

**Note to teachers:**

This presentation was designed to address Sunshine State standards for 4<sup>th</sup> and 5<sup>th</sup> graders and to teach South Florida school children about Everglades ecology. The presentation may be useful to students and teachers outside of South Florida as a case study of an ecosystem and the factors that drive the ecosystem. The program is best enjoyed in a quiet, dark atmosphere on a screen projection. From start to finish the program takes about 40 minutes (this can be adjusted by teacher to a shorter program) if you read all of the information for each of the slides. Please follow the helpful hints in gold throughout this accompanying script. Slide numbers are noted in bold red and follow along with each of the slides in the slideshow. If you have comments or feedback that might be helpful concerning this presentation please go back to the homepage and in the lower left corner of the main page you will see a text box to enter you comments and critique. Thank you for your interest!

Start with a blank screen to calm the students and prepare them for the “Foreverglades” slideshow.

**Slide 1**

The opener – Tell the students who you are working for and represent. Then ask them what do the automatically think of when the word Everglades is heard? What is the first thing that pops into their mind? All those are great ideas now let’s see what some other people might think of when they hear the word Everglades.

**Slide 2**

Mosquitoes. Maybe go into a sentence about mosquitoes they are numerous but not always or certain areas of the park.

**Slide 3**

Mangroves forest – mangrove trees are found in brackish/salt water areas. Over half of Everglades National park is a saltwater habitat. These trees are found in Florida bay and 10,000 island area. There are many different habitats in Everglades National Park. You may want to visit our virtual hydroscape tour at the homepage to find out more about the plants and animals that are characteristic of each of the different communities in Everglades National Park.

**Slide 4**

As the fresh water makes it way down through the park it eventually drains into rivers and the fresh water rivers drain into the Gulf of Mexico and Florida bay. As this happens the fresh and salt water mixes and mangroves like to line these rivers. But notice on the top right pictures the mangroves line the river and then sawgrass is the dominant plant. The bottom right picture shows a sawgrass slough habitat. Have you ever heard the Everglades referred to as the River of Grass?

### **Slide 5**

Alligator. Ah yes one of the big creatures many people tend to think of when the think of the Everglades. People can see a lot of alligators in the fresh water habitat of the park. The panther on the other hand is very hard to see. If you were to spend some time at the park and wanted to see a panther what habitat would be the best to spend time in? Where do panthers prefer to live?

### **Slide 6**

Pineland forest habitat. Ah yes this is the preferred place for the panthers and the small mammals on which they dine. This habitat is the highest and driest in the Park with the exception of a few tree islands. This is one reason the panther enjoy the habitat and why the slash pine trees are found there.

### **Slide 7**

Tree Islands are another habitat in the park. These islands are found in the middle of the freshwater slough (Eleocharis Toothbrush Sedge and Cladium jamaicense or Sawgrass sloughs). They have enormous hardwood trees growing on them and serve as a place for animals to live or take a rest on, even humans live on these islands years ago. Tree islands are a shady oasis from the sun or a moist globe of air in the dry season.

### **Slide 8**

Birds – Great blue heron, snowy egret, green backed heron. People all over the world come to the Everglades during the dry season, winter to see the beautiful birds. And Everglades is an important home to them.

### **Slide 9**

Cypress slough and domes are another habitat found in the Everglades and a great place to explore and go hiking. Inside the dome the atmosphere is magical and bursting with life. Look at all the air plants growing on the cypress trees. Now what do you think is the most important thing in the Everglades? There is no right or wrong answer. It is just what you think.

### **Slide 10**

The water interaction diagram – Ah yes we get our water ultimately from the same source that fills our Bays and oceans. RAIN! 50-60 inches of rain per year. Is that over your head? So the rain comes and helps out the plants. Insects then feed on the nectar of the plants to get energy. Then small animals eat the insects and finally larger animals eat the smaller animals. Water helps all to occur. What do you think would happen if the Everglades did not receive 50-60 inches per year?

