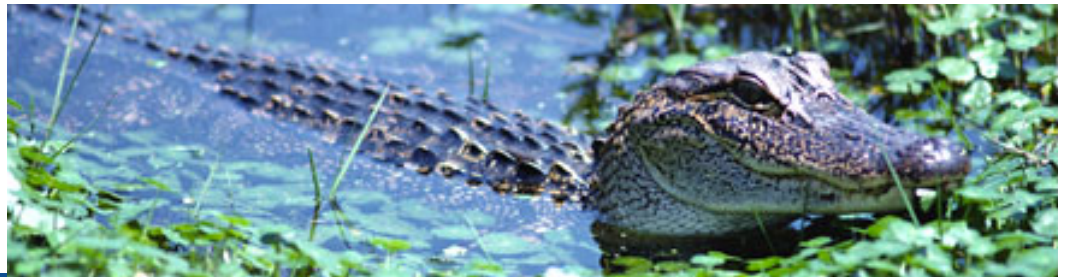




DEERING ESTATE



SHARK  
RESEARCH &  
CONSERVATION  
PROGRAM



## Marine Conservation Science & Policy: The Everglades

### Grade Level:

4<sup>th</sup> – 12<sup>th</sup>

### Subject Area

Science

Biology

### Duration

1.5 Hrs

### Benchmarks:

#### Body of Knowledge

Life Science

Nature of Science

Physical Science

#### Big Idea

Organization and Development of Living Organisms.

The Practice of Science

#### Standards

##### SC.K.N.1.2

Make observations of the natural world using the five senses

##### SC.2.L.17.2

Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.

##### SC.4.L.17.4

Recognize ways plant and animals, including humans, can impact the environment.

##### SC.912.L.17.12

Discuss the political, social, and environmental consequences of sustainable use of land.

### Focus Question

What is the Everglades? What animals live in the Everglades and where do they live? Why is this ecosystem important and how can we better protect it?

### Objectives

Students will be introduced to the various habitats that make up the greater Everglades ecosystem and explore the significance of this ecosystem. Students will learn to

- Identify three main features of the Everglades.
- Identify animals that live in the Everglades habitats and the resources they depend on.
- Demonstrate their knowledge and analyze the significance of the Everglades by writing an original poem.

This will be a project-based activity where students will explore the various Everglades habitats and analyze the importance of this ecosystem.

### Background

The **Everglades** is a hundred-mile long ecosystem comprised of freshwater and coastal prairie, mangroves, marshland, pine forests and cypress swamps, and the waters and barrier islands of Florida Bay. This ecosystem, famously dubbed the “river of grass” by Marjory Stoneman Douglas, has been preserved as a national park since 1947, protecting 1.5 million acres of unparalleled biodiversity. Since its formation roughly 21,000 years ago, this complex system has been continuously in flux, particularly subject to three forces: water, rock and fire.

Water may be considered the most dominant force in the Everglades, abounding throughout the system in springs, rivers, and estuaries, allowing plants to take root, eating away the limestone to form sinkholes, and constantly trickling new nutrients downstream. The area remains especially moist even during the dry season due to the underlying limestone, porous calcium carbonite or oolite that absorbs vast amounts of water. Only a veneer of peat or marl soil covers this limestone, making the area unsuitable for industrial agriculture but providing perfect conditions for vast prairies of sawgrass. Sawgrass is ingeniously adapted to the final forging element of the Everglades: fire. Usually sparked by lightning strikes, fires roar through the prairies, burning acres of stems while the roots remain preserved underwater. Other plants have also adapted to the frequent fires, some, like the slash pine, are even dependent upon it for seed dispersal. These forces have been continually transforming the Everglades, forging several different habitats that have evolved with the landscape.

The greater Everglades hosts several types of ecosystems, though boundaries between them are often insubstantial or nonexistent. The most dominant of these habitats is the **sawgrass prairie**, vast expanses of sharp-leafed plants that thrive in slow-moving water and are woven with deeper channels of water called sloughs. The sawgrass is the preferred nesting ground of the endangered American alligator, and this area also supports wading birds, invertebrates, fish, small mammals and reptiles. Slight rises in elevation create small islands within prairies, forming **hardwood hammocks** that allow for tree growth, including live oak,

## Vocabulary:

### **The Everglades:**

A 2 million acre wetland national park in South Florida characterized by sawgrass and serpentine waterways.

