

## **Wetlands! Wetlands! What Natural Wonders**

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### **INTRODUCTION**

Wetlands can be found in nearly every county and climatic zone in the United States. Wetlands are natural wonders of great value. Because wetlands are so varied, it can be easy to overlook the common features and processes that unite them. Students often find wetlands difficult to recognize because they sometimes take them for granted as “unimportant” parts of the landscape. Many students who reside in the inner cities throughout the state of Texas often miss the chance to learn about or do not know how to identify wetlands or understand the ecological processes that can be found in our own states and cities. For this reason I have decided to create a unit that focuses on these wetlands and the ecological processes that occur within them.

This 5-6 day unit will primarily focus on the natural benefits that wetlands bring to our environment. Through several hands-on interdisciplinary lessons and hopefully at least one field lesson the third and fourth grade students in my class will be able to learn firsthand the functions and values of the four major types of wetlands (marshes, swamps, lakes, and rivers). My students will be encouraged to become elementary experts on the values and types of wetlands in our state as well as the animals and plants that call them home. Upon the completion of this unit the students in my class will learn how:

- To observe and describe changes in systems over time.
- To apply mathematics to science.
- To use scientific thinking processes to conduct investigations and build explanations.

Each student will be given the opportunity to experiment with the major environmental factors in an aquatic system such as a wetland. Most importantly, my students will learn to identify the different types of wetlands that can be found in and near the area where they live.

This unit will be taught in conjunction with Houston ISD’s Project CLEAR science curriculum for third and fourth grades. The introduction of the unit will give a brief overview of the importance of wetlands. I will then give a breakdown of the types of wetlands and the animals, flora, and fauna that can be found in each. Throughout the unit students will explore the interdependence of producers, consumers, and decomposers within wetland habitats that allow organisms to survive, recycle energy as food, and meet their basic needs. I will also include lessons that address the changes that can occur in an environment and how organisms adapt to continue to reproduce and survive.

It is important for my students to understand that all living things are dependent on the conditions in their environment. As we study the relationships between different organisms and their environments, each student will begin to build his or her own basic knowledge of each organism and the types of changes and or limits the organism can endure. This knowledge will later prove to be of the utmost importance for my students as we continue to complete the science unit. It is important for my students to understand how organisms depend on the conditions of their environment because humans can knowingly or unknowingly change environments like wetlands.

To ensure that the students are actively engaged and provided with ample opportunities to demonstrate their conceptual understanding and scientific processing skills, I have organized each lesson on the same conceptual framework as the 5E's scientific instructional method and model. The Five E instructional model was developed and modified by Roger W. Bybee to increase student conceptual scientific understanding and to improve teacher instruction. This instructional model encourages both teachers and students to actively engage themselves in the scientific process while exploring and evaluating learning outcomes and activities.

The components of this model are:

- 1) **ENGAGE** – this stage is initiated by asking well-chosen questions, defining a problem to be solved, or by showing something intriguing.
- 2) **EXPLORE** – this stage provides the opportunity for the student to become directly involved with the key concepts of the lesson through guided exploration that requires them to probe, inquire, and question order to learn the skill.
- 3) **EXPLAIN** – collaborative learning teams begin to sequence logically the events/facts and communicate these findings to each other and the instructor. (The instructor serves only as a facilitator).
- 4) **ELABORATE** – the student is allowed to extend and expand the processes and concepts they have learned in the first three stages and connect this knowledge with their prior learning to create understanding.
- 5) **EVALUATE** – this ongoing process allows the instructor to determine whether the learner has reached the desired level of understanding. (Additional formal evaluation can be conducted at this stage).

## **OBJECTIVES**

I believe that children learn better when they are presented with materials that are not only hands-on but minds-on as well. I will use this two week unit as an addition to my science and geography lessons that I already teach. Through the implementation of this unit, I will cover the following Houston ISD Project CLEAR science objectives.

- Science 3.2.02** - Observe and describe the habitats of organisms within an ecosystem.
- Science 3.2.04** - Observe and identify and record observations of organisms with similar needs that compete with one another for resources such as oxygen, water, food, or space.
- Science 3.2.06** - Describe and analyze the effect of environmental changes in which some organisms would thrive, become ill, or perish.
- Science 3.2.07** - Describe how organisms modify their physical environment to meet their needs such as beavers building a dam or humans building a house.
- Science 3.1.05** - Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.
- Science 3.1.04** - Collect information by observing and measuring.
- Science 3.1.01** - Demonstrate safe practices during classroom and field investigation.

