UF | IFAS Extension
UNIVERSITY of FLORIDA

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LESSON 2

Wetland Ecosystems—Freshwater Marshes and Swamps

LESSON 2: Wetland Ecosystems - Freshwater Marshes and Swamps

OBJECTIVES:
For youth to:

- Distinguish different types of freshwater wetlands from other aquatic/marine ecosystems.
- Identify the characteristics and functions of freshwater wetland ecosystems.
- Name common and endangered plants and animals found in freshwater wetland ecosystem.
- Identify the effects and impacts of the water cycle on freshwater wetlands.
- Identify the role of freshwater wetlands in aquifer recharge.
- Explain the function of freshwater wetlands as water purifiers
- Demonstrate knowledge of food chains and energy flow in wetlands.
- Identify impacts of human activities on wetlands.
- Define ways in which people can maintain, restore and preserve wetlands.
- Describe ways wetlands are important to people and wildlife.

LESSON TIME: 45 minutes to 2 hours for field trip to wetland

ADVANCED PREPARATION:
Read the BACKGROUND BASICS on Freshwater Wetland Ecosystems. Review activities and choose appropriate one(s) to use. Secure necessary materials as described.

PURPOSE:

To become familiar with freshwater wetland ecosystems.

DO:

Here are some learning activities and suggested ways to implement the activities in Lesson 2.

2.1 Discover the characteristics of a freshwater wetland with WHAT'S A WETLAND?

2.2 Learn the names of common plants and animals found in the freshwater wetland ecosystems of Florida with WETLAND BINGO.

2.3 Discover some of the functions of freshwater wetland areas in WETLANDS CAN STORE AND FILTER!

2.4 Identify the effects and impacts of the water cycle on wetlands using WETLAND RECHARGE.

2.5 Understand food chains and energy flow it wetlands with FOOD CONNECTIONS.

2.6 Discover that wetlands are not all the same with WETLAND TYPES.

2.7 Identify important functions of wetlands through WET AND WILD TRIVIA.

REFLECT:

After completing the activities in this lesson, help youth reflect on what they learned with these questions.

- **Is water always present in a freshwater wetland?**

  No, wetland areas experience wet and dry cycles on a periodic basis. In some wetland types, water may never be visible at the surface, but saturates the soil and influences the types of plants found there.

- **Describe how our freshwater wetlands affect the movement of water into the aquifer.**

  In addition to trapping soil and debris, freshwater wetlands also function as temporary water storage areas, slowly releasing the water into rivers, streams and aquifers.

- **How do freshwater wetland plants help purify pollutants from the water?**
  Plants can absorb various nutrients and other pollutants through their roots.

- **Compare the differences and similarities between various wetland types: swamps and marshes, bayheads and hydric hammocks, etc.**

APPLY

- Identify a freshwater wetland in your area. Call the Natural Resource Conservation Service, Forest Service, Florida Department of Environmental Protection and/or other agencies for more information.
- Have youth draw a picture of the freshwater wetland they visited, including any plants and animals they observed. Ask each person to diagram a possible food chain that could be found in the freshwater wetland.
- Learn more about some of the common and endangered species found in freshwater wetlands in your vicinity.
- Draw a map of the freshwater wetland and its surrounding area. Identify possible sources of contaminants (pollution). Discuss how the wetlands function as a filter.
- Discuss where this wetland is located. Is it near development? What are possible threats to this area?
- Help youth to conduct a role-playing study of the ways classification of freshwater wetlands can affect their use and the limitations imposed by federal, state and local regulations.

BACKGROUND BASICS . . . Freshwater Wetland Ecosystems

A wetland can be compared to a nursery, kitchen and bedroom for numerous species of plants and animals. Birds depend on our marshes, bayous and flooded bottomlands for nesting sites, roosts, food, and shelter during all or part of the year. Raccoon, opossum, mink, muskrat, beaver, red fox, gray fox, and otter live in and around wetlands feeding on small mammals, aquatic life, birds and their eggs. The white-tailed deer is found in the bottom lands, and when necessary it will depend on swamps and marshes to escape predators.

Wetland plants create habitats for many of the animals mentioned above. Plants have developed in these special water saturated environments forming complex interrelated communities. Many individual species of plants have adapted in special ways to live in wetland areas. Cypress knees help support the tree in water saturated soils. Carnivorous plants such as sundew and pitcher plants capture insects to supplement their nutrient requirements.

WHAT IS A FRESHWATER WETLAND?

Wetlands include freshwater marshes, swamps, bottomland hardwood forests, bogs, and wet meadows. These areas are covered by water for all or at least part of the year. In some cases, water may never be visible at the surface but saturates the soil beneath. They can be formed in low lying areas subject to flooding, in depressions where water collects, along springs and rivers, or in areas where soil types delay the movement of water.

The word wetlands means many things to different people, and the variety of wetland types have been classified in different ways. According to the definition developed at the 1975 National Wetland Classification and Inventory Workshop; a wetland is a land area where an excess of water is the dominant factor determining the nature of soil development and the types of plant and animal communities living at the soil surface. It spans a continuum of environments where terrestrial and aquatic systems integrate. The U.S. Fish and Wildlife service has listed twenty different types of wetlands, eight freshwater and twelve salt water. (See Lesson 4 for descriptions of coastal wetlands.)

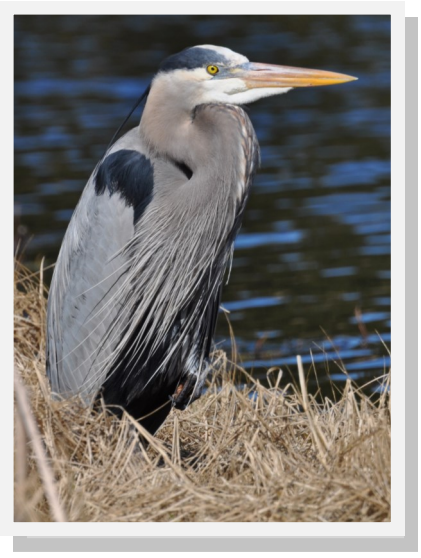
Basically, two major categories of freshwater wetlands exist: swamps and marshes. By definition, a **swamp** is a forested wetland containing woody plants (trees and shrubs) such as cypress, tupelo, buttonbush and red maple. **Marshes** are described as wetland areas dominated by grasses, sedges, and other non-woody species.

WETLANDS FUNCTIONS

Wetlands perform a number of important functions. Some can purify polluted water. Others can reduce the impact of floods by temporarily storing flood waters. Some wetlands provide critical habitat for endangered species. Still others help refill groundwater supplies.

Wildlife and Fisheries

Wetlands are among the world's most biologically productive ecosystems and are very important as habitats for fish and wildlife. Wetlands provide essential breeding, spawning, nursery, nesting, migratory and/or winter habitats for a major portion of the nation's migratory and resident fish and wildlife. Many of the nation's threatened and endangered plant and animal species depend on wetlands for their survival. Millions of birds including Florida mottled ducks, sandhill cranes, wood storks, great egrets, American coots and wood ducks depend on marshes, wet meadows, swamps, mudflats and other wetland types.



Surface and Groundwater Supply

The **groundwater recharge** function of wetlands (i.e., movement of surface water to groundwater/aquifer areas) is an important wetland function. Some wetlands are areas of groundwater recharge that may be linked to human uses. For example, recharge is essential to the refilling of aquifers for water supply. Wetlands are also interconnected with our lakes and rivers. Wetlands help maintain lake levels and river flows by storing floodwater, then gradually discharging water into these surface features.