### **Sawgrass Prairie:**

A habitat dominated by razor-leaved sawgrass, slow-moving water and deeper channels of water called sloughs.

### **Hardwood Hammock:**

Slightly elevated islands within sawgrass prairies that are typically covered in dense thickets of hardwood trees.

### **Pine Rockland:**

A forest habitat characterized by sandy soil, slash pine and frequent fires.

### **Cypress Swamp:**

A wetland habitat dominated by cypress trees.

### **Mangrove Forest:**

An estuary ecosystem populated by mangroves that anchor coastal sediment, reduce erosion and provide crucial habitat for many fish, birds, mollusks and crustaceans.

### **Florida Bay:**

The body of water separating the Florida Keys and the southern tip of the peninsula dotted with mangrove, keys and rich seagrass meadows.

### **Everglades Restoration:**

A plan enacted by Congress in 2000 to restore, protect and preserve the water resources of the greater Everglades ecosystem.

## Background

gumbo limbo, and hackberry. Though these dense thickets are often impenetrable for humans, they make ideal habitats for grey foxes, marsh rabbits, and key deer. Also found at higher elevations, the **pine rocklands** of the Everglades are characterized by sandy soil and frequent fires. While these conditions make growth difficult, some organisms find this area congenial, particularly slash pine, saw palmetto and coonties. This habitat hosts over 90 plant and animal species listed as endangered, including bald eagles, gopher tortoises and panthers. **Cypress swamps** combine sandy soil with the more aqueous conditions of the swamp. These communities are dominated by bald cypress and shelter river otters, alligators and herons.

Along the coast, the freshwater of the Everglades meets the salt water of the Gulf of Mexico and Florida Bay, creating an estuary populated by red, black and white mangroves. The **mangrove forests** reduce erosion, anchor sediment, and decrease flooding during storms, while serving as nurseries for fish, rookeries for birds, and fostering shrimp, crustaceans, and mollusks. Beyond the mangrove forests, more than 800 miles of the **Florida Bay** are considered part of the Everglades ecosystem, featuring seagrass meadows and over 100 keys, providing crucial habitat and feeding grounds for sea turtles, manatees, and flamingos.

Aside from providing essential habitat to millions of organisms, the Everglades has also historically been the territory of several Native American tribes. Though the Calusa and Tequesta were decimated by war and disease, the Seminole and Miccosukee tribes have survived, maintaining traditions while developing gaming and tourism businesses. The Everglades also filters Lake Okeechobee overflow through miles of wetlands, allowing it to absorb through the limestone into the aquifer, which supplies some of the world's purest water to an estimated 7 million people in South Florida. This unique national park also supports tourism and recreation, filters pollution, reduces storm damage and flooding, and contributes to an estimated 80-90% of the state's commercially harvested fish and crustaceans.

Despite its significance, the Everglades faces many threats. Though the national park preserves a large part of the watershed, the upper half, which begins near Orlando and includes the Kissimmee River and Lake Okeechobee, has fallen to development, discharging vast amounts of agricultural runoff and urban pollution that seep downstream to the park. The Everglades are also threatened by loss of habitat from encroaching urban development, invasive species, excessive nutrient and agro-chemicals from sugarcane and other crops, and overdrainage from canals. To restore the Everglades, an estimated \$11 billion will be invested in buying sugarcane land, reconstructing marshes, removing dams, and replacing straight canals with the original serpentine waterways that slow water flow and increase absorption and filtering. Individuals can contribute to Everglades conservation by reducing water use, planting native plants instead of grass, avoiding products with a lot of packaging and plastic, planting trees, recycling, volunteering in restoration projects, and educating others. Restoring this critical ecosystem will ensure clean water, essential habitat, and a beautiful park for future generations to enjoy.