## **RATIONALE**

My third grade students will have little pre-existing knowledge about wetlands. They will know that lakes and ponds are just big standing bodies of water that may contain aquatic organisms such as tadpoles, fish, and other small plants or animals. I will begin by eliciting prior knowledge through a vocabulary development exercise.

Lesson one will begin with the reading of the story *Mystery of the Muddled Marsh*, by Barbara Tharp, Judith Dresden, and Nancy Moreno. This book presents the escapades of Riff and Rosie in an illustrated storybook that also teaches science and health concepts through the discovery of wetland habitats. I will post the following vocabulary list during the introduction of lesson one:

algae	bacteria	carbon dioxide	groundwater
marsh	nutrient	runoff	wetland

In their science notebooks I will have the students record each vocabulary word, and once we have discussed each one, they will then be asked to record the definition and draw a small sketch of each word in their own words in their notebooks. This activity will help me to assess how much of the vocabulary each student is absorbing.

I will continue lesson one with a KWL Chart. In their science journals each student will create their own KWL chart. I will then evaluate their prior wetland knowledge by asking them to write what they already know about wetlands and the types of plants and animals that can be found in them under the K in their charts. Each student will then be asked to write under the W what they would like to know about wetlands or something they hope to learn from our lessons and discussions during the next 5 to 6 days.

Once students have completed their journal writing activity, I will begin to discuss some of the characteristic of wetlands. I will divide the class into equal-sized groups. While the students are in their groups, I will distribute a set of wetland matching cards to each group. The cards will be labeled with a word on card A and a definition on card B. Each group will be instructed to match each card A vocabulary with its appropriate card B definition. After each group has completed its card matching activity, I will ask for volunteers to share their group's findings. As the children share their group work, I will discuss with the class what makes a wetland a wetland and the types of plants and animals that can be found in them.

Day two of our wetland study will begin with a review of what we learned during lesson one. I will add the following additional vocabulary to our previous day's vocabulary list.

ecology	ecosystem	freshwater	saltwater	organism
food chain	food chain	shelter	food	protection

As we discuss lesson two, I will talk about the ecosystem of a wetland. My students will learn that no organism on earth lives isolated from or independent of all others. They will learn that all living things exist in a community of living organisms that we call an ecosystem. An ecosystem also includes nonliving elements such as soil, water, air and sunlight. Students will learn that the prefix "Eco" comes from the Greek word for house, habitat, or environment. We will also discuss some of the many complex relationships that exist in wetlands, the fact that some living things depend on others for food, and that they depend on nonliving things for shelter.

In their science journals I will have my students to answer the following questions before I continue with the lesson:

- 1) What do you already know about how living things depend on one another?
- 2) What would you like to find out about how living things depend on one another?

Once each student has answered each question they will then share answers with the class. I will then break the class into equal groups of 3-4 students. Each group will be given a picture of a wetland environment. I will ask my students to take 3-5 minutes look at the pictures they have in their groups and to see what different kind of relationships they can find and to be ready to discuss the following questions with their group and the class:

- 1) Identify the living things in this environment. Are they plants or animals?
- 2) How do the plants depend on the animals?
- 3) How do the animals depend on the plants?
- 4) Which of these living things need others in order to survive?
- 5) Identify the nonliving things in this environment.

After our group discussion each student will write in his or her science journals an example of a situation in nature in which one living thing depends on another living thing. Upon the completion of their journal writing activity, I will ask the students if they have ever thought of our schoolyard as an environment where plants and animals live. We will then go out to visit our schoolyard habitat and pond area. As we explore the habitat area, I will ask and discuss the following questions with my class:

- What plants can you identify that live our schoolyard environment?
- Is there evidence of any animal inhabitants?
- What nonliving things do the plants and animals depend on?
- How did the living things you observed in this habitat get food, shelter, water, and protection?

Day three of my unit will begin with a review of the previous day's activities and vocabulary. As a warm-up activity and small assessment, I will allow each student to create his or her own food chains. Each group of students will receive construction paper, crayons, glue, scissors, and old magazines. They will be given 15 minutes to draw or use the pictures in the magazines to create a food chain on their construction paper.