### **Slide 11**

Rain drop, animals, plants, human – Ah yes this is another picture showing you who uses the water. It is not just the plants (flowers and trees) but it is the animals (birds and alligators) and then there is us the humans. We use water.

### **Slide 12**

Who needs water and what do they use it for in South Florida? Now let me focus you all a little. Now what do fishermen need water for? They are living down here in Florida and need to make money but just what do they need water for? The students of course will say for the fish, some will even say to put their fish in after they catch them I and in Ice to chill the fish. You may need to help them by asking about creatures with claws and those things you eat with red sauce.

Wildlife of the Everglades – the plants and animals that live in the Everglades what are they going to need water for – drink, move in, live in

Farmer and Ranchers what will they need water for. Farmers crops and ranchers animals (drinking washing, etc) Ask them is there a lot of farming and ranching in Florida. Many times they will say no. Just have them wait until the satellite and point out the farming and ranching.

Residents and visitors of south Florida – what do we use water for? Many times they are good with this one. Washing clothes, cars, showering, bathing cooking, cleaning but what about having fun? How do you use water to have fun? Have you ever been in a swimming pool or seen a fountain? Are there a lot of golf courses in South Florida? Are they green? Do you think they use water to keep them green?

Right before clicking to the next slide ask them “where do you think you all get your water from?” and “Before it comes out of the faucet where does the water come from?”

### **Slide 13**

Miami and the aquifer – Ah yes here is Miami and the water tower, now follow the arrows backwards. We drill a hole in the ground called a well to pump out the water from an underground storage area called an aquifer. Now what type of rock is found in South Florida? Limestone, yes limestone has many holes in it. Have you ever look at a sponge and seen all the little holes in a sponge? Well the Limestone rock here in South Florida looks like a huge sponge. So water collects in this sponge and creates an underground water storage area called an aquifer. But we are pumping the water form the aquifer right? Yep so how is it refilling? Keep following the arrows backwards. Ah wherever there is standing water like a lake some of the water will seep, go into the ground and eventually the aquifer refilling it. Now is there a lot of water in the Everglades? YES and the Everglades is where most of the water the refills the aquifer comes from.

### **Slide 14**

Ah what is this picture of? Anyone good at geography? It is a picture taken from a satellite in space. Ah yes south Florida. Point out Lake Okeechobee, Tamiami trail, Everglades National park, The school location, sawgrass slough, shark valley, etc. Trace the water path south from Lake Okeechobee through Everglades National Park and ask the students what makes the water flow this way..... GRAVITY

### **Slide 15**

Another satellite picture – Focusing of Florida Bay. Here stress again the fresh water flow into Florida Bay and the Gulf of Mexico. Point out Shark valley and ENP again

### **Slide 16**

Satellite picture and land map diagram side by side. Point out and explain each area briefly.

### **Slide 17**

Water flow diagram – Ah here is another way to look at how water flows in South Florida. When Lake Okeechobee fills up in the wet season it overflows. IT is just like a glass when full it overflows. Lake Okeechobee overflows into the Everglades, then the everglades flows into the Gulf of Mexico. As the water travels down some will go back into the sky and some will go into the ground (the aquifer)

### **Slide 18**

Question slide. Ask the students to read it and ask for thumbs up, down or sideways if they are not for sure or think it may be questionable.

### **Slide 19**

Newspaper articles – These are from 1987 and 1988 before you all were born. You can see people have been saying the Everglades are in trouble for sometime. It started in the 1960's and still is happening today. If you read the local newspaper, there are current articles dealing with the topic of whether Everglades is healthy or not.

### **Slide 20**

The quality, quantity, timing and distribution slide. Have you ever talked about everglades and water using these four words? This is what we will be doing now.

### **Slide 21**

Distribution slide – first explain the word distribution. Ask them if they have ever passed out papers or anything. Well you could also say you have distributed the papers.

