



THE SOCIETY OF THE FOUR ARTS

Presents

"Florida's Wetlands"

Photographs by John Green, David Ho, Jim Kern and Tom Sterling



Exhibition on display in the
Mary Alice Fortin Children's Art Gallery

December 1, 2009 – November 30, 2010

A Teacher's Manual & Student Guide

2 FOUR ARTS PLAZA PALM BEACH, FLORIDA 33480 T -561-655-2776 F- 561-655-7233

Florida's Wetlands

Exhibition Summary

Before man arrived in Florida, lakes, rivers, streams, ponds, sloughs, bogs, marshes, and swamps constituted over half of Florida's total land mass. Modern man added two other wetlands (ditches and canals), to drain the land for development and move water to where it was needed for agricultural and urban purposes. That practice, ironically and sadly, reduced Florida's wetlands by half.

This drastic alteration of our wetlands has had a serious impact on native wildlife. Some species have been able to adapt, although reduced in number; while others fight to survive. Reducing wetlands has also reduced man's ability to supply himself with one of his most basic needs - clean water!

This exhibit is an attempt to familiarize the visitor with the importance of wetlands to the very survival of man; as well as the survival of all those creatures with whom we share these marvelous and indispensable environments.

Wetlands serve a multiplicity of purposes. Some activities, like recreation (wildlife photography, swimming, canoeing, hunting, and fishing) are obvious, while others are less so. Wetlands, such as marshes and swamps, act like giant sponges to hold water and then slowly release it into the groundwater table. From there it works its way to the local water plant and eventually the pipes that run to the faucets in your home. The thick vegetation and detritus (decaying plants and animals) serve to filter many of the contaminants that escape from our septic tanks, lawns, streets, and storm sewers. The aquatic plants also absorb CO₂ while replenishing the supply of oxygen in the air and water itself. One acre of marshland is said to be four times as productive, in terms of biomass (total weight of plants and animals produced), as an acre of prime Iowa cropland. It also supplies homes for an uncounted number of plants, birds, mammals, reptiles, amphibians, fish, and invertebrates.

Florida's wetlands are a finite resource. At some point, in the near future, the demand for water will exceed the wetland's ability to meet the needs of man and the many creatures with whom he shares his valuable resource. Some would argue that we've already passed that point. -- Courtesy of Tom Sterling

Appropriate for grade levels K-12
Materials specified to 2nd, 4th, and 8th grades

This exhibit is free for students and chaperones. Please contact Susan Harris or Samantha Crawford (655-2776) in the children's library to schedule group visits.

The exhibit visit will take 45 minutes - 1 hour. The children's library staff can offer grade level appropriate craft projects and stories to accompany your tour.

Visiting the Children's Art Gallery

Good Gallery Manners

The Mary Alice Fortin Children's Art Gallery is honored to display the photographs you will see during your visit. Please abide by the following guidelines during your time with us.

- When you arrive, you will be met by a Four Arts staff member. Please be prepared with the exact number of students and chaperones in your party.
- The staff will provide name tags for each student to be worn throughout the gallery visit.
- For the safety of the students and the protection of the display, students should be supervised by an adult chaperone at all times.
- Visitors should show respect for the exhibit at all times.
- Please keep voices low and be courteous to others.

Lunch/Restrooms

The Children's Library has a room available for lunch. It is available on a first-come, first-served basis. Please make your request to use it when calling to schedule your visit. Water fountains and restrooms are available for your use at the gallery.

Attire

While there is no dress code for the gallery, this is a good opportunity to encourage students to dress nicely for a visit to a cultural destination. If teachers feel that it is appropriate, consider asking students to dress up in slacks, collared shirts, skirts, or dresses.

Students with disabilities

An elevator to the second floor of the Rovensky building is available for your use. All students are welcome at the Society of the Four Arts; please let us know in advance if special assistance will be necessary.