## Resources

- 1- National Park Service  
[www.nps.gov/ever/learn/nature/mangroves.htm](http://www.nps.gov/ever/learn/nature/mangroves.htm)
- 2- Everglades Foundation  
[www.evergladesfoundation.org/2014/06/09evergladesrestort-level-rise/](http://www.evergladesfoundation.org/2014/06/09evergladesrestort-level-rise/)
- 3- "Everglades Poems." Poetry Soup.  
<http://www.poetrysoup.com/poems/everglades>

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## Extension Activity:

Have students deliberate on their new knowledge of the Everglades and the 3-2-1 assessment that they concluded with a question they wanted to investigate. With a parent, have students research their question and explain their discoveries in their science journal, to be presented next class.

## Assessment:

Have students complete the Everglades worksheet after class. Have them write a 3-2-1 reflection on today's lesson by writing 3 things they discovered today, 2 interesting facts they're going to share with others, and 1 question they want to learn more about.

## Program Partner:

University of Miami – Shark Research & Conservation Program

## Ode to the Everglades

### Materials

- Lined paper for draft
- Blank paper for final draft
- Coloring utensils (markers, colored pencils, crayons)
- Pencils or pens

### Procedure

1. When planning, consider the age and ability of your students and decide on a line-limit for the assignment. Haikus may be considered for younger students or shorter time periods.
2. Briefly introduce poetry by reading one or two poems from the Everglades.<sup>5</sup> Explain to students that poems are a type of art, allowing us to express emotions, convey ideas, and inspire others through words, meter and rhythm. Explain that they will each be writing a poem to illuminate the wonders of the Everglades.
3. Have students brainstorm key words from today's lesson on the board for 2-3 minutes. You may decide to simply write The Everglades and have them suggest words and themes that they are reminded of (this step and step 4 may be replaced with your favorite brainstorming activity).
4. Hand each student paper for individual brainstorming. Students should brainstorm for 3-5 more minutes, writing down more words around the theme and possibly selecting more words that rhyme with those words.
5. Explain to them that they will write a first draft poem using their words according to the poem limits you selected. Remind them that poems often use literary devices like similes, metaphors, alliteration, symbolism and personification.
6. Have them edit their first draft and write their final, clean draft on an unlined sheet of paper, which they may decorate and present if time permits. Encourage them to share their work with family and friends.

### Worksheet Answer Key

1. D
2. F
3. E
4. C
5. B
6. A
7. Okeechobee
8. Limestone, oolite or calcium carbonate
9. Answers will vary, may include: sawgrass, gumbo limbo, slash pine, bald cypress, etc.
10. Answers will vary, may include: Florida panther, American alligator, snail kite, West Indian manatee, etc.
11. The Everglades are important because it is a unique ecosystem that provides habitat to endangered species, ensures water quality for South Floridians, filters pollution, reduces flooding and storm damage, and supports many industries, including fishing, tourism and recreation.
12. Humans have altered the Everglades by draining, diking and damming for development, changing the natural water flow, contaminating water sources through point and non-point source pollution, and introducing many invasive species.
13. We can help protect the Everglades by reducing water use, planting native species instead of grass, volunteering in restoration projects and educating others.



## The Everglades

The Everglades is a two million acre national park in South Florida that hosts a wide variety of plant and animal life and forms a complex interconnected ecosystem of six distinct habitats.

Match these habitats with the photos on the right.

1. Sawgrass prairie \_\_\_\_\_
2. Hardwood hammock \_\_\_\_\_
3. Mangrove forest \_\_\_\_\_
4. Pine rockland \_\_\_\_\_
5. Cypress swamp \_\_\_\_\_
6. Florida Bay \_\_\_\_\_



Complete the following sentences.

7. Rivers and lakes flow downstream into Lake \_\_\_\_\_, which overflows into the Everglades.
8. The rock beneath the Everglades is called \_\_\_\_\_ and filters the water as it passes into the aquifer, providing some of the purest water in the world to the 7 million people of South Florida.
9. Some of the plants of the Everglades include \_\_\_\_\_.
10. Over 60 endangered species live in the Everglades, including \_\_\_\_\_.
11. The Everglades are important because \_\_\_\_\_.
12. Humans have affected the Everglades by \_\_\_\_\_.
13. I can help protect the Everglades by \_\_\_\_\_.