Louisiana Wetlands Curriculum for 5th – 7th Grades (2/5/2005)

Level 1: What Is a Wetland?

Level 1/ Section 1 Intro: *How to tell if you're in a wetland*

Over 70% of our planet is covered by water…some of it in the oceans… some of it is in icebergs covering land in polar regions…and some of that water flows in rivers and streams above ground and soaks into the land itself.

All over the world there are places where land and water meet and form what we call ***wetlands.*** *Wetlands are literally "wet lands" where water collects and sits for at least part of the year. Wetlands are not open waters…plants grow through the water, rising above it. Some wetlands are "wet" in one season and dry in another.*

There are many different kinds of wetlands, but wherever they are in the world and whatever they are called, they all have several things in common:

1) One is that they all have a water source that saturates or floods that soil, (such as rain, a nearby coastal area, a river or a lake)

2) Another thing they all have in common is unique ***hydric*** *soil*

As you may know, English words are often rooted in Latin, Greek, and other languages.
Here's some useful GREEK for you…HYDRO means "water" so "HYDRIC SOIL" means "watery soil."

Hydric soils are so waterlogged, that there is little air in the ground, so only certain types of plants can live there…

3)...which brings us to the THIRD thing all different types of wetlands have in common: they all have ***hydrophytic*** *plants (aquatic or semi aquatic) that are specially adapted to live in these soils or in standing water.*

Again, here's the Greek HYDRO for water…"HYDROPHYTIC PLANTS" means plants that grow in water or waterlogged soil.

The types of wetlands most common in LOUISIANA are ***marshes*** *and* ***swamps.***

Marshes *are usually characterized by the salinity of their water (which means how salty). They can be salt, fresh, tidal or* ***brackish*** *(a mixture of fresh and salt water). Marshes also have soft stemmed vegetation like grasses and reeds that grow up out of water.*
Swamps *are dominated by woody plants like trees and are basically forests that flood.*

Level 1 / Section 1 Questions:

Most wetlands are located…

a. Along a coastal area.
b. By a lake.
c. Along a major river system
d. All of the above

The biggest difference between a swamp and a marsh is:

a. A swamp has more animals than a marsh.
b. A swamp has more trees than a marsh.
c. A swamp has more salty water than a marsh.
d. There are more swamps than marshes.

Brackish water…

a. has a mixture of fresh and salt water
b. is opaque and muddy
c. is found in the ocean
d. has no fish

What wetland type is the tropical counterpart to the Salt Marsh?

a. Fen
b. Slough
c. Mangrove
d. Bog

What is the process of deciding where a wetland starts and ends called?

a. Delineation
b. Demarcation
c. Detritus
d. Emergent

Level 1/Section 1 GLE's

Grade 4

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-E-A3: locating and comparing major plant and animal structures and their functions	40. Explain the functions of plant structures in relation to their ability to make food through photosynthesis (e.g., roots, leaves stem, flowers, seeds) (LS-E-A3)
LS-E-C2: describing how the features of some plants and animals enable them to live in specific habitats	53. Identify the habitat in which selected organisms would most likely live and explain how specific structures help organisms to survive (LS-E-C2)
Earth and Space Science: The students will develop an understanding of the properties of earth materials, the structure of the Earth system, the Earth's history, and the Earth's place in the universe	
ESS-E-A1: Investigate the properties of soil (e.g., color, texture, capacity to retain water, ability to support plant growth)	56. Investigate the properties of soil (e.g., color, texture, capacity to retain water, ability to support plant growth) (ESS-E-A1)

Grade 5

Science As Inquiry: The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SI-M-A1: identifying questions that can be used to design a scientific investigation	3. Use a variety of sources to answer questions (SI-M-A1)
Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance (LS-M-C3) 27. Compare common traits of organisms within major ecosystems (LS-M-C3)
LS-M-D1: Describing the importance of plant and animal adaptation, including local examples	29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1)

Grade 6
NONE

Grade 7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	25. Locate and describe the major biomes of the world (LS-M-C3)

Level 1 / Section 2 Intro: ***Functions of LA wetlands: Too valuable to lose, impossible to replace***

When the river or heavy rains saturate or flood our wetlands, it replenishes the wetlands area with fresh water and sediment and nutrients. In this way, wetlands act ***as natural purification systems*** *by recharging groundwater, and also convert sunlight and carbon dioxide into biomass providing nourishment for the rich wildlife found there.*

The wetland soil gradually absorbs the water and thus acts as a ***filter*** *cleaning the water supply. Wetlands act like sponges to slow and store or "absorb" water. This is important as the wetlands help protect us from floods. For every 3 miles of marsh, flooding from a storm is reduced by 1 foot.*

The plants of the wetlands have an important role as well in reducing storm damage. When storms come over open water, there is nothing to slow the winds and waves, but the vegetation of the wetlands does this. When powerful waves from a hurricane crash into the land, the wetland plants act as brakes, slowing down the waves and reducing their destructive power.