Water Quality

Wetlands slow the flow of runoff from uplands before it reaches a river, lake, or other body of water. They trap and filter sediments from flood water. Wetlands play an important role in maintaining and improving water quality by retaining or removing nutrients, and processing chemical and organic wastes and pollutants.

It is critical to recognize that wetlands have a limited capacity to perform this water quality function. When sediments, nutrients, pesticides, heavy metals and other substances collect in wetlands soils, plants, and animals may absorb these substances. High levels of certain toxins can impact the food chain through effects on growth and reproduction. This can result in serious problems for fish, wildlife, and human populations.

Flood, Erosion and Shoreline Damage

Wetlands slow water movement, temporarily store flood water, reduce bank and shoreline erosion, and slowly release stored water downstream, thereby saving lives and property. This function is especially important in areas with human development on flood plains, such as the St. Johns River basin, where the possibility of flood damage is high. Inland wetlands located along major streams and around lakes help protect shorelines and channel banks from storm, wave, or erosion damage.

Important factors influencing the flood reduction role of wetlands include size (larger wetlands provide more flood storage and flow reduction) and location within the basin (wetlands in the upper watershed often are more effective for flood water retention). Other factors such as texture of the subsoil, vegetative cover and connections with other wetlands (isolated wetlands are generally less helpful in flood control) can help reduce high water levels during critical flood stages.

The direct economic significance of the flood and shoreline erosion control function of wetlands can be measured by the millions of dollars spent annually for construction of jetties, bulkheads and other structures intended to inhibit water damage. Flood waters and shoreline erosion destroy homes, eliminate harvestable timber, remove fertile soil, and alter land uses. Eroded sediments are often redeposited in navigable channels, increasing the need for costly dredging. As a natural ecosystem, wetlands provide many of these services at no cost.

OTHER VALUES AND USES OF WETLANDS

Other important wetland values include aesthetic qualities, educational uses, archeological/ historical sites, research, and recreation areas. Undisturbed natural wetlands have high value as examples of their biotic community type for study and comparison, and for protection of unique resources. Also, with proper management, consumptive uses of wetlands such as commercial fishing and forestry may be compatible with ideas for wetland protection. Sustainable management of consumptive use of wetlands is important for the health of these ecosystems.

CONCLUSION

Both saltwater and freshwater wetlands are important as natural areas because they hold a great diversity of plant and animal life. Wetlands are considered nursery areas for many species of fish. The special importance of wetlands as a result of their rarity and diversity is Wetlands in Florida are not only valued for their wildlife diversity but for flood control and as water recharge zones. Wetlands have also played a major role in the state's history and development, shaping settlement patterns and agricultural areas.

Since wetlands make up only an estimated 5.5% of the land area in the United States (excluding Hawaii and Alaska) these areas might be considered rare. With proper management and protection Florida's wetlands will continue to be productive ecosystems that support a variety of uses for the human community and natural community alike.

Activity 1: What's a Wetland?

OBJECTIVES: For youth to:

- Discover what a wetland looks and feels like.
- Identify the characteristics of a freshwater wetland.

LIFE SKILLS:

- Communicating and relating with others.
- Acquiring, analyzing and using information.

SUNSHINE STATE STANDARDS

SC.4.N.1.6--Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

SC.4.L.17.3--Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

SC.4.L.17.2--Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

SC.4.L.17.4--Recognize ways plants and animals, including humans, can impact the environment.

SC.7.L.17.1--Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

Introduction

What do you think a wetland is? What words would you use to describe a swamp? (Is it dark, creepy, wet, etc.?) Is it a scary place with snakes and creepy-crawlies? Some of this may be right but you may be surprised at what a wetland looks like. We are going to take a trip to a nearby wetland. This activity will answer the question, "What's a Wetland?"

Do

- Take a field trip to a freshwater wetland area.
- Upon reaching the site, allow youth to explore the area for a short time. Be sure to set boundaries and warn of potentially dangerous plants and animals before they begin their exploration.
- Have each youth reach down and touch a different plant. Tell youth not to put any plants in their mouths. On an index card have each youth describe their plant by color, height, feel, leaf size, flower and location so another youth can find it. Pair youth up with a partner. Have youth exchange cards with the partner. Have the first youth take the second youth over to the area where the first youth's plant was and try to find it by the description on the index card. Repeat with the second youth's plant.
- Have youth sit in a circle with their eyes closed. Tell youth to listen to sounds around them. After a minute, have youth tell the group what they heard and what might have made the sound.

MATERIALS
- Bucket (2 or 3)
- Small shovel
- Index cards (1 for each youth)
- Pencils
- Guide books for plant and animal identification

TIME: 1-2 hours

SETTING
A nearby freshwater wetland.

ADVANCED PREPARATION:
Ask for adult volunteers to help supervise.

- Find some water in this wetland. Carefully dip your bucket into the water so that you have a sample of this wetland. Examine the water. Help the group to describe what is in this sample of the wetland.
- Examine the soil. What does it feel like, smell like, look like?

REFLECT

- **Is water always present in a freshwater wetland area?**
  No, wetland areas experience wet and dry cycles on a periodic basis. In some wetland types, water may never be visible at the surface, but is present in the soil and influences the types of plants found there.
- **In what ways can we tell plants apart?**
  Color, height, feel, leaf size, flower type, woody/non-woody, etc.
- **What evidence did you see that animals are found in and around freshwater wetlands?**
  Animal tracks, droppings, nests or other "homes," etc.
- **What was in your sample of the freshwater wetland water?**
  Insects, small fish, small plants etc.
- **How would you define a freshwater wetland?**
  A freshwater wetland is land where water is present for some part of the year. It contains special types of soils and has a community adapted to the wetland habitat.
- **How has your view of wetlands changed since the visit?**

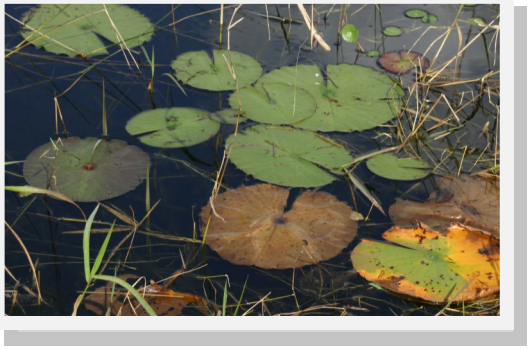
APPLY

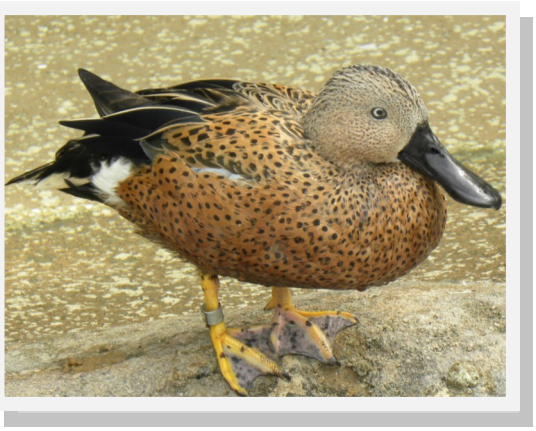
- **Have youth draw a picture of the freshwater wetland they visited, including any plants and animals they observed. Ask each person to diagram a possible food chain that could be found in the freshwater wetland.**

- **Discuss where this wetland is located. Is it near development? What are possible threat to this area?**

- **Are wetlands in your area protected? If so how are they protected? Are any wetlands in the area currently in public ownership such as a State Park or Recreation Area.**

- **What organizations can you identify that are involved in wetland protection?**





Activity 2: Wetland Bingo

OBJECTIVES: For youth to:

- Name common plants and animals found in freshwater wetland ecosystems in Florida.