How is the water being distributed? Read and take answers.

Is the water being distributed the same manner it was 100 years ago? Read and take answers from the students...

### **Slide 22**

Dredge slide – A little Florida history. Back in the 1870's and 1880's they were advertising south Florida land for sale in newspapers up north, in New York, Pennsylvania, New Jersey. The land was described as being the most productive land in the world. These farmers were having a tough time making a living. They were farming ten acres doing a lot of hard work and barely making enough to survive. So When they heard that one acre of South Florida land could produce as much as ten acres of the land they were farming now they wanted to come down to Florida. They could do the same amount of work and be rich or less work and still live comfortably. So a lot of them bought land and when they got here they were unhappy. The land they bough to farm was underwater. Can you grow crops on land that is flooded? No so these farmers were angry and talk to their state legislators. So it was decided then the state needed to drain the land. So they started to build canals. This is a picture from 1912 of a dredge making a canal. The dredge would dig the limestone out and make this man made river.

### Slide 23

Canal Maps – Notice the canals are represented by Blue lines. And the people knew that Lake Okeechobee was the problem so they needed to drain it. Just look at how many canals are present today. Today there are over 1000 miles of canals. They do a good job of what they were designed and made for, to keep south Florida dry. If it was not for these canals a lot of our houses would be flooded. Now they do such a good job that they move a lot of water. Do you want to know how much water they move? On an average day those canals will flush out or send out 1.8 billion gallons of water to the Gulf of Mexico or Atlantic Ocean. 1.8 billion gallons per day used to flow out of Lake Okeechobee into the Everglades and then to Florida Bay or the Gulf of Mexico. Some went back into the sky by way of evaporation and some seeped into the ground during its journey.

### Slide 24

Gate Structure – Have you ever seen one of these before? These are called water control structures or gates. They function just like a door. When you do not want anybody to come in you close the door. And when you want somebody to enter you open the gates. When humans want water to flow into an area they put up the gates or open them. When they do not want water to enter they close the gates.

### Slide 25

Pump House – Humans can speed up the water flow or make it move in the opposite direction with this structure. A pump house. Some of these houses can pump 1000's of gallons per minute in either direction.

**\*\* Before clicking to the next slide ask the students if they think things have changed in South Florida over the last 100 years?**

### Slide 26

Land cover maps 1900 and 1995 – Let's look at the map from 1900 and see what South Florida was like. Point out the sawgrass sloughs, then point out the pine rocklands, and finally the pond apple forest under Lake Okeechobee. In this forest there were pond apple trees 15 feet wide at the base. Imagine how big those trees were. Do you see many trees today in South Florida that are 15 ft wide?

- Now look at the 1995 map. Look and see how much change occurred in only 95 years. There is less sawgrass. The pine rocklands are mostly gone. The pond apple forest totally gone and now agriculture crops grow there. But look at all that yellow. Yellow represents civilization, the roads, streets, malls, parking lots, houses. Look at how much yellow there is today. That is possible because of the canals. But do you think humans have influenced the natural environment that once was here in South Florida. Just look at the 1900 map do you see any yellow? **Point out Miami a little yellow speck, less than 5000 people in 1900 today the Miami area is 3.5 million people!!**

### Slide 27

C-111 canal with dike – This is a picture of a canal and next to it a dike/levee. A levee is a 10-15 foot high wall of limestone that does not allow water to pass. But notice

the holes in the wall. This was created to allow some water to pass through. For just behind that wall is Everglades National Park and Taylor Slough.

#### **Slide 28**

C-111 with dike removed – But the holes were not enough so the whole wall was removed

#### **Slide 29**

C-111 different view – Ah a better picture and here you can see how the water is flowing like a sheet into the Everglades. 100 years ago this sheet flow would have started at Lake Okeechobee but today we have to accept that it will start here at C-111 80 south of Lake Okeechobee.