Location

Our Campus is located in the heart of Palm Beach. Take I-95 to the Okeechobee Boulevard exit; proceed east for approximately two miles to the bridge over the Intracoastal Waterway. After crossing the bridge, turn left at the first street which is Four Arts Plaza (before the traffic lights). Here you will find the Mary Alice Fortin Children's Gallery located on the second floor of the John E. Rovensky Administration building.

Teacher Development

Wetlands are areas where water inundates the land or saturates the soil long enough to support plants and animals that are adapted to these conditions. They are fragile environments and usually transitional in nature. Typical Florida wetlands include swamps, marshes, sloughs, bogs, streams, rivers, ponds, and lakes (see key terms for definitions).

The value of wetlands is manifold. Wetlands can be characterized as Nature's kidneys; marshes and swamps filter and absorb harmful pollutants as well as prevent sediments and excess nutrients (from lawns and golf courses) from entering our open waters. They may also be considered Nature's lungs; instead of consuming oxygen, the plants of a wetland produce it while consuming vast amounts of carbon dioxide. It's said that one acre of marshland is four times as productive (in terms of biomass – plants and animals produced) as one acre of prime Iowa farmland. Wetlands serve as a nursery for juvenile fish, shellfish, amphibians, and insects; many of which are vital to man's survival. Wetlands are home to some of our most endangered species like the Florida Panther, Wood Stork, and Whooping Crane; not to mention the myriad water birds, reptiles, mammals, and insects. They also provide opportunities for recreation in our largely tourist driven state. Fishing, hunting, bird-watching, hiking, swimming, snorkeling, canoeing, boating, and photography are all extremely dependent on our maintaining healthy wetlands. The water we use for drinking, bathing, laundry, cooking, watering our lawns, and cleaning our cars all comes from groundwater that has worked its way through a wetland. Our very survival is dependent on maintaining and improving these vital habitats.

-- Courtesy of Tom Sterling



Swamp and Great Egret by Tom Sterling

Suggested Resources:

National Audubon Society Field Guide to Florida

<http://myfwc.com> Florida Fish Wildlife Conservation Commission

The Audubon Society Nature Guides: WETLANDS

The Swamp by Bill Thomas

Still Waters by Alexander Marshall

Grassy Waters Preserve / West Palm Beach

Florida Dept. of Environmental Protection

South Florida Water Management District

Green Cay Wetlands and Nature Center

Corkscrew Swamp Sanctuary / Naples, Florida

Big Ideas and Key Terms:

The Hydrologic Cycle: The constant movement of water through evaporation, condensation, precipitation, and transpiration. As a general “rule of thumb” when it rains 1/3 evaporates, 1/3 runs off, and 1/3 soaks into the ground.

Human History: In 1850 there were 215 million acres of wetlands in America. Today we’ve reduced that by 54% or 116 million acres. The ability of the remaining 98 million acres, to mitigate (lessen) flooding, has been seriously diminished.

Floodplain: Bottomlands, bordering major rivers, which flood when the river overflows its banks. The resulting deposit of alluvial soil enriches what is usually extremely productive farmland.

The Everglades: A unique shallow basin formed on eroded limestone bedrock and fed by underground and surface water flowing south primarily from Lake Okeechobee.

Man Created Wetlands: Flood control and hydroelectric dams, reservoirs, irrigation ponds, farm ponds, quarry ponds, canals, locally - Green Cay and Wakodahatchee Wetlands.

Swamp: Flooded forest.

Marsh: Flooded grassland (much of the Everglades).

Slough: Shallow water over deep mud. Often a backwater associated with an oxbow (remnant river bend).

Bog: Soft, wet, mossy ground underlain with dead plant material called peat.

Rivers and Streams: Characterized by flowing water and currents.

Lakes and Ponds: Permanent bodies of standing water.

Limnologist: Biologist who studies lakes and ponds.