LIFE SKILLS:

- Acquiring, analyzing and using information.

SUNSHINE STATE STANDARDS

SC.3.L.15.1--Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

SC.4.L.17.3--Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

SC.4.L.17.2--Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

SC.7.L.17.1--Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

MATERIALS

- WETLAND BINGO cards (one for every youth)
- Beans, Corn, or other material for markers.
- WETLAND BINGO plant and animal game words.

Introduction

Freshwater wetlands contain many types of plants and animals. Let's play WETLAND BINGO and discover what lives in freshwater wetlands!

Do

Play WETLAND BINGO

- Depending on the size of your group, youth may work in pairs or small groups on each bingo card.
- Go over the what each picture on the card represents.
- Ask for a volunteer to be the "caller" who is responsible for drawing the game words.
- Give all the other youth a game card and markers (bean, corn, etc.).
- Have the caller draw a game word and announce it to the group.
- Explain that when each person has a match they should cover the picture on the card with a marker.
- BINGO is won when a person has four pictures in a row covered in any direction.
- Continue until someone has BINGO and calls "WETLAND BINGO." Verify that each space covered was called.
- Provide a small "prize" for the winner such as a piece of candy.
- If members of the group wish to, they may swap cards and play again.

TIME: 30 minutes

SETTING
A comfortable room with tables and chairs.

ADVANCED PREPARATION:
Make a copy of WETLAND BINGO plant and animal game words and cut them into individual pieces. Make enough copes of the different WETLAND BINGO cards for every youth or have them work in pairs or small groups.

REFLECT

- **What animals on your card are mammals?**
  The raccoon and the rice rat are mammals.
- **Which fish on your card is a valuable sportfish?**
  The largemouth bass is a valuable sportfish in Florida.
- **Of the two snakes on your card, which is poisonous?**
  The cottonmouth is a poisonous snake found in Florida wetlands.
- **Which plant is considered a major pest in Florida waterways?**
  The water hyacinth is considered a major pest because it clogs waterways and crowds out native plants.
- **What is the largest reptile in the United States?**
  The American alligator is the largest reptile in the United States.
- **Name one insect breeds in standing water?**
  Mosquitos often breed in standing water.

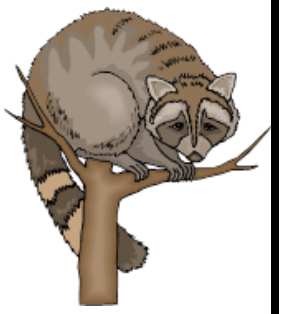
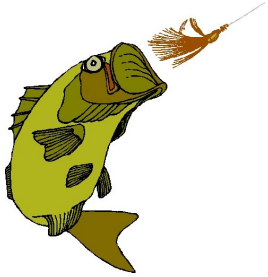
APPLY

- Ask each youth to choose one of the common freshwater wetland plants or animals used in this activity. Have each person read about their chosen species in a field guide; then explain its appearance, habitat, and place in a food web (or role in the freshwater wetlands ecosystem) to the rest of the group.
- From the wetland species in the bingo game try to assemble food chains or a food web that could exist in a wetland area. Can you identify any predator/prey relationships?

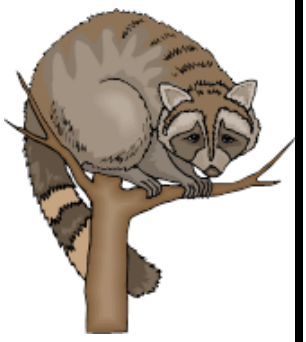
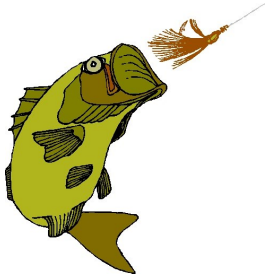
WETLAND BINGO GAME WORDS

WATER LETTUCE	**WATER HYACINTH**
WATER LILY	**MOSQUITO**
COONTAIL	**CATFISH**
ALLIGATOR	**POND TURTLE**
RACCOON	**RAT**
ANHINGA	**GREAT BLUE HERON**
OSPREY	**TADPOLE**
LARGEMOUTH BASS	

WETLAND BINGO CARD—KEY

Tadpole 	***Pond Turtle*** 	***Water Lettuce*** 	***Great blue heron*** 
Catfish 	***Alligator*** 	***Water Hyacinth*** 	***Osprey*** 
FREE SPACE	***Raccoon*** 	***Water Lily*** 	***Anhinga*** 
Largemouth bass 	***Rat*** 	***Coontail*** 	***Mosquito*** 

WETLAND BINGO CARD

			
			
FREE SPACE			
			

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		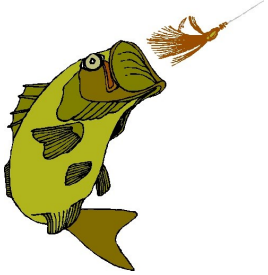	
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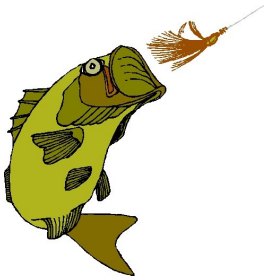
	**FREE SPACE**		
			

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		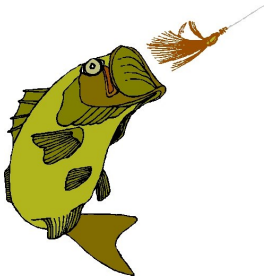	
			

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			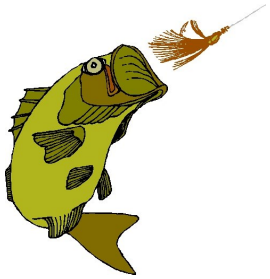
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WETLAND BINGO CARD

			
			
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	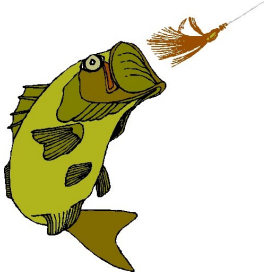		

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		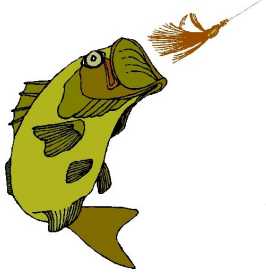	
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Activity 3: Wetlands Can Store and Filter!

OBJECTIVES: For youth to:

- Discover the slow release of water from freshwater wetland areas.
- Discover how freshwater wetlands can purify and filter water.

LIFE SKILLS:

- Acquiring, analyzing and using information.

SUNSHINE STATE STANDARDS

SC.4.L.17.4--Recognize ways plants and animals, including humans, can impact the environment.

SC.7.E.6.6--Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

SC.912.L.17.12--Discuss the political, social, and environmental consequences of sustainable use of land.

SC.912.L.17.16--Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.

Introduction

Wetlands serve many functions in the environment. Freshwater wetlands serve as temporary storage areas for surface water, slowly releasing it into rivers, streams and aquifers. Two more extremely important functions of wetlands are filtering and purifying water. Wetlands remove soil particles, chemicals, and other forms of pollution before the water is released. This activity will help you visualize these important functions of freshwater wetlands.

