This air-breathing snail feeds on algae and decaying matter found on plants and rocks in the water. It has an opening, or door, called an operculum. The operculum opens as the snail's body emerges. As the snail crawls along, it feeds on algae by scraping it from plants and rocks. Every few minutes, the snail returns to the water's surface to breathe air. This is when the snail is most vulnerable. Wading birds, young alligators, and other predators take advantage of the snail's visit to the surface of the water.

The endangered snail kite (a hawk) eats only apple snails. It has a specialized hooked beak adapted for extracting the snail from its shell. If the snail manages to survive the predators of the swamp, it will lay its eggs. The snail lays about twenty-five clustered, pearly white eggs on plant stems just above the water's surface (in the fall). Approximately three to four weeks later, the eggs hatch and the baby snails crawl down the plant into the water. Water levels play an important role in snail survival. If the water levels rise above normal, the covered eggs will drown. Human interference with the natural South Florida water systems has created situations where water was released into the park too fast, causing damage to the snail eggs and the wildlife that depends on them.



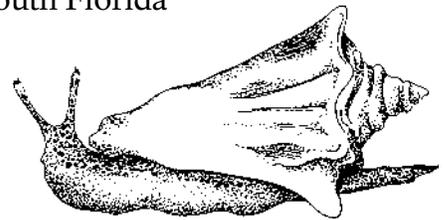
Colorful **Liguus tree snails** live in the tropical hardwood hammocks of the Everglades. There are over fifty different color variations. The Liguus tree snail is a tree-dwelling species, feeding on minute lichens, algae, and fungi that grow on the bark and leaves of trees.

Tree snails, like their favorite host, the lysiloma tree, are tropical species. Originally from Cuba, these snails arrived in South Florida thousands of years ago on floating logs and were blown ashore during hurricanes. They were once found on tree islands from Key West to Fort Lauderdale. In September, the snail crawls to the base of the tree and twists itself into the ground where it lays ten to thirty eggs. After covering the eggs with soil, the adult snail crawls up the tree to find a sheltered spot for winter. The snail emits a substance, that like glue, seals its shell to the tree's bark.



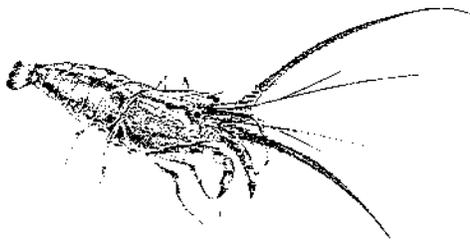
Through this process of estivation, the snail conserves moisture during the dry winter months. With the first spring rain, the adult snail comes out of estivation. This is also when the eggs hatch and the young climb up the tree. All summer, the moist hammock provides the perfect growing habitat for the snails. As they eat, they grow, adding to the size of their shell. Under good conditions, Liguus tree snails live to the ripe old age of eight years. Raccoons and crows are their natural predators. Animals like the armadillo, dig up and eat the snail's eggs. Tree snails have other problems, too, including loss of habitat and spraying for mosquitoes. The mosquito spray falls on the tree trunk, and the snail eats the spray as it crawls along. It may eventually die from the effects of the spray. The snail shells are also highly prized by collectors. (Tree snail collecting is now prohibited in South Florida.) Several color forms that were once found in Florida are now extinct. Florida tree snails are listed by the state as a "Species of Special Concern" because of their restricted range and their vulnerability to exploitation or environmental changes.

The **conch**, pronounced "konk," is a marine snail that makes a large, thick shell, prized as a souvenir by South Florida tourists. Two of the conchs found in South Florida seas are the **Queen conch** and the **Hawk wing conch**. Conchs move using their foot, upon which a claw-like structure (the operculum) is located. Primarily plant eaters, conchs feed on algae and edible debris in grass beds and reef areas. Loggerhead turtles are known to crush adult Queen conchs, but by far the most common predators are people. The meat of the conch makes tasty salads, fritters and chowders. Florida's conchs are protected, and the conch meat sold here is mostly from other countries, like Jamaica.