And the wetland plants themselves keep the land from washing away into the ocean.

Their root systems in the soil hold the ground together and prevent ***erosion****.*

Wetlands are critical in reducing the destructive power of storms.

Level 1 / Section 2 Questions:

We benefit from wetlands as they…

a. Reduce storm damage.
b. Recharge groundwater aquifers.
c. Supply nourishment for many different species.
d. <u>All of the above.</u>

_____

How many miles of healthy wetlands does it take to reduce storm flooding by one foot?

a. 25 miles
b. 14 miles
c. 5 miles
d. <u>3 miles</u>

_____

Wetlands have many important functions that help people. Which of the following choices BEST represents a wetland?

1. Dishtowel – Dries out surrounding areas.
2. Sponge – Holds extra water and helps prevent flooding.
3. Shovel – Turns the soil over.
4. Puppy – Provides companionship for humans to enjoy.

What is a warning sign that our wetland's are in distress?

a. Sedimentation
b. Fresh water intrusion
c. Pnuematophores
d. Betsy Balls

Level 1/Section 2 GLE's

Grade 4

Science As Inquiry: The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SI-E-A1: Asking appropriate questions about organisms and events in the environment	1. Ask questions about objects and events in the environments (e.g., plants, rocks, storms) (SI-E-A1)
Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
PS-E-A5: Creating mixtures and separating them based on differences in properties (salt and sand)	25. Describe various methods to separate mixtures (e.g., evaporation, condensation, filtration, magnetism) (PS-E-A5)
Earth and Space Science: The students will develop an understanding of the properties of earth materials, the structure of the Earth system, the Earth's history, and the Earth's place in the universe.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
ESS-S-A4: Investigating, observing, measuring and describing how water changes from one form to another and interacts with the atmosphere	60. Identify various types of weather-related natural hazards and effects (e.g., lightening, storms) (ESS-S-A4)

Grade 5

Science As Inquiry: The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SI-M-A1: Identifying questions that can be used to design a scientific investigation	3. Use a variety of sources to answer questions (SI-M-A1)
Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance (LS-M-C3)
Earth and Space Science: The students will develop an understanding of the properties of earth materials, the structure of the Earth system, the Earth's history, and the Earth's place in the universe.	

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
ESS-M-A7: Modeling how landforms result from the interaction of constructive and destructive forces	32. Demonstrate the results of constructive and destructive forces using models or illustrations (ESS-M-A7) 33. Identify the processes that prevent or cause erosion (ESS-M-A7)

Grade 6
NONE

Grade 7
NONE

Level 1 / Section 3 Intro: *Growing up in the Wetlands*

Since wetlands are an environment so flooded with water, the animals that live there are specially adapted to meet this challenge. (You'll learn more about this later.) Wetland plants have adaptations too, and you can tell if you're in a wetland by what plants are around you.

As you learned in the last section, one thing wetlands all have in common is that they have hydrophytic plants (aquatic or semi aquatic) that are specially adapted to live in the moist soil that does not hold air.

So the question is: How does as a tree or plants breathe when the ground is mostly wet or flooded?

There are a few key adaptations of plants in Louisiana wetlands:

- *Plants with shallow or exposed roots that get air from the topsoil or Floating plants with roots that dangle in the water like hyacinth or duckweed.*
- *Some plants have developed hollow tubes running through them that bring air from the leaves at the top down to the roots in the ground (reeds, cattail). These hollow tubes of air also help the plant stand up straight in the water and float.*
- *One way trees in the swamp get more air is through their pneumatophores, which is part of their root system that sticks out of the ground. Mangrove shrubs are an example of a plant with pneumatophores. Cypress knees are commonly mistaken for pnuematophores, current research indicates they are actually for starch storage.*
- *Here's some more GREEK for you…*

  pneumo- meaning "air" or "lung" and phor- meaning "carry" So since these growths are intended to carry air from above the water line, they are called pneumatophores…"air –carriers"

Some plants you'll usually find in a Louisiana Marsh are: ***cattail, saw grass, and cord grass***

Some plants you'll usually find in a Louisiana Swamp are: ***Cypress, tupelo gum, willow, and red maple***