Do

- Cut two pieces of plastic wrap about 1½ feet long. Put one piece of plastic on top of the other in the shape of a cross. Use this to line the inside of the colander, making sure all the holes are covered. Fold the plastic wrap edges over the outside of the colander and tape securely.
- Use a straight pin to punch six or eight holes through the plastic wrap at the bottom of the colander. The colander demonstrates the slow release of water from a wetland area.
- Put a coffee filter in the center of the colander with a piece of Spanish moss on top of it. These materials represent the soil and plant roots found in wetland areas.
- Set the colander and filters in the clear glass bowl. The bowl represents an aquifer.

MATERIALS
For each group of 3 to 5 youth:

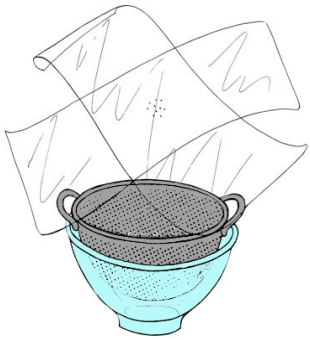
- 2 coffee filter1 clear bowl
- 1 colander
- Clear plastic wrap
- Packaging tape
- Scissors
- Small plants (duckweed will work well)
- Spanish moss (enough to fill the coffee filter)
- 1 straight pin
- 1 qt. jar w lid
- 1 qt. of water mixed with 1/4 cup sand, leaves, small twigs

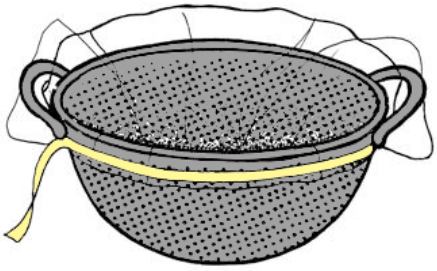
TIME: 60 minutes

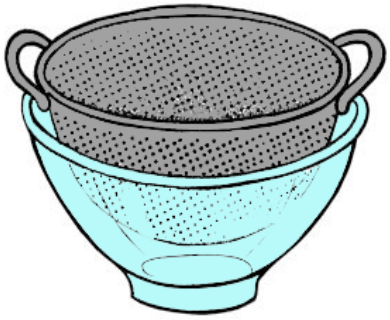
SETTING
Classroom near a sink or outside.

ADVANCED PREPARATION:
Wet the filters the night before and allow to dry.

- Put leaves, small twigs, and about ¼ cup of sandy soil into the jar of water. Put the lid on the jar, shake the contents.
- Slowly pour the contents into the colander. The dirty water represents rain and storm water runoff.
- Observe what happens to the dirty water.







REFLECT

- **Describe how the freshwater wetland model affected the soil and debris in the runoff water.**

  The wetlands' soil and plant roots filtered the soil and debris before the water entered into the aquifer.

- **Describe how the freshwater wetlands model affected the movement of runoff water into the aquifer.**

  In addition to trapping soil and debris, freshwater wetlands also function as temporary water storage areas, slowly releasing the water into rivers, streams and aquifers.

- **How do freshwater wetland plants help purify pollutants from the water?**

  Plants can absorb various nutrients and other pollutants with their roots.

- **Why are freshwater wetlands crucial for surface water and ground water (aquifer) recharge?**

  Wetlands are needed to provide us with clean water; without the filtering and purifying functions of wetlands our aquifer could be unsuitable for drinking.

APPLY

- Identify the closest freshwater wetland area. Call the Natural Resource Conservation Service, Forest Service, Florida Department of Environmental Protection and/or other agencies for more information.
- Draw a map of this freshwater wetland and its surrounding area. Identify possible sources of contaminants (pollution). Discuss how the wetlands function as a filter.
- Identify any threats to local freshwater wetlands areas.

Activity 4: Wetland Recharge

OBJECTIVES: For youth to:
- Identify the effect and impacts of the water cycle on wetlands.
- Evaluate the effectiveness of wetlands as aquifer recharge areas.

LIFE SKILLS:
- Acquiring, analyzing and using information.

SUNSHINE STATE STANDARDS
SC.2.E.6.3--Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants

SC.3.L.14.1--Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

MATERIALS
Copies of WETLAND RECHARGE Activity sheet for each youth.
- Plastic to cover table
- 2 10-gallon aquariums
- 2 small buckets
- 2 small diameter aquarium filter hoses.
- 2 Styrofoam cups
- Large (more than 1 gallon) sprinkling can
- Peat soil, not sphagnum peat (from any garden store)
- Sand
- Water
- Gravel
- Measuring cup
- Watch

TIME: 45 minutes

SETTING
A comfortable room with large conference style table (where water or soil can be used without too much problem)

ADVANCED PREPARATION:
Cover work area with plastic so any spilled water or soil will be easy to clean up.

INTRODUCTION

Wetlands act like a sponge. Wetlands soak up water from rain and runoff and slowly release it over long periods of time. The process of releasing this water to aquifers is known as recharge. Groundwater recharge is an important function of wetlands. This recharge supports surface and underground flow of water during dry periods.

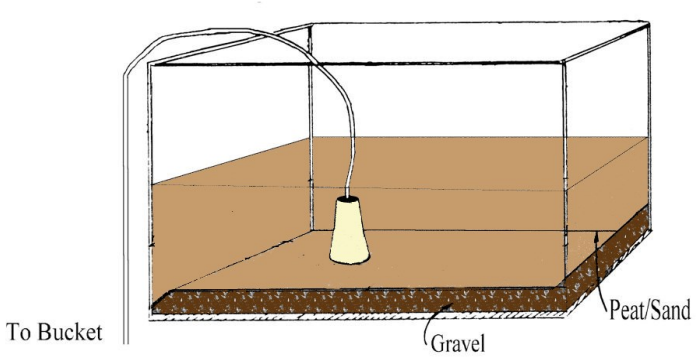
Several factors determine how important a particular wetland is to groundwater recharge. Soil permeability is the rate at which water can pass through the soil. The percentage of open pore space in the soil (porosity) is also an important factor. Other factors include the size of the wetland and local geology. In this activity we will see how different soil types affect the rate of water movement. The rate at which water moves through soil affects the types of plant life that are found in a particular wetland.

In this activity we will build two wetlands each with a different soil type. We will then simulate rainfall and see how the rate of water flow through the wetland varies.

DO (Part 1)

- Distribute WETLAND RECHARGE activity sheet to youth.
- Review the activity sheet with youth (emphasize that questions come from demonstration).
- Push hose through the bottom of the Styrofoam cup (hose should fit snugly inside hole).

- Stuff the same end of hose with gauze or cheese cloth.
- Place a Styrofoam cup upside down in the empty aquarium. Place the other end of the hose in the bucket. Bucket should be placed on a surface lower than the aquarium.
- Line the bottom of the aquarium with two inches of gravel around the cup.
- Fill the aquarium half full of peat, then compress it in the center to make a depressed area.
- Repeat the above steps for the second aquarium, substituting sand for peat.



DO (Part 2)

- Use the sprinkling can to apply 1 gallon of water evenly over the top of peat until water is present at the surface (measure how much water you used).
- Have youth time how long it takes for water to reach the bottom.
- Siphon water through the hose into one of the buckets. To start a siphon simply insert one end of hose into water and gently inhale on the other end while holding hose below the water level.
- Measure the amount of water that is in the bucket when no more can be siphoned out.
- Repeat these steps for the second aquarium filled with sand.
- Wait 30 minutes after the initial siphoning period and try again with each aquarium, measure the water removed after this second try.

REFLECT

- **Why did we use peat?**

  Peat can be found in some wetland types and closely represented wetland soil.