Once we have completed the warm-up activity, I will explain to the students that we are going to take an in-school field trip to visit some of the wetlands that we have discussed this week. While on this field trip, we will act as scientists by making observations in our journals and even collecting samples. The first place we will visit during our field trip is the school yard pond. While visiting the pond, each group of students will collect soil samples and draw sketches of some of the things they have observed in this area. We will then visit the school technology lab. While in the technology lab, I will partner students to work on the next group of activities together. Before we begin, I will explain to my students that the second half of our field trip will end with an online trip through many different wetlands. In order for the trip to begin everyone will be instructed to log onto one of the following websites:

- [http://sofia.usgs.gov/virtual\\_tour/ecosystems/index.html](http://sofia.usgs.gov/virtual_tour/ecosystems/index.html)
- <http://www.pbcgov.com/waterutilities/wakodahatchee/tour.htm>

The journey that they will take will be through many forms of wetlands. On this journey they will be able to virtually explore the ecosystems that can be found in marshes, swamps, bogs, lakes, and rivers. While exploring the web site on wetlands each group of students will also complete the following set of treasure hunt questions.

- 1) What are forested and/or scrub shrub wetlands commonly referred to as?
- 2) What is a dominant plant species located within a marsh area?
- 3) What type of wetlands are better known as marshes?
- 4) What areas do bogs form in?
- 5) How do wetlands protect us from floods?
- 6) Out of all endangered species, how many live in wetlands? (Lehman)

I will give my students 30 minutes to complete the treasure hunt activity. Once this activity is completed we will review and discuss the treasure hunt activities and pond observations they made as a class.

I will introduce lesson four with the reading selection “Duckweed, Elodea, and Algae: Why Are They Important?” During days four and five of my unit, we will create an aquarium and terrarium using soil samples and other plants and organism from our school yard habitat. Through this activity I expect my students to create and observe how ecosystems, such as those found in many wetlands, play an important role in maintaining the ecosystems. I will have my students compare and contrast both the aquarium and terrarium in their science journals.

The final lesson will be covered in two parts and will deal with the pollution of wetland ecosystems. I will have my students create a pollution experiment using the aquariums and terrariums they created in lesson four. Before beginning this experiment any live organism in the aquariums will be removed and replaced with fake fish, ducks, snails, etc. Students will then be asked to hypothesize about how they think pollution affects a wetland and the plants and animals that live in it. They will be given three solutions (vinegar, oil, salt). As a team they will decide which solution they would like to use to pollute their ecosystem. Each team will create and discuss their pollution plan. Before they begin their experiment, they will use pH paper to test the acidity of the aquarium water. Once they have recorded the results of their pH paper each group will pour a small amount of salt into their ecosystems. They will then conduct another acidity test using their pH paper. After completing the test, they will record the result in their science journals. This test will be completed with the vinegar as well. For the final test the students will simulate an oil spill by add a small amount of oil to their ecosystems.

Although the damage to one system was visible almost immediately, it will take longer for damage to become visible in the aquatic system. I am expecting my students to understand that in real-world ecosystems the same things might occur. More often pollutants accumulate over a long period of time before any major damages begin to show. I would also like them to find the following conditions in their experimental ecosystems:

- If the terrarium is polluted with acid and salt, no healthy plants will survive.
- The plants in the aquarium may become discolored over time.
- Due to too many pollutants, the animals in the aquarium may not be able to survive.

## **UNIT BACKGROUND**

### **Wetland Environmental Factors**

Wetlands are defined by the periodic presence of water. Wetland organisms can be stressed by either too much or too little water. There is one basic factor that determines the well-being of an organism in a wetland. This factor is hydrology. Water is the most important aspect of this factor because without water drought would not be recognized as a condition. It is true that many organisms do have strategies for obtaining and conserving water within their range of tolerance. But what about those plants and animals that have not adapted to the harsh conditions of drought and flooding? Scientists have found that plants in general are mostly affected by the flooding of wetlands and animals by the drying of a wetland.

### **Aquatic Environments**

Aquatic environments of wetlands are very diverse and complicated. There are two major types of aquatic systems: freshwater and saltwater. Freshwater and saltwater systems present opposite challenges for organisms that are seeking to maintain their osmotic balance. Freshwater environments are further divided into two categories. The first includes standing-water environments, such as swamps, lakes, and marshes, etc. These habitats may at times have low

oxygen levels and are relatively “self contained.” The second includes running- water environments, such as rivers and springs. These habitats rarely have low oxygen levels, but organisms must be adapted to strong currents. Furthermore, running-water habitats experience a constant input of materials and organism from “upstream” habitats. The temperature, light, nutrients, currents, carbon dioxide, concentration of salt, and oxygen all are important factors affecting the survival of the organisms living in and around these places.