Level 1 / Section 3 Questions:

What is one way pneumatophores help a wetland tree?

a. They reduce flooding
b. They help the tree "breathe"
c. They trip loggers

LS-M-D1
(LS-M-D1/5g) Describe adaptations of plants and animals that enable them to thrive in local and other natural environments

_____

(Image of reeds and grasses)
If you're in a Louisiana wetland and see plants like these growing around you, you are probably in a _____.

a. Marsh
b. Swamp

_____

(Image of cypress trees)
If you're in a Louisiana wetland and see trees like these growing around you, you are probably in a _____.

c. Marsh
d. Swamp

_____

What do hollow tubes running through wetland plants do?

a. carry air to the roots
b. help the plants stand up straight in the water
c. help the plants to float
d. all of the above

Level 1/Section 3 GLE's

Grade 4

Science As Inquiry: The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.	
BENCHMARKS	**GRADE-LEVEL EXPECTATION**
SI-E-A1: Asking appropriate questions about organisms and events in the environment	1. Ask questions about objects and events in the environments (e.g., plants, rocks, storms) (SI-E-A1)
Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATION**
LS-E-A3: Locating and comparing major plant and animal structures and their functions	40. Explain the functions of plant structures in relation to their ability to make food through photosynthesis (e.g., roots, leaves, stems, flowers, seeds) (LS-E-A3)
LS-E-C2: Describing how the features of some plants and animals enable them to live in specific habitats	52. Describe how some plants and animals have adapted to their habitats (LS-E-C2)
LS-E-C3: Observing animals and plants and describing interaction or interdependence	53. Identify the habitat in which selected organisms would most likely lie and explain how specific structures help organisms in the environment (LS-E-C3)

Grade 5

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C3: Investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance (LS-M-C3) 27. Compare common traits of organisms within major ecosystems (LS-M-C3)
LS-M-D1: Describe the importance of plant and animal adaptation, including local examples	29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1)

Grade 6
NONE

Grade 7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-D2: Explaining how some members of a species survive under changed environmental conditions	32. Describe changes that can occur in various ecosystems and relate the changes to the ability of how an organism can survive (LS-M-D2)

Level 1 / Section 4 Intro: *Water = Life*

*Wetlands are dependent on the **water cycle.** The sun is the main source of energy for the water cycle. The heat from the sun evaporates water from oceans, lakes, rivers, and moist land.*

*As the **water vapor** cools in the atmosphere, it condenses in the clouds. When the clouds meet cold air the water returns to the earth as rain. This is called precipitation.*

All water flows down hill due to gravity, so as it rains, water flows downward and into wetland areas carrying with it nutrients and sediments from the land uphill. This nutrient-rich water makes this wetland one of the most productive ecosystems on earth.

Because of this, the Louisiana wetlands are teeming with plants, fish, insects, and other invertebrates…they are critical rest stops for migratory birds and are home to many species of reptiles, mammals and amphibians.

Level 1 / Section 4 Questions:

What makes the wetlands so rich in wildlife?
a. the water cycle
b. levees
c. water vapor
d. nutrients from the ocean

_____

Water always flows…
a. South
b. Towards the ocean
c. Downhill
d. North

_____

What provides the energy that creates the water cycle?
a. Gravity
b. The sun
c. Pneumatophores
d. Erosion

Level 1/Section 4 GLE's

Grade 4

Science As Inquiry: The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SI-E-A1: Asking appropriate questions about organisms and events in the environment	1. Ask questions about objects and events in the environments (e.g., plants, rocks, storms) (SI-E-A1)
Earth and Space Science: The students will develop an understanding of the properties of earth materials, the structure of the Earth system, the Earth's history, and the Earth's place in the universe.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
ESS-E-A3: Investigating, observing, and describing how water changes from one form to another and interacts with the atmosphere	58. Draw, label and explain the components of a water cycle (ESS-E-A3)

Grade 5

Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
PS-M-A5: Investigating the relationships among temperature, molecular motion, phase changes, and physical properties of matter	5. Describe the properties and behavior of water in its solid, liquid and gaseous phases (states) (PS-M-A5)
Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A7: Demonstrating knowledge of the natural cycles, such as the carbon cycle, nitrogen cycle, and oxygen cycle	51. Describe naturally occurring cycles and identify where they are found (e.g., carbon, nitrogen, water, oxygen) (SE-M-A7)

Grade 6
NONE

Grade7

Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	35. Identify resources humans derive from ecosystems (SE-M-A1)

Level 1 FINAL INTERACTIVE: A wetland animals "memory" matching game.