Lobsters, Shrimp, Crabs, Spiders, and Insects

Lobsters, shrimp, crabs, spiders, and insects, are in a group of invertebrates called arthropods because they have jointed legs and a hard outer skeleton. The Arthropods are further divided into three groups - crustaceans (which includes lobsters, shrimp, and crabs), arachnids (which includes spiders and scorpions), and insects (which includes mosquitoes, butterflies, wasps, and ants). Some of the more obvious of these creatures are discussed below.



Crustaceans

Lobsters, shrimp, and crabs are an important commercial fishery in South Florida. The highly valued **Florida spiny lobster** is established off South Florida's southeast coast by larvae that arrive from the ocean, floating on the currents of the Gulf Stream from islands in the Caribbean. The lobsters hide under rocks and ledges during the day, and come out to

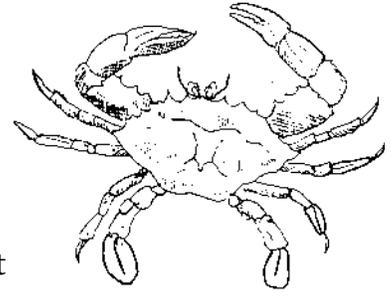
find food at night - usually mollusks, worms, or dead animals. At about five years old, lobsters are 8-10 inches long and breed for the first time. Overfishing of the population has drastically reduced the spiny lobster population and there are strict limits on the harvesting of lobster in South Florida (it is protected within Biscayne, Everglades, and Dry Tortugas National Parks).

Pink shrimp are harvested near the Dry Tortugas (outside of the park) where the adults lay their eggs. During the spring and summer the tiny shrimp emerge and float with the currents to Florida Bay, where the

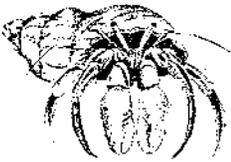


mangroves and less salty water provide a nursery with food and shelter. The shrimp grow throughout the summer, maturing into adults. In the fall and winter they return to the warmer waters of the Dry Tortugas to continue the cycle.

True crabs resemble folded up lobsters. Their abdomens are folded tightly beneath their bodies, and they have four pairs of walking legs and two legs with claws. The **blue crab** has paddles on the end of its last legs, which helps it to swim. Like shrimp and lobster, the blue crab is a commercially important species. They live in estuaries like Florida Bay. The fiddler crab is another frequently seen crab. Male fiddler crabs have one greatly enlarged claw. They burrow in sand and mud beaches and coming out of their burrows at low tide to feed on detritus.



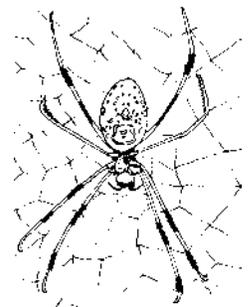
Horseshoe crabs and **hermit crabs** are not true crabs. Although they are arthropods, the horseshoe crab is more closely related to scorpions. Often seen washed up on beaches at low tide, the horseshoe crab uses its long tail as a rudder while plowing through the sand and muck looking for burrowing mollusks and worms. A hermit crab's abdomen is not tucked under it like a true crab. To protect its soft body, the hermit crab lives in empty snail shells. As the hermit crab grows it must find and move into larger shells.



Arachnids

Spiders are fascinating creatures that are distinguished from insects by having eight legs instead of six. All true spiders produce silk, but they vary in how they use it- building a web, making egg cases, producing a climbing rope, or for ballooning to float long distances in the wind. All spiders kill their prey by injecting venom. (They then use juices from their digestive glands to liquefy the insides of their prey before sucking it into their mouths.) Spiders dine mostly on insects. Fear of spiders is unnecessary. None eat humans, and biting a human is a desperate line of defense as it wastes venom. Two North American spider species, the brown recluse and the black widow, are considered poisonous to humans but are rarely seen. Much more common are the non-poisonous **argiope**, **thorn**, **orchard** and **wolf spiders** to name just a few.