Oligotrophic: Body of water that is low in nutrients. (northern glacial lakes)

Mesotrophic: Body of water with a moderate level of nutrients. (lakes in the midwest)

Eutrophic: Body of water with a heavy nutrient load. Excessive plant decay (using oxygen) makes it difficult for fish and insects to live in the water.

Ecosystem: Plants and animals interacting with one another and their immediate environment.

Detritus: Organic debris (plant particles, animal waste, dead invertebrates or their cast skins) found suspended in, or on the bottom of, a body of water. On land it's called "humus".

Decomposers: Bacteria, fungi, worms, and aquatic insects that produce detritus.

Phytoplankton: Microscopic plant life (floating algae) that is the beginning of the aquatic food chain.

Zooplankton: Tiny aquatic animals (copepods, rotifers, and Fairy Shrimp) that filter feed on phytoplankton.

Photosynthesis: The process by which plants combine water, sunlight and carbon dioxide, in chlorophyll filled cells, to form sugars (energy) and oxygen.

Pa Hay-Okee: Seminole word for the Everglades meaning – "grassy waters".

Suggested Books and DVD:

These titles are available for your use through the Palm Beach County Library System

Elementary:

- ✿ “Bill Nye the Science Guy: Wetlands” Full screen classroom ed. DVD Elk Grove Village, IL: Disney Educational Productions, c2003.
- ✿ Dunphy, Madeleine. Here is the Wetland ill. Wayne McLoughlin. New York: Hyperion Books for Children, 1996.
- ✿ Johnson, Rebecca L. A Journey into a Wetland. ill. Phyllis V. Saroff. info: Minneapolis: Carolrhoda Books, c2004.
- ✿ Fowler, Allan. Life in a Wetland. New York: Children's Press, c1998.
- ✿ Luenn, Nancy. Squish! : a Wetland Walk. ill. Ronald Himler. New York: Atheneum; 1994.
- ✿ Macken, JoAnn Early. Wetlands. Milwaukee, WI: Weekly Reader Early Learning Library, 2006.
- ✿ Sill, Cathryn P. Wetlands. ill. John Sill. Atlanta, Ga.: Peachtree, c2008.
- ✿ Weaver, Jeanne. Wetlands Journey. Washington D.C.: National Geographic, c2007.

Middle:

- ✿ Purdy, Barbara A. The Art and Archaeology of Florida's Wetlands. Boca Raton: CRC Press, c1991.
- ✿ Hammer, Donald A. Creating Freshwater Wetlands. Boca Raton: CRC Press, c1997.
- ✿ Dugan, Patrick ed. Firefly Guide to Wetlands. Buffalo, N.Y.: Firefly Books, 2005.
- ✿ Dugan, Patrick ed. Wetlands in Danger: a World Conservation Atlas. New York: Oxford University Press, 1993.
- ✿ Tiner, Ralph W. In Search of Swampland : a Wetland Sourcebook and Field Guide New Brunswick, N.J.: Rutgers University Press, c2005.



Standards and Expectations for Second Grade

Language Arts:

LA.2.1.6: *The student uses multiple strategies to develop grade appropriate vocabulary.*

LA.2.1.6.1 The student will use new vocabulary that is introduced and taught directly.

LA.2.1.6.5 The student will relate new vocabulary to familiar words.

LA.2.4.1: *Creative* LA.2.4.1.1 The student will write narratives based on real or imagined events that include a main idea, characters, a sequence of events and descriptive details.

LA.2.4.2: *Informative* LA.2.4.2.2 The student will record information (e.g., observations, notes, lists, charts, map labels, legends) related to a topic.

Science:

SC.D.2.1.1: *The student understands that people influence the quality of life of those around them.* The student knows ways that human activity affects the environment (for example, land fills for disposal of wastes, land development for homes and industry, dams to control rivers or generate electricity).

SC.F.1.1.1: *The student knows the basic needs of all living things.* The student understands that the amount of food, water, space, and shelter needed is dependent on the size and kind of living things.