Level 2: The Louisiana Wetland Ecosystem

Level 2 / Section 1 Intro: *Welcome to the Ecosystem*

An ecosystem is a community of organisms (living things) that interact with each other and the non-living things in their environment.

The living things in an ecosystem are easy to spot…they are the plants and animals that feed off each other passing on energy, but non-living things in the ecosystem are also very important. The rain and the water are essential to the living things…give them a place to live, grow, or hide…and the source of all energy for an ecosystem is the sun…which like the soil and air is a non-living thing.

The creatures in an ecosystem are interdependant…which means that though they don't know it; their survival depends on the survival of others.

An alligator just knows it wants to eat. But, it needs the water to live and hunt. It needs the turtles and fish to be healthy and plentiful. Thus, it needs the plants that feed the turtles and fish to also be healthy and plentiful. …and if any of these things change, then the alligator eventually suffers.

Changing one element of an ecosystem will affect the others. It's a domino effect.

Level 2 / Section 1 Questions:

A(n) _____ is a community of organisms (plants and animals) interacting with each other and with other living and non-living things in their environment.

a. Adaptation
b. Ecosystem
c. Food chain
d. Decomposer

_____

_____ is the source of energy for an ecosystem.

a. Plants
b. Dirt
c. The Sun
d. Microscopic animals

_____

The special place in an ecosystem where an animal lives is called its **habitat**. Within ecosystems there are many habitats that supply an animal with everything it needs to survive - food, water, and a home. Although many animals share the same habitat, each animal has its own niche, or role, to play in a habitat. The way each animal lives may be very different from the way the other animals in that habitat live. Often, an animal will occupy a very specific part of a habitat, called a **microhabitat**. This is where the animal's needs are best met.

Read the descriptions of **microhabitats** below and match them to the animal that you think might prefer to live there.

Egret -- The shallow waters along the shoreline make it easy for this animal to spot tiny minnows swimming just below the surface.

Bullfrog -- The tightly woven roots of aquatic plants provide shelter for the young of this animal.

Red-eared slider -- Floating logs and large rocks jutting out of the water are good places to bask in the warm sunlight.

_____

Changes in the conditions (non-living factors) of an ecosystem are constant, and an important part of maintaining a balance among organisms. When change occurs, it may be negative for one organism, but positive for another. Which organism would **least likely** benefit from the event of a fallen tree?

a. An owl
b. Fungus
c. A cypress seedling
d. A termite

What factors in combination **most likely** benefit a wetland ecosystem?

a. Salt water encroachment and the dying off of cypress trees
b. Prolonged drought followed by heavy rains
c. Increased infiltration of fresh water and heavy sedimentation

Level 2/Section 1 GLE's

Grade 4

Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-E-A1: understanding that an "ecosystem" is made of living and non-living components	70. Design an ecosystem that includes *living (biotic)* and *nonliving (abiotic)* components and illustrates interdependence (SE-E-A1)
SE-E-A2: understanding the components of a food chain	72. Predict and describe consequences of the removal of one component in a balanced ecosystem (e.g., consumer, herbivores, nonliving component) (SE-E-A2)

Grade 5

Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
PS-M-C3: understanding that the sun is a major source of energy and that energy arrives at the Earth's surface as light with a range of wavelengths.	12. Identify the Sun as Earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion (PS-M-C3)
Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C2: modeling and interpreting food chains and food webs	24. Describe the roles of producers, consumers, and decomposers in a food chain (LS-M-C2)
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance (LS-M-C3) 27. Compare common traits of organisms within major ecosystems (LS-M-C3)
LS-M-C4: explaining the interaction and interdependence of nonliving and living components within ecosystems	28. Explain and give examples of predator/prey relationships (LS-M-C4)

Grade 6

NONE

Grade 7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C2: modeling and interpreting food chains and food webs	24. Analyze food webs to determine energy transfer among organisms (LS-M-C2)
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	25. Locate and describe the major biomes of the world (LS-M-C3) 26. Describe and compare the levels of organization of living things within an ecosystem (LS-M-C3)

Level 2 / Section 2 Intro: *Who's Eating Whom?*

Wetland animals have different characteristics and skills that help them fulfill their needs for survival.

Those that hunt in water may have fins or long legs to wade or underwater vision.

These physical adaptations can be thought of as tools that animals use.