- **What is water that is under the soil called?**

  Water that is below the confining layer underground is called the aquifer.

- **What did the Styrofoam cup represent?**

  The Styrofoam cup represented a well which is used to obtain water from the aquifer.

- **How might different soil types affect the rate of water movement?**

  Water will move faster through some soils and slower through others.

- **Is peat or sand more common in wetland areas?**

  Peat is more common in a wetland because it is made of partially decomposed organic matter and tends to hold water.

- **Over a period of time, where would the water in the freshwater wetland soil move?**

  Water could move from the wetland into the atmosphere through evaporation or into the aquifer by groundwater recharge.

- **If plants were present, would there be another means of water movement?**

  If plants were present, water would also move into the atmosphere due to transpiration through plant leaves and stems.

APPLY

- **If the freshwater wetland had a soil through which water moved quickly, how would the plants have to adjust?**

  Plants adapt to sandy soils by growing many small roots which are able to capture the water as it rushes by.

- Allow aquariums to sit over night. Pour water out of bucket and then suction any water that may have accumulated on the bottom of the aquarium. Measure how much water accumulated over night in each of the aquariums.

- Repeat experiment with other soil types found near where the youth live.

WETLAND RECHARGE

Answer these questions as you watch the demonstration.

1. How much water was put in each of the aquariums?

   PEAT _____ **SAND** _____

2. How long did it take for water to reach the bottom of the aquarium?

   PEAT _____ **SAND** _____

3. How much water was in the bucket?

   PEAT _____ **SAND** _____

4. How much water is still in the soil?

   PEAT _____ **SAND** _____

5. Over a period of time, where would water in the soil move to?

6. If plants were present, would there be another way for water to move out of the wetland? If so, how?

Activity 5: Food Connections

OBJECTIVES: For youth to:

- Demonstrate knowledge of food chains and energy flow in wetlands.
- Define the terms; herbivore, carnivore, and omnivore.

LIFE SKILLS:

- Communicating and relating with others.

SUNSHINE STATE STANDARDS

SC.4.L.17.3--Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

SC.4.L.17.2--Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

SC.7.L.17.1--Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web

MATERIALS

- Scissors (one pair for each youth)
- Glue
- Poster paper (piece for each youth)
- Magazines (preferably wildlife types such as Audubon, National Wildlife, Ranger Rick, Outdoor Life, etc.).

TIME: 1 hour

SETTING

A comfortable room with tables and chairs.

INTRODUCTION

What do we call it when one thing eats another, which is then eaten by another organism? It's called a food chain! In a food chain there are animals that eat only plants called herbivores. Animals that only eat other animals are called carnivores. Some animals that eat both plants and animals are omnivores. Let's see how many different freshwater wetlands food chains we can make!

DO (Part 1)

- Students should have completed activities 5 and 6 in Lesson One: Aquatic/Marine Ecosystem Connections, to understand the concepts of food chains and food webs before beginning this activity.
- Give each person a magazine, scissors, glue and a sheet of paper.
- Ask everyone to make a food chain using pictures in the magazine (try to use only freshwater inhabitants if possible). Organisms in the chain are to be labeled as producer or consumer; and omnivore, herbivore or carnivore. Explain that consumers will have two labels. For example, an alligator would be a consumer and a carnivore.
- Draw lines to connect the food chain.
- Ask each person to show the group their food chain and explain it.

DO (Part 2)

- Bring the group back together and explain that it's time to prepare to sing a song. It's a song about a food chain, a wetland ecosystem, and an old lady. Tell them that while singing, they're going to act out the story told by the song. This will be a fun way to understand what a food chain is all about--eating!
- Ask for seven volunteers to play the parts of animals. Ask, "Who will be a fly?" and have volunteers raise their hands. Choose a fly, and then continue with a spider, a fish, a snake, a bird, a fox, and an alligator. Have the animals gather over to one side of the area and tell them to wait for their cues.
- Have the remaining youth form a circle. Inform them that they will represent the old lady of the song, or more specifically, her stomach. Choose a place in the circle where her "mouth" will open by having two youth stretch their arms out and touch hands.
- Ask if everyone knows the tune to the "There was an old lady" song. If not, you might want to demonstrate by singing a verse or two. Explain that as the song is sung, the animals will tell the story by acting out their roles and being "eaten" by the old lady. For this they must pass through her "mouth" and will stay inside the circle.
- Encourage everyone to really get into their roles. Those forming the circle may clap or sway to the song as it is sung. As each animal is consumed, they will create a chain inside the circle that represents the order in which they are eaten. The spider will put his\her hands on the waist of the fly. The fish will join to the spider, and so on. The fly will lead the chain in a little dance around the inside of the circle as the story unfolds.
- Tell everyone that when the last line is sung, those forming the circle should fall down as if dead.

REFLECT

- **What are animals that only eat other animals called?**

  Carnivores are animals that only eat other animals.

- **What are animals that only eat plants called?**

  Animals that eat only plants are called herbivores.

- **What do we call an animal that eats both plants and other animals?**

  An omnivore is an animal that eats both plants and animals.

- **Were there any producers present in the food chain of the "There was an old lady" song?**

  No producers were in this food chain because producers use the sun for energy. Plants are producers. There were no plants in the song, only animals.

- **So that food chain is made up of only consumers?**

  This food chain is made up only of consumers because all of the animals must eat other living things to have energy. They can't produce it themselves like most plants.

- **What role do humans play in food chains?**

  Humans are consumers in the food chain.

- **Are you a herbivore, omnivore, or carnivore?**

  Most will say omnivore, but there may be some vegetarians in the group, in which case the correct answer is herbivore.

APPLY

- **Ask youth to identify an endangered carnivore found in Florida's freshwater wetlands.**

  Florida panther, wood stork or snail kite

- **Name a carnivore found in Florida's freshwater wetlands that was once endangered but is now common.**

  Alligator

- **Name a common omnivore found in Florida's freshwater wetlands.**

  Raccoon or wood duck

- **Ask youth to identify an endangered herbivore that frequents Florida's freshwater wetlands.**

  Manatee, Florida saltmarsh vole or Anastasia Island beach mouse

- **Identify a freshwater wetland in your area and some of the common and endangered species found there.**

"There Was an Old Lady (Wetlands Version)"

Tune: There Was an Old Lady

There was an old lady who swallowed a fly.
I don't know why she swallowed a fly.
Perhaps she'll die.

There was an old lady who swallowed a
spider that wriggled and tickled
and jiggled inside her.
She swallowed the spider to catch the fly.
I don't know why she swallowed the fly.
Perhaps she'll die.

There was an old lady who swallowed a
fish. Imagine this! She swallowed a fish.
She swallowed the fish to catch the spider.
She swallowed the spider to catch the fly.
I don't know why she swallowed the fly.
Perhaps she'll die.

There was an old lady who swallowed a
snake. It made her shake to
swallow the snake.
She swallowed the snake to catch the fish.
She swallowed the fish to catch the spider.
She swallowed the spider to catch the fly.
I don't know why she swallowed the fly.
Perhaps she'll die.

There was an old lady who swallowed
a bird. How absurd to swallow a bird!
She swallowed the bird to catch the snake.
She swallowed the snake to catch the fish.
She swallowed the fish to catch the spider.
She swallowed the spider to catch the fly.
I don't know why she swallowed the fly.
Perhaps she'll die.

There was an old lady who swallowed a
fox. It rolled her socks to swallow a fox.
She swallowed the fox to catch the bird.
She swallowed the bird to catch the snake.
She swallowed the snake to catch the fish.
She swallowed the fish to catch the spider.
She swallowed the spider to catch the fly.
I don't know why she swallowed the fly.
Perhaps she'll die.