SC.F.1.1.4: *The student understands that structures of living things are adapted to their function in specific environments.* The student understands that structures of living things are adapted to their function in specific environments.

SC.G.1.1.3: *The student knows that there are many different plants and animals living in many different kinds of environments (e.g., hot, cold, wet, dry, sunny, and dark).* The student understands that living organisms need to be adapted to their environment to survive.

SC.G.1.1.4: *The student knows that animals and plants can be associated with their environment by an examination of their structural characteristics.*

SC.G.2.1.2: *The student knows that the activities of humans affect plants and animals in many ways.* The student knows that human beings cause changes in their environment, and these changes can be positive or negative.

Social Studies:

SS.B.1.1.2: *The student uses simple maps, globes, and other three-dimensional models to identify and locate places.* The student knows the locations of the community, city, state, and country on a map and globe.

Visual Arts:

VA.B.1.1.2: *The student understands that works of art can communicate an idea and elicit a variety of responses through the use of selected media, technique, and processes.* The student explains and defends personal responses to works of art.

VA.D.1.1.1: *The student uses age-appropriate vocabulary to describe, analyze, interpret, and makes judgments about works of art.* The student analyzes artworks using elements of art and principles of design.

VA.E.1.1.3: *The student understands and uses appropriate behavior in a cultural experience.* The student uses good observation, listening, and questioning skills during a museum visit.

Pre-Activities for Second Grade

- ✿ Familiarize your students with three types of wetlands: swamps, marshes, and bogs. Define each for the class, and then ask the students what kinds of animals would live in these wetlands. Make a three column chart with the definition for each, as well as animals they believe would live in each (some will overlap). After your visit to the exhibit, revisit your chart and check for accuracy.
- ✿ Help your students to understand the concept of decay, an important part of the carbon cycle. Show them a banana or melon at various stages of ripeness/decomposition. Consider starting the activity well in advance of your visit to allow the students to observe the changes over time.
- ✿ Complete a key terms activity (included in your packet) as a class. You may choose to adapt this as a chart and/or eliminate some words to accommodate your students' comprehension.



Post-Activities for Second Grade

- ✿ Revisit your three-column chart. Check for accuracy, adding or removing animals from columns.
- ✿ As a class, build a pond, marsh, or bog in an aquarium. Decide what plant and animal life (or models) is necessary to include. Compose a description of your wetland, along with a paragraph about conservation of Florida's wetlands. Display your wetland prominently in your classroom or school.
- ✿ Have the children compose narratives that take place in a wetland. Instruct them to include details about the types of wetlands they learned about through the exhibit. Encourage them to use clear descriptions of the various animals they observed in the photos, perhaps choosing to use them as characters.
- ✿ Using a map of Florida, South Florida, or Palm Beach County, locate wetlands in our local area. Encourage the students and their families to visit these beautiful places to observe the complex ecosystems in person.
 - Suggested areas: Arthur R. Marshall Loxahatchee National Wildlife Refuge, Wakodahatchee Wetlands, Green Cay Nature Center

Standards and Expectations for Fourth Grade

Language Arts:

LA.4.1.6: *The student uses multiple strategies to develop grade appropriate vocabulary.*

LA.4.4.1.1: *Creative The student will write narratives based on real or imagined ideas, events, or observations that include characters, setting, plot, sensory details, a logical sequence of events, and a context to enable the reader to imagine the world of the event or experience*

LA.4.4.2.3: *Informative/Expository The student will write informational/ expository essays that contain introductory, body, and concluding paragraphs*

Social Studies:

SS.B.1.2.1: The students uses maps, globes, charts, graphs, and other geographic tools including map keys and symbols to gather and interpret data and to draw conclusions about physical patterns.

Science:

SC.D.1.2.3: The student knows that the water cycle is influenced by temperature, pressure, and the topography of the land.