The type of skull an animal has determines what it is able to eat. If you examine the "design" of a skull's mouth or beak and teeth, you can see how that animal fed
*Some wetland animals only eat plants. These vegetarian animals are called **"herbivores".** The incisors (or front teeth) of herbivore mammals are used to cut tough plants, acting like scissors while the molars at the back of the mouth are flat and ridged to grind tough plants like a mortar and pestle.*

*Other wetland animals only eat other animals for nutrition. These animals are known as **"carnivores"** and often have sharp canines that are knifelike for tearing and piercing and pointed molars for ripping meat.*

Not all carnivores have canines or molars; but have teeth or beaks that are capable of tearing meat or spearing insects.

*And then some animals will eat both plants and animals. They are called "**omnivores"** and have teeth or beaks both for piercing meat as well as eating plants.*

Human beings are omnivores…in your own mouth you'll find chopping incisors at the font, then canines, then molars in the back.

The shape of an animal and its parts can tell you a lot about what it eats, and how it lives.

Level 2 / Section 2 Questions:

(Image of a white tail deer skull)
This animal's back teeth look:
a. sharp and pointy (carnivorous)
b. flat and ridged (herbivorous)
c. some flat and some pointy (omnivorous)

_____

(Image of an alligator skull)
This animal's teeth are:
a. sharp and pointy (carnivorous)
b. flat and ridged (herbivorous)
c. some flat and some pointy (omnivorous)

_____

(Image of a wood duck skull)
This animal's bill is:

a. Short, thick, and conical for cracking seeds
b. Sharp and curved for shredding meat
c. Long and flat for straining plants and animals from the water

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(Image of a river otter skull)
This animal is probably a(n):

a. carnivore
b. herbivore
c. omnivore

(Image of beaver skull)
From the skull shown, what would this animal's diet most likely be?

a. It preys upon native songbirds
b. It eats the basal and root portions of wetland plants
c. It roots around for insects and grubs in the soil

(Image of a raccoon skull)
The skull shown here belongs to a(n)

a. armadillo
b. eastern cottontail rabbit
c. raccoon

(Image of a barred owl skull)
Which of the following does NOT describe a behavior of this animal's food?

a. The food has thorns or contains sticky, unpleasant-tasting sap.
b. The food moves quietly and swiftly to avoid detection.
c. The food's coloration allows it to blend into its environment and avoid detection (camouflage).

Level 2/Section 2 GLE's

Grade 4

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
LS-E-A3: locating and comparing major plant and animal structures and their functions	41. Describe how parts of animals' bodies are related to their functions and survival (e.g., wings/flying, webbed feet/swimming) (LS-E-A3)
LS-E-B2: observing, comparing, and grouping plants and animals according to likenesses and/or differences	48. Classify examples of plants and animals based on a variety of criteria (LS-E-B2)
LS-E-C2: describing how the features of some plants and animals enable them to live in specific habitats	52. Describe how some plants and animals have adapted to their habitats (LS-E-C2) 53. Identify the habitat in which selected organisms would most likely live and explain how specific structures help organisms to survive (LS-E-C2)

Grade 5

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	27. Compare common traits of organisms within major ecosystems (LS-M-C3)

LS-M-C4: explaining the interaction and interdependence of nonliving and living components within ecosystems	28. Explain and give examples of predator/prey relationships (LS-M-C4)
LS-M-D1: describing the importance of plant and animal adaptation, including local examples	29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1)
Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
SE-M-A4: understanding that human actions can create risks and consequences in the environment	50. Describe the consequences of several types of human activities on local ecosystems (e.g., polluting streams, regulating hunting, introducing nonnative species) (SE-M-A4)

Grade 6
NONE

Grade 7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
LS-M-C4: explaining the interaction and interdependence of nonliving and living components within ecosystems	27. Identify the various relationships among plants and animals (e.g., mutualistic, parasitic, producer/consumer) (LS-M-C4)
LS-M-D1: describing the importance of plant and animal adaptation, including local examples	30. Differentiate between structural and behavioral adaptations in a variety of organisms (LS-M-D1) 31. Describe and evaluate the impact of introducing nonnative species into an ecosystem (LS-M-D1)

Level 2 / Section 3 Intro: ***CHOMP (CHAINS TO WEBS)***

The energy of life begins with the sun. It is passed along from one organism to another—from plants to ***herbivores****, to* ***carnivores****, and so on. Each organism can be described by its position in the energy flow we call the* ***FOOD CHAIN****.*

Producers *are the green plants that harness the sun's energy through photosynthesis…they turn the sun's light into* carbohydrates *which is food.*

Primary consumers *are the herbivores that feed almost exclusively on photosynthetic plants. (They are called "Primary Consumers" because Primary means first and they consume the producers…which are the plants.)*