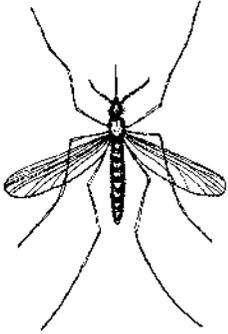
The **golden orb weaver** is a beautiful yellow, white, and black spider that spins its golden web into intricate patterns in the hammocks of the Everglades. The fine web traps unsuspecting flying insects. Once trapped in the web, the struggling victim is wrapped in silk. The spider may wait for the struggling victim to die before it begins feasting on its body fluids. Golden orb weavers clean their webs daily to free them of leaves and small twigs. If not cleared of debris, the web would be easily seen, thus alerting potential victims of the danger that lies in wait.



Insects

There are hundreds of insects and other small creatures in the four South Florida parks; too many, in fact, to discuss here. They range in size from the giant diving beetle to tiny ants. Their varied adaptations are true wonders of nature. Butterflies are among this group of wonders.

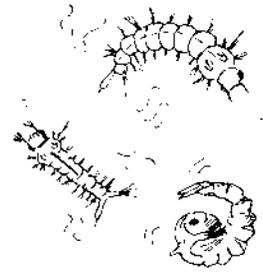
Everglades/South Florida national parks have over fifty species of butterflies, several of which are tropical species. The **atala butterfly** is an extremely rare species, found in the park's pinelands. We have selected a few of the area's most visible insect inhabitants to describe.



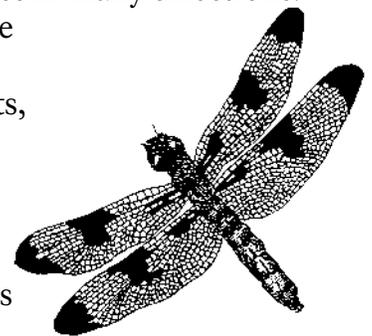
Mosquitoes are not considered to be friends to people, but in fact, they truly are, especially in the Everglades. They are an important part of the food chain in the mangrove estuary. Only the female mosquito bites. After sucking blood from a host, she uses the blood to produce approximately 150 eggs. These eggs are deposited in the water or on a damp place. Soon fish and other aquatic dwellers feed on the larvae, or “wrigglers” as they are called. In turn, larger fish like bream may eat these fish. Bass then eat the bream, gar fish eat the bass, and the alligator eats the gar fish. The alligator digs water holes, where adult mosquitos lay their eggs, thus creating an Everglades food chain. If you visit the park in the buggy summer months, you can make a blood donation to the park's food chain!

Here are a few mosquito facts:

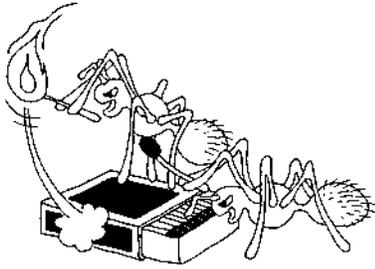
- There are 68 species of mosquitoes in Florida and 1,500 worldwide.
- An anti-coagulant left by the mosquito after she bites you causes the itch from a mosquito bite. This substance stays under the skin for a few hours until the body absorbs it.
- Mosquitoes bite to get the protein found in blood to use in the formation of their eggs.
- Human blood is not always the best; reptiles, other mammals, and birds' blood provide higher concentrations of the needed amino acids.
- A square foot of shallow water under the right conditions can produce 100,000 mosquitoes.
- Male mosquitoes feed on flowers and fruits, extracting the sugar from them while at the same time pollinating them.
- Most are more active in the early morning hours or at dusk, but anytime will do if a feeding opportunity is near.