SC.D.2.2.1: The student knows that reusing, recycling, and reducing the use of natural resources improve and protect the quality of life. knows ways misuse of natural resources affects the quality of life for all species.

SC.G.1.2.1: The student knows ways that plants, animals, and protists interact.

SC.G.1.2.4: The student knows that some organisms decompose dead plants and animals into simple minerals and nutrients for use by living things and thereby recycle matter.

SC.G.1.2.6: The student knows that organisms are growing, dying, and decaying and that new organisms are being produced from the materials of dead organisms.

SC.G.1.2.7: The student knows that variations in light, water, temperature, and soil content are largely responsible for the existence of different kinds of organisms and population densities in an ecosystem.

SC.G.2.2.1: The student knows that all living things must compete for Earth's limited resources; organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring.

SC.G.2.2.3: The student understands that changes in the habitat of an organism may be beneficial or harmful.

SC.H.1.2.4: The student knows that to compare and contrast observations and results is an essential skill in science.

SC.H.1.2.5: The student knows that a model of something is different from the real thing, but can be used to learn something about the real thing.

Visual Arts:

VA.E.1.2.1: The student understands the influence of artists on the quality of everyday life.

VA.E.1.2.3: The student understands the similarities and differences and the various

Pre-Activities for Fourth Grade

- ✦ Familiarize your students with three types of wetlands: swamps, marshes, and bogs. You may choose to find images via the internet, a textbook, or a simple line drawing you make on your whiteboard. Have each student create a three column chart, including a definition for each and the types of animals that would live in these wetlands. After your visit to the exhibit, revisit the chart.
- ✦ Help your students to understand the concept of decay, an important part of the carbon cycle. Show them a banana or melon at various stages of ripeness/decomposition. Consider starting the activity well in advance of your visit to allow the students to observe the changes over time.
- ✦ Introduce the key terms and definitions from the teacher development section. You may choose to have your students complete the key terms activities prior to, during your visit, or upon return to school.

Post-Activities for Fourth Grade

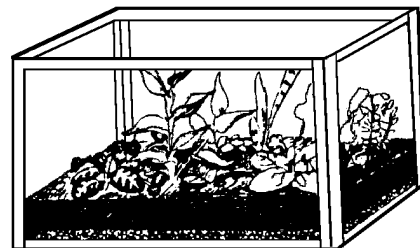
- ✦ Have each student revisit his or her three-column chart. Instruct them to check for accuracy, adding or removing animals from columns.
- ✦ In groups, have the students build a model swamp, marsh, or bog. Decide what plant and animal life (or models) is necessary to include. Instruct them to compose a description of each wetland, along with a paragraph about conservation of Florida's wetlands. Display your wetlands prominently in your classroom or school.
- ✦ Using a map of Florida, South Florida, or Palm Beach County, locate wetlands in our local area. Encourage the students and their families to visit these beautiful places to observe the complex ecosystems in person.
 - Suggested areas: Arthur R. Marshall Loxahatchee National Wildlife Refuge, Wakodahatchee Wetlands, Green Cay Nature Center
- ✦ Have the children compose narratives or essays that take place in a wetland. Instruct them to include details about the types of wetlands they learned about through the exhibit. Encourage them to use clear descriptions of the various animals they observed in the photos, perhaps choosing to use them as characters.

Sample narrative prompt:

Much of Florida's land can be described as a wetland. Think about what these wetlands are like and the kinds of plants and animals that live there. Tell what might happen on a visit to one of Florida's wetlands.

Sample expository prompt:

Much of Florida's land can be described as a wetland. Think about what types of wetland can be found here, what make them similar, and



Standards and Expectations for Eighth Grade

what makes them different. Explain what makes a swamp, marsh, or bog a wetland.

Language Arts:

LA.8.1.6.1 The student will use new vocabulary that is introduced and taught directly.

LA.8.1.6.4 The student will categorize key vocabulary and identify salient features.