Secondary consumers *are the carnivores that feed on primary consumers. Since they eat the Primary or 1st consumers, they are next down the line in the food chain, thus "secondary consumers"*

Tertiary consumers *are the carnivores that feed on secondary consumers. Since they eat the Secondary Consumers, they are the third consumers down the line in the food chain. Tertiary means "third".*

Eventually a ***Tertiary Consumer*** *will die, and that's where the Food Chain continues with* ***Scavengers****, which are animals that eat dead animals. The* ***decomposers*** *feed on and break down any organic matter that is left behind…and they play a crucial role in recycling nutrients for further use in an ecosystem.*

The Food Chain is one way we illustrate how the different animals in an ecosystem relate to each other as they pass on the energy that comes from the sun.

Level 2 / Section 3 Questions:

_____ begins every food chain on earth.

a. Plants
b. Dirt
c. <u>The sun</u>
d. Microscopic animals

Given the animals above, put them in the correct order of a food chain. Simply click and drag the animal images to the boxes.

SUN→ MILKWEED→ MONARCH BUTTERFLY→ BULLFROG→ RACOON→COUGAR→OPOSSUM

Earthworms, bacteria, and fungi are all examples of:

a. Producers
b. Consumers
c. Food chains
d. <u>Decomposers</u>

(Example food-chain displayed) How many producers are there in this food chain?

SUN→CATTAIL→MUSKRAT→ALLIGATOR→VULTURE→CRAWFISH

a. 2
b. 0
c. <u>1</u>

Which of the following components is missing from the above diagram (food web illustration)?

a. an energy source
b. a producer
c. a consumer
d. <u>a decomposer</u>

What immediate problem would occur if there WERE NO DECOMPOSERS in a food web?

e. No energy would be provided for the producers to make their own food.
f. Tertiary consumers would have no food to eat.
g. No oxygen would be produced for consumers to breathe.
h. <u>Nitrogen, carbon, and other nutrients would not be returned to the soil.</u>

Level 2/Section 3 GLE's

Grade 4

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATION**
LS-E-B2: observing, comparing, and grouping plants and animals according to likenesses and/or differences	48. Classify examples of plants and animals based on a variety of criteria (LS-E-B2)
Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
SE-E-A2: understanding the components of a food chain	71. Describe and explain food chains/webs and the directional flow of energy in various ecosystems (e.g., construct a model, drawing, diagram, graphic organizer) (SE-E-A2) 72. Predict and describe consequences of the removal of one component in a balanced ecosystem (e.g., consumer, herbivores, nonliving component) (SE-E-A2)

Grade 5

Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
PS-M-C3: understanding that the sun is a major source of energy and that energy arrives at the Earth's surface as light with a range of wavelengths	12. Identify the Sun as Earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion (PS-M-C3)
Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C2: modeling and interpreting food chains and food webs	23. Construct food chains that could be found in ponds, marshes, oceans, forests, or meadows (LS-M-C2) 24. Describe the roles of producers, consumers, and decomposers in a food chain (LS-M-C2
LS-M-C4: explaining the interaction and interdependence of nonliving and living components within ecosystems	28. Explain and give examples of predator/prey relationships (LS-M-C4)

Grade 6

NONE

Grade 7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C2: modeling and interpreting food chains and food webs	24. Analyze food webs to determine energy transfer among organisms (LS-M-C2)
LS-M-C4: explaining the interaction and interdependence of nonliving and living components within ecosystems	27. Identify the various relationships among plants and animals (e.g., mutualistic, parasitic, producer/consumer) (LS-M-C4)

Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A5: tracing the flow of energy through an ecosystem and demonstrating a knowledge of the roles of producers, consumers, and decomposers in the ecosystem	40. Construct or draw food webs for various ecosystems (SE-M-A5)

Level 2 / Section 4 Intro: *What Do I Need to Live In a Wetland?*

What do you need if you're living in a wet environment?

You need to get around, to eat, find/make shelter, attract a mate and reproduce, protect yourself, etc.

Plants & animals develop adaptations to thrive in their environment.

For example, let's take a look at some of the adaptations of the American alligator.

Click on different parts of the alligator to discover how this adaptation helps it to live in a wetland.

Level 2 / Section 4 Questions:

Match the wetland adaptation to the human tool that represents it. (Example: Ladder – helps humans get to high places. Answer: a raccoon's claws help it to climb)

Armor	Nutria teeth (Chisel)
Sneaker	Palmetto leaves (Umbrella)
Chisel	otter's streamlined body (Sports car)
Sports car	turtle's shell (Armor)
Umbrella	bobcat's feet (Sneaker)

BUILD A BIRD
As tools, bills are not just used for eating food, but also for catching it, prying up bark that conceals it, filtering it from water, killing it, carrying it, cutting it up and so on. Bills also serve for preening, nest building, excavating, egg-turning, defending, attacking, displaying, scratching, hatching, climbing, and so on.