#### **Slide 30**

Timing and Quantity – Define the word Quantity – Ask them What is the quantity of pencils you have in your desk? What type of answer will you give me? A number. Yes so Quantity deals with how much and the timing well I know you all know how to tell time. Are there different seasons and water levels in the Everglades? Ask to have them put up the number of fingers for the number of season there are in the Everglades. Then ask what those seasons are?

When should water be released? Should we release water during the dry season when it starts to disappear?

How much water should be released into the Everglades? Should we always keep it at the same depth, maybe knee high, waist high, shoulder high?

All these are questions that the people that manage water in South Florida ask themselves everyday.

#### **Slide 31**

Sawgrass slough in wet season – Here is a picture of the sawgrass slough during the wet season. Notice all the water that is around.

#### **Slide 32**

Sawgrass Slough in dry season – Here is a picture of the sawgrass slough during the dry season. Do you see any water in the picture? Look at that instrument in the middle. That is a water quality monitor. It measures what is in the water, Do you see any water for it to measure? No, IS this a good thing? What if I told you it was normal.

#### **Slide 33**

Sawgrass Slough in the dry season – Here is another picture of the Sawgrass in the dry season. Notice the little puddles of water. This dry down is important for some animals that live in the Everglades.

#### **Slide 34**

Wet and dry season diagrams – Here is a diagram showing how the water levels differ between the wet and the dry season. Look at how high the water level is during the wet

season. The rain is falling most every day and Lake Okeechobee over flows. Then during the dry season the rains stops for the most part. Lake Okeechobee does not overflow anymore and the water level of the Everglades goes down. The water starts to collect in holes. Some of these holes may be 4 foot deep. These 4 foot deep holes are made by a creature. Does any one know the name of the hole of creature that makes these holes?

#### **Slide 35**

Gator hole diagram and picture – Does this diagram help you out? Ah yes a gator hole. The gator uses its tail and snout to push away the dirt and limestone. This hole is very important for when the water level starts to drop the fish follow the water. Eventually some of the fish follow they water to these holes and they can survive the dry season.

#### **Slide 36**

Gator hole web diagram – Now the gator hole is a place with much activity there in the dry season. The water is there so many animals come to visit it. The fish of course live in the hole, the birds come to eat the fish, frogs, turtles, and snakes need moisture so they live around the hole. Plants tend to thrive around the gator hole. And the best thing of all the gator is rewarded for its work. Whenever the gator gets hunger it can go ahead and eat anything that is in the hole.

#### **Slide 37**

Tree islands in slough – Here is another habitat that is water level specific. These are tree islands or also known as tropical hardwood hammocks. These surface of these islands are above the water level even during the wet season in normal years. These islands are pretty cool places. They have the tropical hardwood tree growing on them like Gumbo Limbo, *Lysilloma*, and even palm trees

#### **Slide 38**

Palmy hammock - But the problem is if these islands are flooded or covered in water for a long period of time this tropical tree end up dying and the hammock plants are changed.

#### **Slide 39**

Collage of hammocks – These tree islands come in all shape and sizes. These pictures show you the can be as small as your front yard or as big and if not bigger than 10 football fields. But the water level is important.

#### **Slide 40**

Inside a hammock – Here is what a healthy hammock may look like. They are a cool place inside with gigantic tropical hardwood trees with vines growing up them and the floors of the islands are sometimes covered with ferns and wild coffee. And another special creature lives on these hammocks. It is called the tree snail or Liguus snail. You will have an opportunity to see the beautiful snail shells later. But people used to live on these islands the Calusa and Miccosukee. Plus animals like panthers, deer, raccoons,



bears they liked to take breaks on these islands as they travel through the sawgrass slough.