LA.8.1.6.5 The student will relate new vocabulary to familiar words.

LA.8.4.2.3 The student will write specialized informational/expository essays (e.g., process, description, explanation, comparison/contrast, problem/solution) that include a thesis statement, supporting details, an organizational structure particular to its type, and introductory, body, and concluding paragraphs.

LA.8.4.3.1 The student will write persuasive text (e.g., advertisement, speech, essay, public service announcement) that establishes and develops a controlling idea, and supports arguments for the validity of the proposed idea with detailed evidence.

Science:

SC.8.N.4.1 Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

SC.8.P.9.3 Investigate and describe how temperature influences chemical changes.

SC.8.L.18.1 Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.

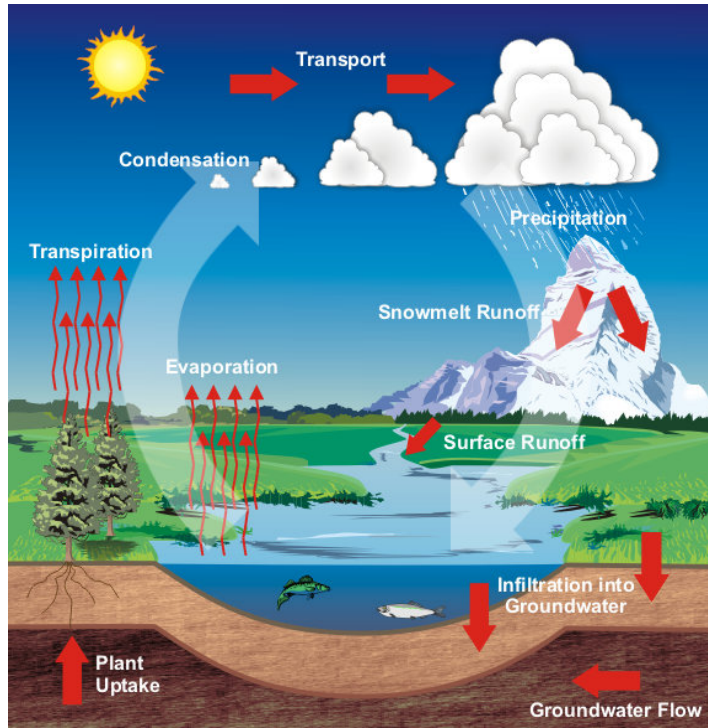
SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.

Social Studies:

SS.8.G.3.1 Locate and describe in geographic terms the major ecosystems of the United States

Visual Arts:

VA.E.1.3: The student makes connections between the visual arts, other disciplines, and the real world. The student understands the various roles of museums, cultural centers, and exhibition spaces.



Pre-Activities for Eighth Grade

- Go over the key terms with your class. You may choose to have them complete the activities prior to their visit, during the time at the gallery, or upon return to school.
- Have your students conduct some research on the different kinds of wetlands, including swamps, marshes, and bogs. Have each student create a three column chart, including a definition for each and the types of animals that would live in these wetlands. After your visit to the exhibit, revisit the chart.

Post-Activities for Eighth Grade

- Have each student revisit his or her three-column chart. Instruct them to check for accuracy, adding or removing animals from columns.
- Using a map of Florida, South Florida, or Palm Beach County, have the students locate wetlands in our local area. Encourage the students and their families to visit these beautiful places to observe the complex ecosystems in person. Consider assigning an extra credit activity to be conducted for the visit.

- Suggested areas: Arthur R. Marshall Loxahatchee National Wildlife Refuge, Wakodahatchee Wetlands, Green Cay Nature Center
- ✦ In groups, have the students build a model of a pond, marsh, and bog. They should decide what plant and animal life is necessary to include. Instruct them to compose a description of each wetland, comparing and contrasting the three, along with a paragraph about conservation of Florida's wetlands. Display your wetlands prominently in your classroom or school.
- ✦ Have the children compose essays about wetlands. Instruct them to include details about the types of wetlands they learned about through the exhibit. Encourage them to use clear descriptions of the various plants and animals from the photos.