There was an old lady who swallowed a
gator. She died later.

Activity 6: Wetland Types

OBJECTIVES: For youth to:

- Name and describe several wetland types.
- Discover that wetlands are not all the same in terms of "wetness" and the plants and animals that inhabit each wetland type.

LIFE SKILLS:

- Problem solving and decision making.
- Working with others.

SUNSHINE STATE STANDARDS

SC.6.E.6.2 Recognize that there is a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.

COMMON CORE

CCSS.ELA-Literacy.SL.6.1 Engage effectively in a range of collaborative discussions with partners, building on other's ideas and expressing their own clearly.

MATERIALS

- A copy of FRESHWATER WETLAND TYPES - DESCRIPTIONS for each youth
- A set of WETLAND TYPES - PICTURES, for every three persons
- Field guides of trees and plants (See "Reference List" section)

TIME: approximately 30-40 minutes

SETTING

A comfortable room with tables and chairs.

Introduction

A wetland is described as land where water is the dominant factor determining the types of plant and animal communities living in the soil and on its surface. There are a variety of wetland ecosystems. Wetlands are classified by the frequency and degree of wetness, soils, and the type of plant life most prevalent there. A wetland does not need to be wet all of the time to be considered a wetland, in fact many wetlands are only covered by water during a rainy spring or summer season. Some wetlands are regularly or frequently flooded, while others may be covered by water all of the time. Wetlands may be present in either fresh or salt water environments. This lesson and activity will focus on freshwater wetland types.

NOTE: In actuality, wetland classification is a very complex topic. The classifications included in this activity have been simplified for the intended audience.

Do

- Divide the youth into groups of three.
- Give each youth a copy of FRESHWATER WETLAND TYPES - DESCRIPTIONS to read.
- Give each group a field guide book, if available, and a copy of FRESHWATER WETLAND TYPES - PICTURES.
- Have field guides available as references for youth to look up terms from the descriptions they are not familiar with (broad-leaved, saturated, etc.).

- Have each group use the guide book to look up any trees or plants that are listed in the descriptions (for example, bald cypress, sweetgum, water lilies, etc.)
- Ask each person to use the descriptions to classify all of the wetland diagrams.
- Discuss the correct classification of each wetland.

REFLECT

- **What is the difference between a swamp and a marsh?**

  The main difference between a swamp and a marsh is that a swamp has trees and shrubs while a marsh is dominated by grasses and other non-woody vegetation.

- **How can you tell if a freshwater wetland is a hardwood swamp?**

  A hardwood swamp consists of mostly broad leaved deciduous trees.

- **How would you compare a bayhead and a hydric hammock?**

  Both bayheads and hydric hammocks are forested wetlands. Soils in both of these wet lands are usually saturated and seldom flooded. Some of the same kinds of trees are present in both bayheads. However, bayheads are dominated by broad-leaved ever greens, while hydric hammocks have a mixture of deciduous and evergreen trees.

- **Was it difficult getting the entire group to agree on the classification of a freshwater wetlands ecosystem?**
- **If you disagreed on a classification, how did you decide on the final classification?**

APPLY

- Take youth to a nearby wetland and have them classify it based on the description given in this activity.
- Have youth investigate how controversial wetland classification can be by contacting the regional planning council, an environmental lawyer, the EPA, and/or through library research, for current wetland delineations. Youth will discover how difficult wetland classification can be.
- Help youth to conduct a role-playing study of the ways classification of freshwater wetlands can affect their use and limitations imposed by federal, state and local regulations.

FRESHWATER WETLAND TYPES - DESCRIPTIONS

SWAMPS (Forested Wetlands)

Cypress swamps are dominated by bald or pond cypress trees. The cypress is a deciduous conifer that has needle-like leaves. Cypress swamps may be flooded for long periods of time and have soils that are poorly drained.

Bayheads are wetlands dominated by broad-leaved evergreen trees such as loblolly bay, swamp bay and sweet bay. Trees such as swamp tupelo, pond pine, cabbage palm and cypress may be commonly found in a bayhead as well.

Hardwood swamps consist of deciduous broad-leaved trees such as red maple, tupelo, elms, oaks, sweetgum and ashes. Seasonal periods of prolonged flooding may occur each year. Soils are nearly level and are very poorly drained.

Hydric hammocks are composed of a mixture of broadleaf, evergreen and deciduous trees. Cabbage palm may be common along with red maple, sweet bay, sweetgum, water oak, ashes and swamp laurel oak. These wetlands are seldom flooded but have saturated soils most of the year. Soils are nearly level and poorly drained.

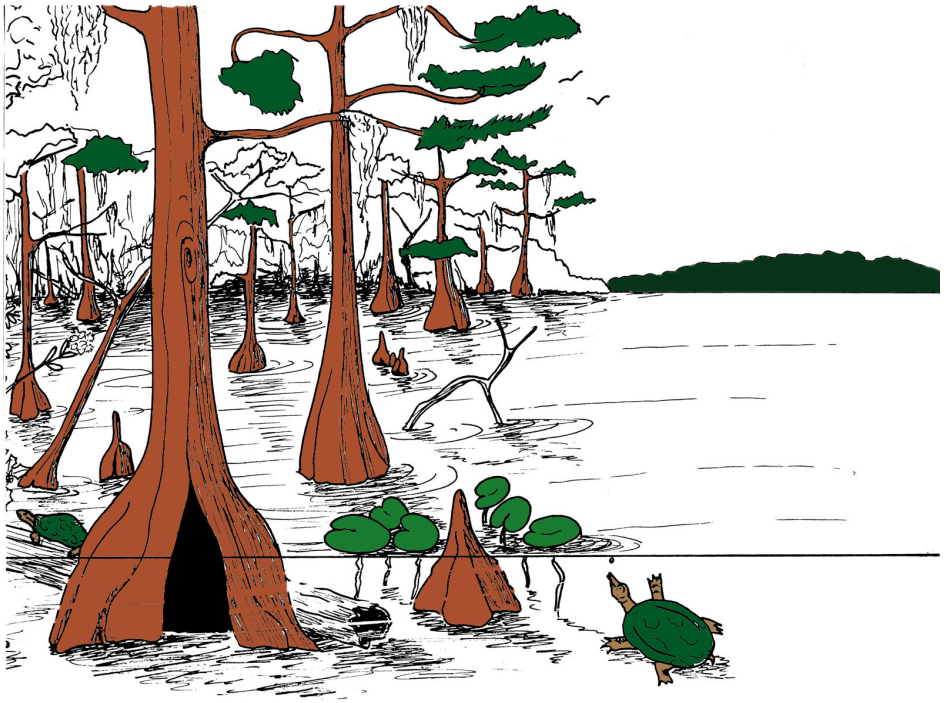
MARSHES (Non-Forested Wetlands)

Deep marsh is composed mainly of submergent and emergent aquatic plants such as water lilies. Deep marshes are semi-permanently to permanently flooded. These areas may be found along lakes and rivers or may be isolated wetland areas not connected to another water body. Soils are nearly level and very poorly drained.