Dragonflies are curious-looking insects that can be seen flying throughout the wetland areas of Florida. They have large, bulging eyes on a head that rotates at angles in many directions. Net-like veined wings are in sets of four and are horizontal most of the time. Body color may range from blue, brown, and a combination of green and black. The dragonfly is a predator that feeds on other insects, especially mosquitoes. The mosquito hawk is another name for this flying wonder that has an adult life span of six months. They gather food while in flight, using their basket-like legs for capturing prey, often eating their catch while in flight. Females deposit their eggs in the water on aquatic plants. Once the egg hatches, the nymph searches its watery home for food. It has a large appetite and, depending on its stage of development, it may feed on larvae, protozoan, or small fish. The nymph breathes by extracting oxygen from the water through a gill located in the intestine. After a period ranging from three months to five years, depending on the species, the nymph completes its life cycle by crawling out of the water. Once out of the water, it slowly dries its newly developed wings and legs. It is during this drying period that the dragonfly is most vulnerable to predators.

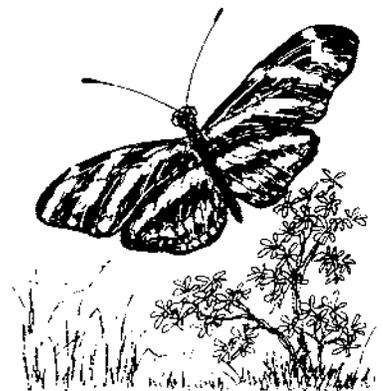


There is no mistaking the two-inch-long **lubber grasshopper**. The adults are yellowish with black markings, and they have a red cast to their wings. Even though they have wings, they cannot fly. Sharp spikes on their hind legs offer protection from possible predators. Eighty or more eggs can be laid in the ground anytime from June to August. The eggs hatch in 90 to 120 days. The young are black with red or yellow lines. After hatching, the young can be seen traveling like a small army across Florida roadways. Both the young and the adults feed on a variety of plants. Adults have been seen eating other already dead lubbers. Their life may span up to one year.



Fire ants are believed to be an exotic species in South Florida, but are now common throughout the mainland. The sandy mounds can be from six inches to three feet across, and up to two feet high. Each mound supports a dense colony of small ants, bright red to dark brown in color. These ants have a potent sting so use **CAUTION** near their nest mounds.

Wasps have a stinger at the end of their abdomen that is connected to a poison gland. These insects normally do not sting unless disturbed. One of the more common wasp nests seen in the area, is the dried mud tube of the **mud dauber wasp**. Usually found on sheltered surfaces like porch walls where they are protected from the rain, the female builds several mud tubes side by side which contain the egg or larva. Female mud daubers prey ferociously on spiders, packing them into the larval cell, to provide food for the developing mud dauber. Mud daubers are most active from April through October.



Exotic Species

“Exotics” are plants and animals that have been introduced to South Florida by humans. Since they have not evolved in association with the other plants and animals living here, many exotic species have detrimental effects to the native flora and fauna.

Certain plants and animals are native to the Florida peninsula. These plants and animals either walked here, were blown here by the wind, washed up on the sand, or, as with seeds, were flown here in the bellies of birds. Such residents of an area are called native species. Each has its own job (niche) in the habitat.

Plants or animals that live hundreds or perhaps thousands of miles away from Florida have evolved with features often very different from the native species of Florida. When humans bring these non-natives (exotics) to Florida and release them, often the results are disastrous for the native Florida creatures. Away from their original habitats, these exotic species lack natural controls, such as disease and predation, that help keep the balance between species. In the Everglades, there is a serious problem with many invasive exotic species. They are crowding out many of the natives.

Perhaps the most harmful exotic species in the Everglades is a tree that was brought here from Australia. It is called the **Australian paperbark tree, punk tree, or Melaleuca**. If planted in someone’s backyard, the seeds will quickly blow to wild areas. There, dense areas of Melaleuca trees quickly shade out



melaleuca

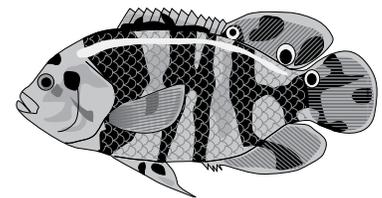


Brazilian pepper

other plants and dry out the soil. Melaleuca forests use four to five times more water than a sawgrass prairie, and these forests can be so thick that many animals can no longer walk through or live in that area. Another plant, **latherleaf or Colubrina asiatica**, is a high climbing, woody vine that blankets forests and kills the trees. It already has done serious damage to the buttonwood forests and tropical hammocks all across the south coast of Everglades National Park. Other plants causing similar problems include the **Brazilian pepper, Australian pine, and Old World climbing fern**. National Park staff are

experimenting with procedures for removing these invasive species from our wild areas, but some methods are very costly or impractical because of the remote locations of these plants. By using native species in our landscaping, we can help to reduce the spread of exotic plants.