I will teach my students about four major types of wetlands.

### **Types of Wetlands**

**Marsh** – A wetland that is typically not very deep and remains wet at least half of the year. A marsh can be distinguished from a swamp in that it dominated by non-woody vegetation.

**Swamp** – A wetland that is located in an area were the land is flooded with water and usually covered with dense vegetation, such as grass ,trees, and shrubs, A swamp can be distinguished from a marsh because the plants in a swamp are woody.

**Lake** – A large inland body of fresh or salt water that is surrounded by land.

**River** – A large natural stream of water emptying into an ocean, lake, or other body of water and usually fed along its course by converging tributaries.

### **Unit Vocabulary**

Vocabulary plays a very important role in developing a student’s reading comprehension skills and his or her ability to communicate effectively at a higher level. With this in mind, I have created daily vocabulary lists for my students to read, comprehend and implement through out the learning process of this unit. The vocabulary words introduced to students will be actively included in the lessons. Some of the vocabulary words that I will introduce are:

wetland	food chain	water	lake
river	swamp	marsh	species
organism	environment	ecosystem	

## **LESSON PLANS**

### **Lesson One**

#### ***Day 1***

#### Objective

Science 3.1.05 - Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.

#### Introduction

Purpose – Identify the characteristics of wetlands

#### Engage

Lesson one will begin with the reading of the story *Mystery of the Muddled Marsh* by Barbara Tharp, Judith Dresden, and Nancy Moreno. This book presents the escapades of Riff and Rosie in an illustrated storybook that also teaches science and health concepts through the discovery of wetland habitats. I will post the following vocabulary list during the introduction of lesson one:

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marsh	nutrient	runoff	wetland

In their science notebooks I will have the students record each vocabulary word, and once we have discussed each one, they will then be asked to record the definition and draw a small sketch of each word in their own words in their notebooks. This activity will help me to assess how much of the vocabulary meaning each student is absorbing.

I will continue lesson one with a KWL chart. In their science journals each student will create their own KWL chart. I will then evaluate their prior wetland knowledge by asking them to write what they already know about wetlands and the types of plants and animals that can be found in them under the K in their charts. Each student will then be asked to write under the W what they would like to know about wetlands or something they hope to learn from our lessons and discussions during the next 5 to 6 days.

<b>K</b> (What I know about wetlands)	<b>W</b> (What I want to know about wetlands)	<b>L</b> (What I have learned about wetlands)

Concept Development

Explore

Once students have completed their journal writing activity, I will begin to discuss some of the characteristic of wetlands. I will divide the class into equal groups. While the students are in their groups, I will distribute a set of wetland matching cards to each group. The cards will be labeled with a word on card A and a definition on card B. Each group will be instructed to match each card A vocabulary with its appropriate card B definition.

<b>Cards A</b>	<b>Cards B</b>
<b>Marsh</b>	A large inland body of fresh or salt water that is surrounded by land.
<b>Swamp</b>	A large natural stream of water emptying into an ocean, lake, or other body of water and usually fed along its course by converging
<b>Lake</b>	A wetland is typically not very deep and remains wet at least half of the year. This wetland can be distinguished from a swamp in that it dominated by non-woody vegetation.

Cards A	Cards B
<b>River</b>	A wetland that is located in an area where the land is flooded with water and usually covered with dense vegetation, such as grass, trees, and shrubs, This wetland can be distinguished from a marsh because the plants in it are woody.

Explain

After each group has completed their card matching activity I will ask for volunteers to share their group's findings. As the children share their group work I will discuss with the class what makes a wetland a wetland and the types of plants and animals that can be found in them.

Student Practice

Elaborate

- In their science journals each student will create their own KWL chart.
- They will write what they already know about wetlands and the types of plants and animals that can be found in them under the K in their charts.
- Each student will then be asked to write under the W what they would like to know about wetlands or something they hope to learn from our lessons and discussions during the next 5 to 6 days.

Assessment

Evaluation

Review students' science journals to make sure they have completed KWL charts.

Closure:

Elaborate

- Review key vocabulary and points discussed during lesson.
- Encourage students to research on their own about wetlands.
- Ensure students that more information on wetlands will be discussed during the next lesson.