Sample persuasive prompt:

Much of Florida's land can be characterized as wetland. Think about the ways that the wetlands of this state enrich the lives of residents and visitors. Now write to convince the reader that wetland conservation is essential to the future of the state of Florida.

Sample expository prompt:

Much of Florida's land can be described as a wetland. Think about what types of wetland can be found here, what make them similar, and what makes them different. Explain what makes a swamp, marsh, or bog a wetland.

Key Terms Activity 1

Directions: In the third column of each row, add an illustration to show your understanding of the term.

<i>Bog</i>	Soft, wet, mossy ground underlain with dead plant material called peat	
<i>Ecosystem</i>	Plants and animals interacting with one another and their immediate environment	
<i>Lakes and Ponds</i>	Permanent bodies of standing water	
<i>Marsh</i>	Flooded grassland	
<i>Photosynthesis</i>	The process by which plants combine water, sunlight and carbon dioxide to form sugars (energy) and oxygen	
<i>Phytoplankton</i>	Microscopic plant life that is the beginning of the aquatic food chain	
<i>Rivers and Streams</i>	Characterized by flowing water and currents	
<i>Slough</i>	Shallow water over deep mud	
<i>Swamp</i>	Flooded forest	
<i>Zooplankton</i>	Tiny aquatic animals that filter feed on phytoplankton	

Advanced Key Terms

<i>Decomposers</i>	Bacteria, fungi, worms, and aquatic insects that produce detritus	
<i>Detritus</i>	Organic debris found suspended in, or on the bottom of, a body of water	
<i>Eutrophic</i>	Body of water with a heavy nutrient load	
<i>Limnologist</i>	Biologist who studies lakes and ponds	
<i>Mesotrophic</i>	Describes a body of water with a moderate level of nutrients	
<i>Oligotrophic</i>	Describes a body of water low in nutrients	
<i>Pa Hay-Okee</i>	Seminole word for the Everglades meaning – “grassy waters”	

Key Terms Activity 2

Have students make a word storm for some or all of the key terms listed. Word storms take the following format, but can be modified to fit your students' grade/ability level.

1. What is the word?
2. What part of speech is this word?
3. What do you think of when you hear the word?
4. What are three other forms of the word?
5. Name three people who would use this word (in their everyday life).
6. Give an antonym(s) for this word.
7. Give a synonym(s) for this word.
8. Use this word in meaningful sentence.

Example:

Gallery

Noun

Art, photographs, being quiet

Galleries, galleria, galleried

An art collector, a docent, a museum director

Cupboard, closet, storage

Museum, display, exhibition

I visited the children's gallery to view the exhibition about Florida's wetlands.



THE SOCIETY OF THE FOUR ARTS

Teacher Evaluation Form

Thank you for taking the time to evaluate your gallery experience. Your comments will help The Society of the Four Arts to better serve the children and teachers of our community.

School: _____

Name: _____

Grade level: _____

Date of visit: _____

Program: Florida's Wetlands

Please rate the following:

Scale: 5-excellent 4 -good, 3-satisfactory, 2-fair, 1-poor

Student gallery experience: _____

Teacher gallery experience: _____

Exhibit: _____

Pre-visit materials: _____

Post-visit materials: _____

Facility: _____

Additional on-site activity (if applicable): _____

Please answer the following:

1. What did your students most enjoy about their visit to the children's gallery?
2. What portion of the program materials did you find most helpful?
3. What could the Society of the Four Arts improve to make your visit more productive or enjoyable?
4. Would you recommend this venue to other teachers? Why or why not?

Please return this form in the mail after your visit to Heidi Roth, The Society of the Four Arts, 2 Four Arts Plaza, Palm Beach, FL 33480.