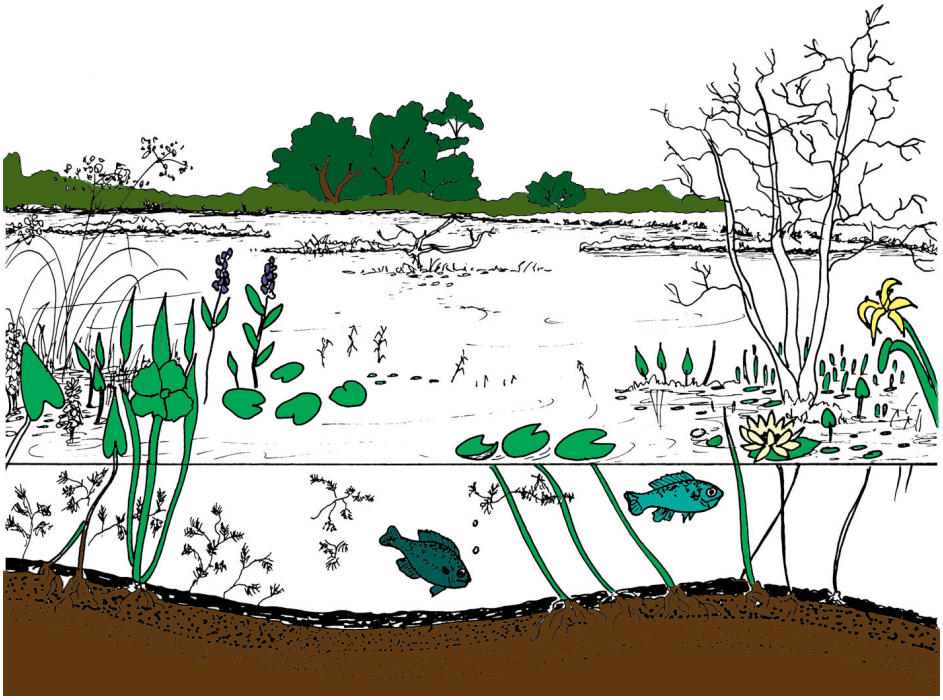
Shallow marsh is dominated by grasses, sedges (sawgrass) and other non-woody plants such as cattails. The soil is usually covered with water at least two months of the year. Soils are nearly level and poorly drained.

Wet prairie is made up mostly of grasses, sedges and rushes. Wet prairies are flooded for only short periods of time but are saturated most of the time. Soils are poorly drained. Often called freshwater meadows.