Exotic plants are not the only species causing problems. Animals not native to Florida are impacting our native fish, amphibians, reptiles, and mammals. Fish like **oscars, mayan cichlids, blue tilapia, and walking catfish** have escaped from fish farms or have been dumped into nearby canals from home aquariums. They quickly move into the Everglades, where they compete with native bass and bream for precious food and breeding space.



oscar

Several exotic species of reptiles and amphibians have been able to adapt to the Everglades environment. These exotics often compete for food, shelter, and territory with native animals. The exotic **Cuban tree frog**, which is slightly larger than the native tree frogs, not only competes for habitat but actually eats the smaller natives! Likewise, the Cuban brown anole is outcompeting our native green anole. Today, the wildlife of the Everglades faces a new threat—**Burmese pythons**. These large constrictors are capable of consuming many of the species we are trying so hard to protect and restore. Reaching lengths of up to twenty feet, it is believed that pythons were either released into the wild by, or escaped from, careless pet owners who could no longer keep their snakes. You can help protect the native lizards by not releasing exotic pets anywhere in South Florida. Remember, “Don’t Let it Loose!”

There are dozens of examples of non-native species that have been released into wild South Florida. Not all exotics are invasive and crowd out the natives, but many scientists believe that the ones that do may be one of the greatest threats to our natural areas. In almost all cases, exotic species cause increased difficulty for the native species to compete for the limited food, water, shelter, and space in South Florida habitats. When an exotic species is as invasive as the *Melaleuca* it can change the habitat to the point of causing extinction of some species. Each time a species becomes extinct, we lose another piece of the puzzle of life on earth. We lose our food supply, the source of a potential new medicine, or a source of beauty and enjoyment.

What can you do to help? Never release an unwanted pet into a wild area. Encourage your family to landscape your yard with native plants. Talk to your class about writing letters that will encourage your community to adopt laws banning exotic species in your area. If we all work together, there is hope to protect and keep a wide variety of plants and animals safe in their natural homes.



Endangered Species*

Endangered: A species, subspecies or isolated population that is, or soon may be, in immediate danger of extinction unless the species or its habitat is fully protected and managed for its survival.

Threatened: A species, subspecies or isolated population that is very likely to become endangered in the near future unless the species or its habitat is fully protected and managed for its survival.

*This text and list of endangered and threatened species is taken from: "Threatened & Endangered Species of South Florida's National Parks" brochure produced 3/97 by the Florida National Parks & Monuments Association in cooperation with the National Park Service. Revised by: Oron L. Bass, Jr., and William B. Robertson, Jr. (February, 1995). Introduction written by Shirley Beccue and revised (March 95) by Suzanne White.

"Threatened," "endangered," and "extinct" are words that have become all too common in our 20th century vocabulary. Today, with our desire for land and raw materials, our continued pollution, and our indiscriminate hunting, plants and animals that have evolved over millions of years are going extinct in a single human lifetime.

Perhaps nowhere is our impact on other species more evident than in South Florida: drainage of wetlands, alteration of overland water flow and uncontrolled hunting have all contributed to species decline. The Everglades, once known for its abundant bird life, has seen its wading bird population decline drastically since the turn of the century. The Florida panther, once common throughout the state, is on the verge of extinction. In fact, within the boundaries of Everglades National Park, Biscayne National Park, Big Cypress National Preserve, and Dry Tortugas National Park, there are 14 endangered and 9 threatened plant and animal species. The mere physical boundaries of a national park, though, do not guarantee species survival.