Resources

Materials and Supplies Needed for this Lesson

- Science journals
- Book (*Mystery of the Muddled Marsh*)
- Sentence strips for posting vocabulary

Equipment

Overhead projector

**Lesson Two**

**Day 2**

Objective

- Science 3.2.02 – Observe and describe the habitats of organisms within an ecosystem.



- Science 3.2.04 – Observe and identify and record observations of organisms with similar needs that compete with one another for resources such as oxygen, water, food, or space.

Introduction

Purpose – Identify the characteristics of organisms within an ecosystem

Elicit Prior Knowledge

- Review of what was learned during lesson one.
- Add the following additional vocabulary to our previous day’s vocabulary list.

Ecology	ecosystem	freshwater	saltwater	organism
food chain	food chain	shelter	food	protection

Engage

Students will answer the following questions in their journals.

- 1) What do you already know about how living things depend on one another?
- 2) What would you like to find out about how living things depend on one another?

Once each student has answered each question they will then share answers with the class.

Concept Development

Explore

- Break the class into equal groups of 3-4 students.
- Give each group a picture of a wetland environment.
- Each group will take 3-5 minutes to look at the pictures and to see what different kind of relationships they can find amongst the organisms in the picture.

As they work please make sure each group of students are ready to discuss the following questions with their group and the class.

- 1) Identify the living things in this environment. Are they plants or animals?
- 2) How do the plants depend on the animals?
- 3) How do the animals depend on the plants?
- 4) Which of these living things need others in order to survive?
- 5) Identify the nonliving things in this environment.

Explain

- Discuss group questions from above.
- Post student answers.
- Ask students if they have ever thought of our school yard as an environment where plants and animals live.
- Take students out to visit school yard habitat and pond area.
- Encourage students to make observations.
- Allow students to collect and bring samples back to classroom.

Student Practice

Elaborate

Students will write in their science journals an example of a situation in nature in which one living thing depends on another living thing.

As we explore the habitat area I will ask and discuss the following questions with my class:

- What plants can you identify that live our schoolyard environment?
- Is there evidence of any animal inhabitants?
- What nonliving things do the plants and animals depend on?
- How did the living things you observed in this habitat get food, shelter, water, and protection?

#### Closure

#### Elaboration

- Allow time for students to observe and record final observations in their journals.
- Allow time for students to review and revisit prior questions and vocabulary.

#### Resources:

#### Materials and Supplies Needed for this Lesson

- Science journals
- Schoolyard habitat (pond area)

#### Equipment

None

### **Lesson Three**

#### **Day 3**

#### Objective

- Science 3.2.02 – Observe and describe the habitats of organisms within an ecosystem.
- Science 3.1.04 – Collect information by observing and measuring.
- Science 3.1.01 – Demonstrate safe practices during classroom and field investigation.

#### Introduction

Purpose – Explore school yard ecosystems and to develop a deeper understanding of wetlands

#### Elicit Prior Knowledge

Review of the previous day's activities and vocabulary.

#### Engage

- Allow each student to create their own food chains.
- Each student will receive construction paper, crayons, glue, scissors and an old magazine. Given them 15 minutes to draw or use the pictures in the magazines to create a food chain on their construction paper.

#### Concept Development

#### Explore/Explain

- Explain to the students that are going to take an in-school field trip to visit some of the wetlands that we have discussed this week.
- While on this field trip, they will act as scientists by making observations in their journals and collecting samples.
- The first place they will visit during their field trip is the school yard pond.
- While visiting the pond, each group of students will collect soil samples and draw sketches of some of the things they have observed in this area.

- They will then visit the school technology lab.
- While in the technology lab, students will partner to work on the next group of activities together.
- Before they begin please explain to the students that the second half of their field trip will end with an online trip through many different wetlands.
- In order for the trip to begin instruct everyone to log onto one of the following sites:
  - [http://sofia.usgs.gov/virtual\\_tour/ecosystems/index.html](http://sofia.usgs.gov/virtual_tour/ecosystems/index.html)
  - <http://www.pbcgov.com/waterutilities/wakodahatchee/tour.htm>

The journey that they will take will be through many forms of wetlands. On this journey they will be able to virtually explore the ecosystems that can be found in marshes, swamps, bogs, lakes, and rivers. While exploring the web site on wetlands each group of students will also complete the following set of treasure hunt questions.