#### **Slide 41**

Woodstork Slide – Does anyone know the name of this bird? IT is called a Woodstork and it is an endangered bird. This is one of the neatest birds around. It has a lot of adaptations to help it live in the Everglades. **BRING OUT THE WOODSTORK SKULL or draw one on paper or the chalkboard** – Now this bird has hairs on its beak! What a bird with hairs on its beak why would a bird need hairs on its beak? They serve as feelers just like a cat has whiskers to feel things. The bird also has pink feet! Pink feet what would the bird need pink feet for? **NOW DEMONSTRATE WHILE TALKING.** So the bird puts its beak in the water. IT is a touch feeder so it needs to put the beak where the food is at. So the bird wants to attract fish so it stirs up the mud a little (The woodstork shuffle) then the bird may keep one of its feet up off the mud and wiggle a toe. The fish may think the toe is a worm. The water is all mucky and the pink toe sure looks like a worm so in it goes after the worm. Pow the fish hits the worm but it turns out to be a toe so it swims back out. All the time taking a chance of hitting the sensitive hairy beak. The wood stork also raises its wing. This makes shade in the water. So the fish swim to the shade. The wood stork moves its beak towards the shade in the hopes to touch a fish. And when the fish do sense a fish SNAP the beak shuts. This bird has a super fast reflex Lets try something out here. EVERYBODY stare at me, do not blink, we having a little staring contest. Now BLINK, ok the wood stork can shut its beak faster than you can blink. The bird has the fastest reflex of all vertebrate animals, animals with backbones. These are some of the wood storks adaptations to survive

But the wood stork when it has young needs 3.5 pounds a fish per day. Easy right, well these fish are the size of McDonald's French fries. Imagine 3.5 pounds of McDonald's fries in front of you. That is 6 super sized orders of fries. Now I am going to give you two cases and tell me which one you would prefer. The first case is I am going to take those 3.5 lbs of fries and spread them all over your school yard. Then all day long you are going to have to feel for those fish with your beaks and when you touch one snap it up. The second case is I will spread 3.5 lbs of fries in this classroom and again you have all day to feel for the fries and pick them up. Which of those would you like 1 or 2. Yes 2 for it would be a lot easier. Now that is like the Everglades in the Dry and wet season. The wet season the fish are all over the Everglades just like the school yard. Tough for the wood stork to catch. But in the dry season the fish are concentrated or collected in puddles and gator hole, your classroom, very easy to find and pick up. One stop shopping so to say. What if the wood stork does not get the 3.5 lbs of fish? Well the babies will end up starving and dying if it goes on for a long time. So the population or number of woodstorks stay the same or decrease in number. We saw this in the past and it is one of the reasons the woodstork are endangered today because humans let too much water in the Everglades during the dry season.

#### **Slide 42**

Tree Snail and eggs – Does anyone know the name of this snail? In the next slide, you'll meet the apple snail. The eggs you see here are apple snail eggs. Okay these snails live in the sawgrass slough habitat and in cypress domes and sloughs. They lay their eggs



above the water line. What do you think will happen to the eggs if the water level rises and floods the eggs? The eggs will not hatch, correct. So what, who cares if the apple snails do not hatch and the numbers of apple snails are low. Bass may eat them, baby alligators, birds like the limpkin. But they can eat other things too. CLICK

#### **Slide 43**

Snail kite – Does anybody know the name of this bird? The Snail Kite, another endangered bird. Now this bird loves apple snail. 98% of its diet/food are apple snails. The beak of the snail kite is adapted to eat apple snails. It has a sharply hooked beak that makes reaching into the shell and scooping out the snail an ease. Now just imagine your favorite food. Let's say it is Pizza, imagine eating pizza for 33 days straight, morning, noon, and night, breakfast lunch and dinner. Then on the 34 day for breakfast you can have oatmeal then after that back to pizza for 33 days and then on the 34<sup>th</sup> day oatmeal for breakfast. Now imagine you eat like this for 40 -50 years. Then when you are 54 years old pizza becomes extinct or there is a shortage, what will happen to you? Yes you are going to have problems maybe even die for your body is so used to pizza it might not be able to digest anything else.