Maintaining harmony between "20th century progress" and wilderness areas required research, legislation, and public awareness. For the last decade, the South Florida Natural Resources Center in Everglades National Park has been studying how changes occurring outside the parks influence the fragile areas within their boundaries. Research going on today may lead to a brighter future for many species. Legislation such as the Endangered Species Act of 1973 has also afforded some measure of protection of wildlife. The Act provides for the classification of wildlife species as "endangered" or "threatened," and mandates legal protection for species so listed. In justification for such protection, the Act recognizes that various species of plants and animals have aesthetic, educational, historic and scientific value.

Public support is vital for species preservation. You can help by:

1. Becoming informed about threatened and endangered species in your state.
2. Not purchasing products that you suspect are made from endangered or threatened species of plants or animals.
3. Reporting people who are known dealers in endangered or threatened plants and wildlife.
4. Supporting conservation legislation.

Today, it is not enough merely to appreciate nature; we must work actively to protect it. What we do today toward that goal will be the legacy we leave our children and their children. The extinction of a species is final... Whether our children's children will see plants and animals we cherish today is largely up to us.

Endangered Species**

Insects

Schaus Swallowtail Butterfly

Park

Biscayne National Park
Everglades National Park

Status

Breeding
Casual ?

Reptiles

American Crocodile

Everglades National Park
Biscayne National Park

Breeding
Casual

Hawksbill Turtle

Biscayne National Park
Dry Tortugas National Park
Everglades National Park

Resident
Resident
Casual

Green Turtle

Dry Tortugas National Park
Everglades National Park
Biscayne National Park

Breeding
Casual
Casual

Atlantic Ridley Turtle

Everglades National Park
Dry Tortugas National Park

Casual
Casual

Leatherback Turtle

Biscayne National Park
Everglades National Park
Dry Tortugas National Park

Breeding
Casual ?
Casual?

Birds

Wood Stork

Everglades National Park
Big Cypress National Preserve
Biscayne National Park

Breeding
Breeding
Casual

Snail Kite

Everglades National Park
Big Cypress National Preserve

Breeding
Casual

Red-Cockaded Woodpecker

Big Cypress National Preserve
Everglades National Park

Breeding
Formerly

Cape Sable Seaside Sparrow

Everglades National Park
Big Cypress National Preserve

Breeding
Breeding

Mammals

Key Largo Cotton Mouse

Everglades National Park

Casual ?

Key Largo Wood Rat

Everglades National Park

Casual ?

West Indian Manatee

Everglades National Park
Biscayne National Park
Big Cypress National Preserve
Dry Tortugas National Park

Breeding
Resident
Casual
Reported

Florida Panther	Everglades National Park	Breeding
	Big Cypress National Preserve	Breeding

Threatened Species**

Plants

Garber's Spurge	Everglades National Park	Resident
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Invertebrates

Stock Island Tree Snail	Everglades National Park	
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Reptiles

American Alligator	Everglades National Park	Breeding
	Big Cypress National Preserve	Breeding
	Biscayne National Park	Casual

Eastern Indigo Snake	Everglades National Park	Breeding
	Big Cypress National Preserve	Breeding
	Biscayne National Park	Casual

Loggerhead Turtle	Everglades National Park	Breeding
	Biscayne National Park	Breeding
	Dry Tortugas National Park	Breeding

Birds

Southern Bald Eagle	Everglades National Park	Breeding
	Big Cypress National Preserve	Breeding
	Biscayne National Park	Breeding

Arctic Peregrine Falcon	Everglades National Park	Wintering
	Biscayne National Park	Wintering
	Dry Tortugas National Park	Migrant
	Big Cypress National Preserve	Migrant

Piping Plover	Everglades National Park	Wintering
	Dry Tortugas National Park	Migrant

Roseate Tern	Dry Tortugas National Park	Breeding
	Everglades National Park	Wintering

** These are federally listed endangered and threatened species. This list may vary from the state list of endangered and threatened species. A species status may change. For updates call the Florida Game & Freshwater Fish Commission.