### Student Practice

#### Elaborate

While exploring the web site on wetlands each group of students will also complete the following set of treasure hunt questions.

- 1) What are forested and/ or scrub shrub wetlands commonly referred to as?
- 2) What is a dominant plant species located within a marsh area?
- 3) What type of wetlands are better known as marshes?
- 4) What areas do bogs form in?
- 5) How do wetlands protect us from floods?
- 6) Out of all endangered species, how many live in wetlands?

### Assessment

#### Evaluation

Review students science journals for accuracy and understanding.

### Closure

#### Elaboration

- Allow students to complete treasure hunt activity.
- Review and discuss treasure hunt activity and pond observations with entire group.

### Resources

#### Materials and Supplies Needed for this Lesson

- Science journals
- Glue
- School yard habitat (pond area)
- Old magazines
- Construction paper
- Scissors
- Crayons

#### Equipment

Computer (with Internet)

## Lesson Four

### Day 4

#### Objective

- Science 3.2.02 – Observe and describe the habitats of organisms within an ecosystem.
- Science 3.1.05 – Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.
- Science 3.1.04 – Collect information by observing and measuring.
- Science 3.1.01 – Demonstrate safe practices during classroom and field investigation.

#### Introduction

Purpose – Identify the characteristics of organisms within an ecosystem by creating an aquarium habitat.

#### Elicit Prior Knowledge

- Review of what was learned during lessons one through three.
- Ask students what they can tell you about an aquarium or if they have ever seen one before.
- Elaborate on what an aquarium looks like — the types of plants and animals that can be found in it.

#### Engage

- Read the reading selection “Duckweed, Elodea, and Algae: Why Are They Important?”
- Tell students that they will be creating aquariums in their groups with some of the things they have just discussed in this reading.

#### Concept Development

##### Explore/Explain

- Hand out materials to every group of 2 students.
- Ask students to discuss with their partners the following questions:
  - 1) What do plants need to live?
  - 2) What do algae need to live
  - 3) What do animals need to live?
  - 4) Think of one living thing. How does it get what it needs to live in nature?
  - 5) How will we provide for these needs in an aquarium?
- Have students put a cupful of gravel in the bottom of their aquarium.
- Fill the aquarium with water until it is 3 to 4 cm from the top.
- Remind students to record their procedures and amounts of materials that they are using to complete this project in their science journals using the following table format.

	<b>Amount</b>	<b>Color</b>	<b>Description</b> <i>(example: texture, shape, etc)</i>
Gravel			
Water			
Elodea			

	<b>Amount</b>	<b>Color</b>	<b>Description</b> <i>(example: texture, shape, etc)</i>
Duckweed			
Algae			
Water Snail			
Mosquito Fish			

- Add the elodea.
- Use a spoon to scoop up the duckweed plants and place them in the aquarium.
- Use a dropper and place 3 droppers full of algae into the aquarium.
- Use aquarium thermometer to record the temperature of each students aquarium
- Place snails into the aquarium.
- Put mosquito fish into the aquarium.
- Have students to make 3 10-minute observations and record them in their journals. Use aquarium thermometer to record the temperature of each aquarium after each 10-minute observation.

### Student Practice

#### Elaborate

After setting up their aquariums, have students answer the following questions in their science journals.

- 1) What do plants need to live?
- 2) What do algae need to live?
- 3) What do animals need to live?
- 4) Think of one living thing. How does it get what it needs to live in nature?
- 5) How will we provide for these needs in an aquarium?

### Assessment

#### Evaluation

- Review students science journals for accuracy and understanding
- Observe each groups aquarium making sure they:
  - 1) Followed all instructions correctly for creating their aquarium.
  - 2) Used proper scientific observations and materials

### Closure

#### Elaboration

- Allow students to complete journal writing.
- Review and discuss student observations and completed projects.

## Resources

### Materials and Supplies Needed for this Lesson

- Science journals
- Aquarium Thermometer

(For every 2 students)

- 2 pond snails
- 2 mosquito fish
- 1 hand lens
- 1 spoon
- 1 clear plastic cup
- 2 sprigs of elodea
- 3 droppers full of algae
- 1 dropper
- 1 metric ruler
- 1 2 liter bottle (top should be already be but off)
- 1 ½ liters of water
- 2 paper towels
- 10-15 duckweed plants

### Equipment

None

## **ANNOTATED BIBLIOGRAPHY**

### **Works Cited**

“Duckweed, Elodea, and Algae: Why Are They Important?” *Ecosystems*. Science and Technology for Children. Carolina Biological Supply Company.  
<[http://www.carolina.com/carolina\\_curriculum/stc/acrobat/Ecosystems\\_1stEd\\_errata\\_set\\_1006\\_SG.pdf](http://www.carolina.com/carolina_curriculum/stc/acrobat/Ecosystems_1stEd_errata_set_1006_SG.pdf)>.  
This reading selection is used in Lesson 4.