WETLAND TYPES - Answer Key

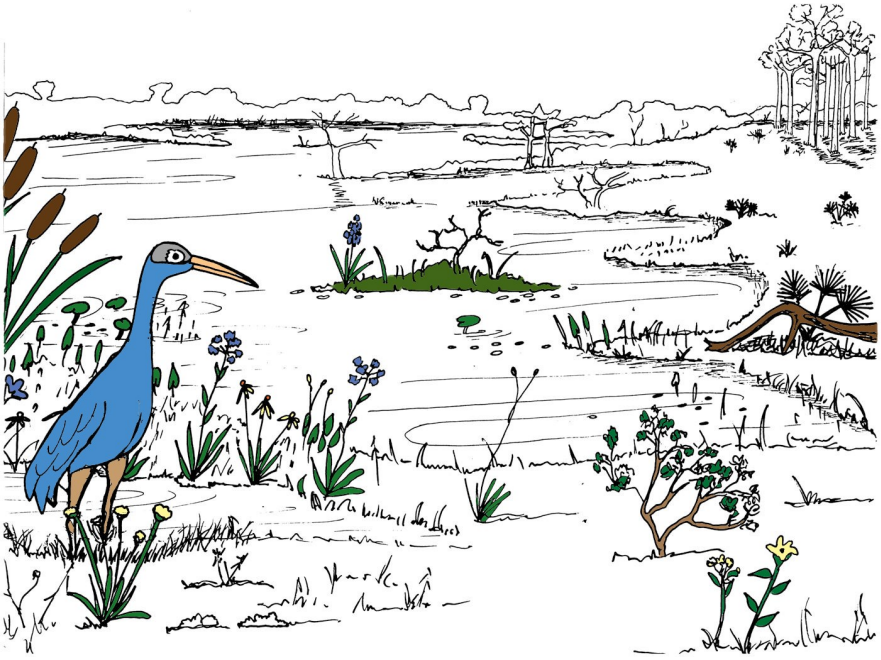


A-Cypress Swamp



B-Deep Marsh

WETLAND TYPES - Answer Key

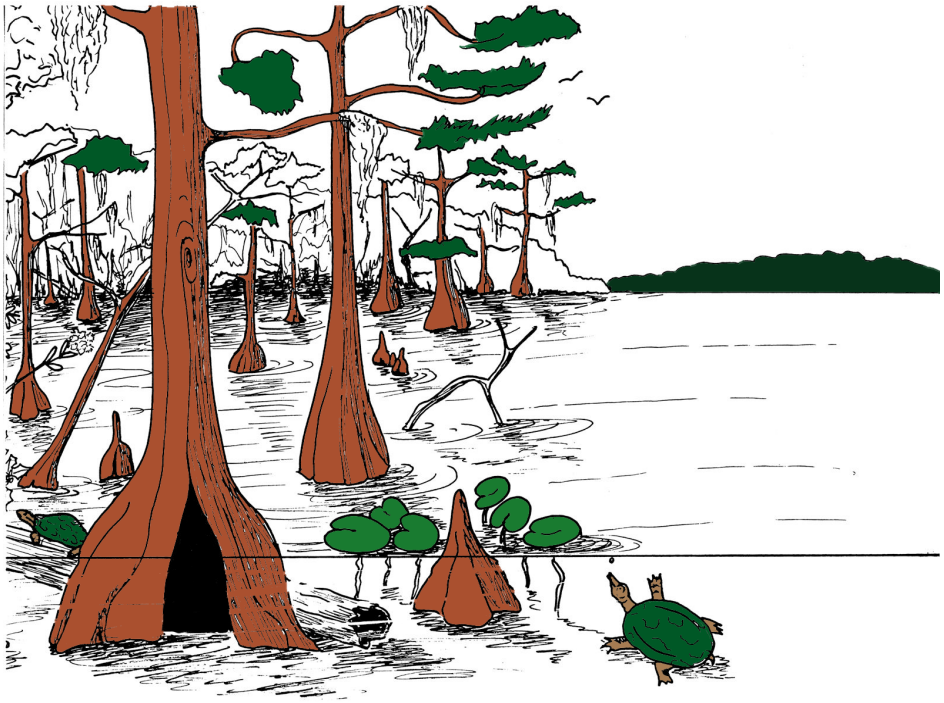


C-Shallow Marsh

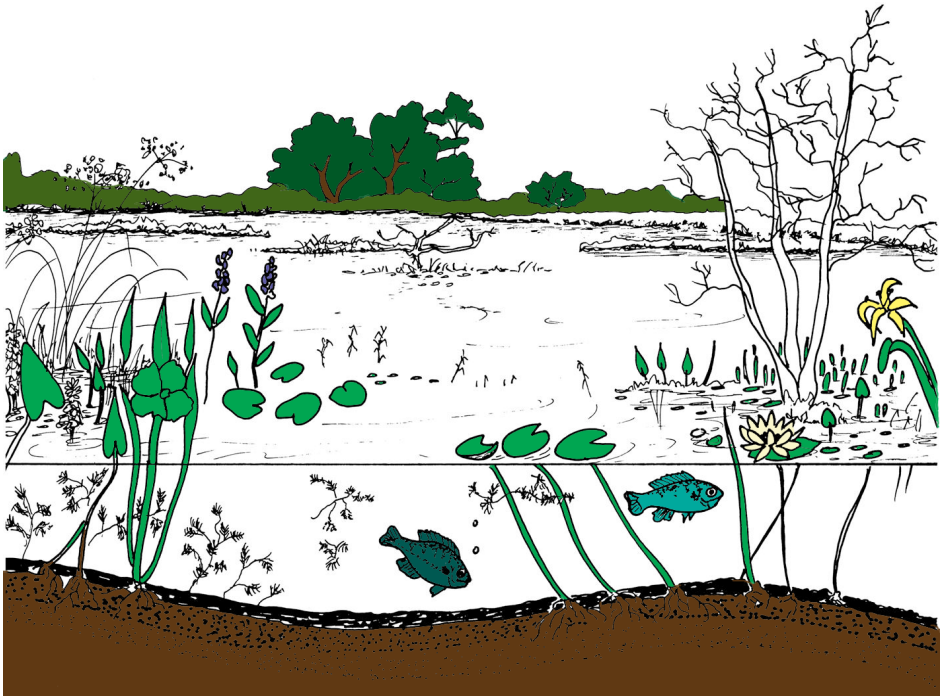
D-Bayhead

WETLAND TYPES

A

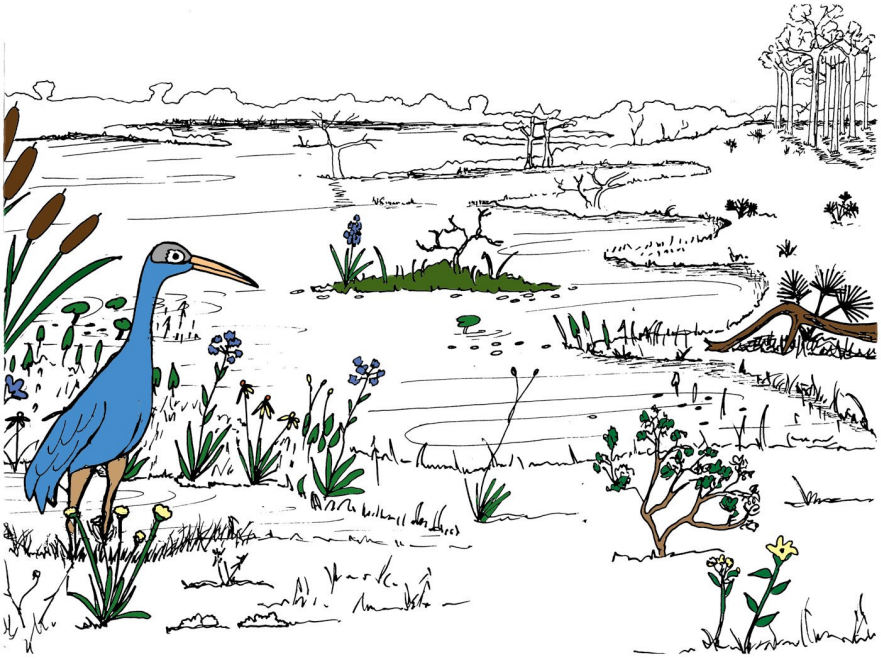


B



WETLAND TYPES - Answer Key

C



D

Activity 7: Wet and Wild Trivia

OBJECTIVES: For youth to:
- Review their knowledge of wetland ecosystems.
- Describe several ways that wetlands are important to humans and wildlife.
- List three important function of wetlands

LIFE SKILLS:
- Acquiring, analyzing and using information.

SUNSHINE STATE STANDARDS
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 plants and animals, including humans, can impact the environment.

SC.7.E.6.6--Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

MATERIALS
- WET AND WILD TRIVIA Questions
- Chalkboard or easel paper
- Index cards
- Glue
- Scissors
- Large sack
- Chalk, markers

TIME: 60-90 minutes

SETTING
Classroom

ADVANCED PREPARATION:
Review trivia questions and select appropriate questions for your group.

Introduction

Now that you have learned about wetlands, let's see what you can remember from the past activities. We are going to play a trivia game where you will answer questions about wetlands. In this activity you will also learn how wetlands are valuable to people and wildlife.

Do

- Start by asking youth to describe ways that wetlands are important to people and to wildlife. List their answers on a chalkboard or large sheet of easel paper. Add to their list, using information from the Background Basics. Then tell youth that they are going to play a trivia game.
- Divide the group into teams of three to four participants. Explain that the object of WET AND WILD TRIVIA is to correctly answer questions about wetlands. Teams will be awarded five points for each correct response. The team with the most points at the end of the activity is the "wetland winner." The leader may modify the game by adding a lightning round that doubles the point value for each question.

Have each team appoint a spokesperson. Then alternate from team to team, asking each a different trivia question from the list at the end of the activity. Explain that team members can discuss each question, but the answer must come from the spokesperson. Set a time limit of 15-30 seconds. If the leader chooses you may pass the question to the next group if the response given by the first group is incorrect.

REFLECT

- Refer to the "Trivia Questions" section for this information.

APPLY

- Explain how wetland ecosystems function as flood control areas. Identify wetlands in your area and explain how these wetlands might influence floodwater levels in the area.
- Can you identify any crops that are grown in former wetland areas in Florida, in the United States? Do you utilize these crops in any way?
- Contact your local water management district about information on ground water recharge areas. Are any of these areas associated with wetland habitats?
- Make a list of agencies in your area that work with wetlands. Contact these areas to find out more about what they are doing and explore ways in which you can get involved in wetlands protection or restoration.

Trivia Questions

1. **Name two types of freshwater wetlands.**

   Swamp, freshwater marsh, bog

2. **Name three animals that might be found in a wetland.**

   Frog, duck, fish, mosquito, beetle, spider, deer, beaver, muskrat, crab, snail, etc.

3. **Many carnivorous plants grow in wetlands. Name two.**

   Sundew, pitcher plant, bladderwort, Venus flytrap, butterwort, etc.

4. **Explain two reasons why wetlands are valuable.**

   Wildlife habitat, water purifier (improves water quality), flood control and prevention, shoreline protection, recreational opportunities

5. **True or false: If you go to a swamp you are likely to drown in quicksand.**

   False

6. **What part of a bald cypress tree produces the tree's "knees": trunk, roots, or branches?**

   Roots

7. **How are wetlands related to underground aquifers?**

   They help recharge water in the aquifer.

8. **True or false: Water is always present in a freshwater wetland area.**

   False

9. **Name a common omnivore in Florida's freshwater wetlands.**

   Raccoon, wood duck

10. **Name an endangered animal that lives in freshwater wetlands.**

    Whooping crane, snail kite, wood stork, Florida panther, bald eagle

11. **Name two ways human activities can alter wetlands.**

    Filling, dumping, dredging, draining

12. **What classification is a forested freshwater wetland?**

    Swamp

13. How does a freshwater wetland affect soil and debris in runoff water?

The wetland filters out soil and debris from runoff water

14. Name two tree species that grow in freshwater wetlands.

Bald cypress, red maple, sweet bay, cabbage palm, swamp black gum, water oak, saw palmetto

15. What type of soil is characteristic of a wetland ecosystem?

Hydric soil

16. What are some general characteristics of wetland soils?

May smell like rotten eggs or sulfur, usually dark brown or black, high in organic materials or humus.

17. True or False: Bayheads are wetlands dominated by broad leaved evergreen trees.

True

18. Deep marshes are usually associated with what other types of ecosystems?

A. mangroves and salt marsh

B. lakes and rivers

C. beaches and dunes

19. Name a wetland area that exists in your county.

20. Which of the following poisonous snakes would you most likely encounter in a wetland habitat?

A. anhinga

B. copperhead

C. cottonmouth

D. coral Snake