#### **Slide 44**

Quality – What does the word Quality mean? Have you ever been asked to do quality work? What type of work did you do then? Good work right. So when we talk about water quality we like to ask

How good is the water?

How pure is the water?

How clean is the water?

Or what I really like to say what is in the water?

This is a major area of focus in the Florida Coastal Everglades Long Term Ecological Research program.

But why would what is in the water be so important? What could be in it that could help or hurt the plants and animals. POLLUTION

#### **Slide 45**

What do you need to grow? **Help the students out if needed i.e. protein, vitamins.**

Nutritious food: notice the root word of nutrients and nutritious are the same. We eat nutritious food for the nutrients. And our bodies need water

What do the plants and microscopic organisms of the everglades need to grow? Help them out

They also need nutrients and water. How many people have plants or a garden? What do you give the plants? Water, do you put anything in the water at times? Miracle grow, fertilizer, well these are the nutrients the plants need. You do not see a plant eating an apple but the apple tree takes the nutrients from the soil and stores them in the apple.

#### **Slide 46**

But there is a catch

The plants and algae of the Everglades need very little nutrients

Have you ever heard of the saying too much of a good thing can be bad?

Well too many nutrients in the Everglades can be bad. If there are a lot of nutrients in the Everglades the normal plants like sawgrass are bullied out by cattails. These cattails grow really close together making it tough for fish to swim through and the birds to catch the fish. So not only do the plants change but the whole way animals survive and interact when too many nutrients are in Everglades water.

#### **Slide 47**

Two of the major nutrients are Nitrogen and Phosphorus

Scientists in the Florida Coastal Everglades Long Term Ecological Research program look at these two minerals and how they cycle in the Everglades.

#### **Slide 48**

Nitrogen cycle – So have you all studied the Water cycle. You know that water continually cycles. Well nutrients are just like water that they continue in a circle. But humans sometimes disrupt the nature cycle by adding more to it.

#### **Slide 49**

Agriculture – farmers (and you) want crops to grow and produce. So to help out the plants they give the plants fertilizers, nutrients. Now look at the water that is coming out of the pipe. Does that look like good water? No but this is water being pumped from a sugar cane field. Everglades water usually has a level of 7 ppm for Phosphorus. Sometime the water that comes out of sugarcane fields has a level of 200!!! Now that water from the fields goes into canals and eventually some of the nutrient rich water will make it way to the Everglades and help the Cattails to grow faster than normal and can replace the sawgrass and change the ecology.

#### **Slide 50**

Satellite photo [click to this when you talk about the nutrient rich farmland water flowing to the Everglades.](#)

#### **Slide 51**

Hydroscape map showing Long Term Ecological Research water monitoring stations. Those dots are study sites in the Florida Coastal Everglades where a permanent water monitoring station is located. Let's take a look at some of those dots.

#### **Slide 52**

Taylor Slough

#### **Slide 53**

Shark river slough

#### **Slide 54**

Mangrove river

#### **Slide 55**

Mangrove river

**Slide 56**

Start the conclusion – Now if we watch the Quality, quantity, timing and distribution of water in South Florida and humans get it correct, scenes like these will continue for you, your children and their children. The sawgrass slough

**Slide 57**

Pinelands will be healthy and the Florida panther can roam its preferred habitat

**Slide 58**

The cypress sloughs will stay wet enough but not too wet and serve as a great place for people to explore

**Slide 59**

As people are out there exploring they will be able to slow down and appreciate nature more the Water quality will stay normal and allow the lily pads to grow and flower.

**Slide 60**

And as you are near a marine area the brown pelicans will be fishing and making their spectacular bomb dives to catch a fish

**Slide 61**

The Alligator will stay healthy for there are enough fish around to eat or feed the animals the alligators may eventually eat. And if you are lucky enough you may even get to see a baby alligator perched on top of mom's head.

Wrap up with a good review/conclusion then to hands-on activities.