_____

(part 1) SNOWY EGRET
…"stalk and strike feeding"; known to stand close to a foraging White Ibis, where it can snatch stray prey scared to the surface by the ibis but beyond the shorter ibis' reach;
…long thin legs ideal for wading into shallow waters

_____

(part 2) BARRED OWL
…incredibly strong hooked beak able to tear meat and even crack the shells of turtles
…as a raptor, the barred owl has sharp talons to seize prey; however, the talons of the barred owl are smaller than some other species, limiting the size of the prey. Feathered legs also help reduce the amount of sound made in flight.

_____

(part 3) WOOD DUCK
…has long flat bill that strain small plants and animals from the water;
…with large feet and short legs in the back, they can "power swim" diving from the surface and chasing prey underwater

Level 2/Section 4 GLE's

Grade 4

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-E-A3: locating and comparing major plant and animal structures and their functions	41. Describe how parts of animals' bodies are related to their functions and survival (e.g., wings/flying, webbed feet/swimming) (LS-E-A3)
LS-E-C2: describing how the features of some plants and animals enable them to live in specific habitats	52. Describe how some plants and animals have adapted to their habitats (LS-E-C2)

Grade 5

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance (LS-M-C3) 27. Compare common traits of organisms within major ecosystems (LS-M-C3)
LS-M-D1: describing the importance of plant and animal adaptation, including local examples	29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1)

Grade 6
NONE

Grade7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-D1: describing the importance of plant and animal adaptation, including local examples	30. Differentiate between structural and behavioral adaptations in a variety of organisms (LS-M-D1)

Level 2 / Section 5 Intro: *The Balancing Act*

For a plant or an animal to live in any habitat, including this marsh, certain needs must be met.

*These needs include available **space and shelter**…**food and water***

*The available supply of FOOD, WATER, and SPACE are called "**limiting factors.**" Sometimes the availability of these limiting factors changes. For example, food supplies many increase seasonally.*

And more food means more animals can be supported.

But a habitat can only support so many plants or animals before one or more of the limiting factors begin to run out, thus "limiting" the growth of the population. In this case, food and space eventually limit growth of the turtle population.

The population of a plant or animal species is constantly fluctuating for a number of reasons. More predators may enter the habitat.

Humans may alter the habitat.

Natural disasters such as hurricanes may occur.

*Though populations may increase or decrease over time, there is a "comfortable" number of animals that given habitat can support over time. This is called the "**carrying capacity**". Sometimes the population is a little above the carrying capacity…*

…and sometimes it's a little below the carrying capacity.

It all depends on the natural or human forces that are influencing that habitat at that time.

Level 2 / Section 5 Questions:

The number of organisms that a habitat can support given the quality and amount of available resources is called…

a. Energy Flow
b. Carrying Capacity
c. Niche
d. Food Web

_____

Which of these factors may cause a population of wood ducks to rise *above* its previous carrying capacity?

a. removal of nesting boxes
b. increased shooting of bobcats by local residents
c. a particularly harsh winter
d. spraying of the area with pesticide to reduce insect numbers

_____

Which of the following is NOT a limiting factor for carrying capacity?

a. Population
b. Available Food
c. Land/Space
d. Clean Water

_____

Which of these factors might cause a decrease in the populations of nutria in an area?

a. Raccoons manage to eat more alligator eggs than usual.
b. Fur coats become very popular and in high demand
c. A very mild spring

_____

Alligator farmers get their eggs from the nests of wild alligators. When the alligators are grown the farmer must put some back into the marshes. Which factors would wildlife biologists need to consider to tell the farmers how many alligators to release?

a. the number of alligators already in the marsh
b. the number of prey animals in the marsh
c. the price of alligator products
d. a & c
e. a & b
f. all

Over time which of these would cause the largest decrease in the carrying capacity of a swamp area?

a. A large hurricane
b. A rice farm
c. A shopping center.