Dresden, Judith, Nancy Moreno, and Barbara Tharp. *Mystery of the Muddled Marsh*. WOW Publications, 1997.

Lehman, John. “Wetlands of the World.” *Wetland Home*. 23 Feb. 2001. 10 Apr. 2007  
<[www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm](http://www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm)>.

This page gives an overview of the basic wetland types around the world. Visitors of this site will be able to view online first hand the benefits and different organisms that can be found in each wetland.

### **Supplemental Sources**

Alderet, Francisco, and Dana Kickler. “Wetland Wonders.” 07 May 2007  
<[www.nisd.net/lockehill/webquests/wetlands/WetlandWonders.htm](http://www.nisd.net/lockehill/webquests/wetlands/WetlandWonders.htm)>.

The following links come from all over the World Wide Web and represent a variety of facts about wetlands.

“Animals of the Wetlands.” *Wetland Home*. 23 Feb. 2001. 10 Apr. 2007  
<[www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm](http://www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm)>.

This overview of animals of the wetlands provides basic information about adaptations and characteristics of wetland species.

*Center for Aquatic and Invasive Plants*. 10 May 2007. Institute of Food and Agricultural Sciences. University of Florida. <<http://aquat1.ifas.ufl.edu/photos.html>>.

This website provides a well cataloged list of photos, links, and images of native and non-native aquatic plants in the Florida area.

Gobien, Andrew. *The Wakodahatchee Wetlands Virtual Tour*. 2006. Palm Beach County Water Utilities Department. <<http://www.pbcgov.com/waterutilities/wakodahatchee/tour.htm>>.

This site provides a virtual tour of the Wakodahatchee Wetlands.

“National Wetlands Inventory.” U.S. Fish and Wildlife Service. 6 Mar. 2007 <<http://www.fws.gov/nwi/>>.

This site provides Wetland Information to the American Public. Wetlands Mapper: view, download, or print maps of wetland digital data.

“Pond Food Web.” *Harcourt School Publishers*. Harcourt School Publishers. 07 May 2007  
<[http://www.harcourtschool.com/activity/food/pond\\_activity.html](http://www.harcourtschool.com/activity/food/pond_activity.html)>.

This is an interactive food chain activity that allows students to practice placing pond organisms within different food chains.

*South Florida Virtual Tour: Ecosystems.* U.S. Department of the Interior, U.S. Geological Survey, Center for Coastal Geology. February 2005. <[http://sofia.usgs.gov/virtual\\_tour/ecosystems/index.html](http://sofia.usgs.gov/virtual_tour/ecosystems/index.html)>. This site provides a virtual tour of South Florida wetlands.

*Texas Parks and Wildlife.* Texas Wetland Newsletter. <[www.tpwd.state.tx.us/landwater/water/habitats/wetland/publication](http://www.tpwd.state.tx.us/landwater/water/habitats/wetland/publication)>. Texas Wetland Newsletter is produced by TPWD. The Texas Wetland Newsletter is a bi-yearly publication that focuses on wetland conservation.

“Types of Wetlands.” *Wetland Home.* 23 Feb. 2001. 10 Apr. 2007 <[www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm](http://www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm)>. This page gives an overview of the basic wetland types.

“Wetland Plants.” *Wetland Home.* 23 Feb. 2001. 10 Apr. 2007 <[www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm](http://www.lethsd.ab.ca/mmh/grade5/wetlands/page4.htm)>. This overview of animals of the wetlands provides basic information about adaptations and characteristics of wetland species.

“Wetlands Scan Report.” Texas Department of Transportation. 15 May 2007 <[www.fhwa.dot.gov/environment/wetland/scanrpt/tx.htm](http://www.fhwa.dot.gov/environment/wetland/scanrpt/tx.htm)>. Coastal Bottomlands wetland mitigation bank in Brazoria County, Texas, includes compensation for bald eagle habitat.