Which of these non-living factors would probably have an effect on the carrying capacity of a wetland?

a. Lower than average rain fall
b. Higher than average rain fall
c. Powerful Hurricane
e. All of above
f. None of the Above

If there is an increase in 2nd and 3rd level consumers in an area, the producers will probably:

a. Increase
b. Decrease
c. Stay the same

If the population of predators in an area increases, OVER TIME there will probably be a decrease in:

a. prey animals
b. predators
c. both of the above
d. neither of the above

Level 2/Section 5 GLE's

Grade 4

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-E-A3: locating and comparing major plant and animal structures and their functions	41. Describe how parts of animals' bodies are related to their functions and survival (e.g., wings/flying, webbed feet/swimming) (LS-E-A3)
LS-E-C2: describing how the features of some plants and animals enable them to live in specific habitats	52. Describe how some plants and animals have adapted to their habitats (LS-E-C2)

Grade 5

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance (LS-M-C3) 27. Compare common traits of organisms within major ecosystems (LS-M-C3)

LS-M-D1: describing the importance of plant and animal adaptation, including local examples	29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1)

Grade 6
NONE

Grade 7

Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-D1: describing the importance of plant and animal adaptation, including local examples	30. Differentiate between structural and behavioral adaptations in a variety of organisms (LS-M-D1)

Level 2 FINAL INTERACTIVE: An egret fishing game.

Level 3: Human Impact

Level 3 / Section 1 Intro: *Pollution overview*

A pollutant is a substance that contaminates an environment, especially human-made wastes.

Pollutants can take on any number of forms, from oils spills, to sewage, to over-use of fertilizers at homes or on farms, to trash and litter.

As we look for ways to dispose of household trash and wastes, we need to consider their impact on the environment around us.
*One of the ways pollutants end up in wildlife areas is through **runoff**. For example, if motor oil drips onto a driveway and a big rain comes, the oil, if not properly disposed of, can end up washing into a nearby lake or river.*

Wetlands help protect our natural areas from the effects of runoff in a very important way. They can act as a sponge and absorb the excess rainwater caused by runoff. In doing so, wetlands help to trap and contain pollutants into the soil, preventing them from traveling into larger waterways and contaminating wildlife habitats.

*If the wetlands are eroded away, runoff is **not** stopped, and runs directly into major waterways and pollutes the ecosystem there.*

Level 3 / Section 1 Questions:

Match the pollutant to the problems it can cause in the wetlands:

a. Motor Oil (2)
b. Leaching Chemicals (3)
c. Trash/Litter (1)

1. Animals can eat or get caught up in this. It often causes injury or death.
2. Clouds water, damages water quality for animals that live in water. Also can cause health problems for animals
3. Can seep into drinking water and soils to contaminate crops and human water systems. Not always easily detected. High levels can cause serious health problems to people and animals.

_____

How do wetlands help reduce pollution from runoff?

a. By evaporation
b. By drying the land uphill
c. By redirecting runoff into a major waterway
d. By absorbing excess rainwater

Level 3/Section 1 GLE's

Grade 5

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems	49. Identify and give examples of pollutants found in water, air, and soil (SE-M-A3)

Grade 6

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems	

Grade 7

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems	

Level 3 / Section 2 Intro: *Pollution Detective*

*When trash or litter ends up in waterways (either thrown or washed in) it is a type of pollution we call **Marine Debris**. It is extremely hazardous to wildlife causing damage, pain, and death.*

One example is this Common Snapping Turtle that was found in a local bayou. When she was very young, this turtle crawled into a plastic ring from a bottle. She was in the water most of the time so sunlight did not make the ring brittle. As she grew, her shell was constricted by the ring. There was an area in which there was no back bone protecting the spinal cord. Despite this she survived to maturity, and is now under the care of a staff person at Audubon Zoo.

***Point Source Pollution** are pollutants discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, and containers of various types. For example an oil spill in the Gulf of Mexico would be considered point source pollution, because you can directly trace where the oil is coming from.*

***Non-Point Source Pollution**, on the other hand, is pollution through widespread overland runoff…so the contamination can't easily be traced back to one specific cause or location.*

Remember that motor oil that leaked onto a driveway? Once that oil is in a river, it would be impossible for you to be able to figure out exactly where that oil came from – which city? Which street? Which house? That motor oil combines with other pollutants that ended up in that same river to create non-point source pollution.

In helping to maintain a healthy environment and track down pollution, it sometimes takes a little detective work.

Level 3 / Section 2 Questions:

Widespread overland runoff containing pollutants; the contamination does not originate from one specific location, and pollution discharges over a wide land area is called…

a. Point Source Pollution
b. Marine Debris
c. Non-point Source Pollution
d. Habitat Destruction

_____

Pollutants discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, and container are called

a. Point Source Pollution
b. Marine Debris
c. Non-point Source Pollution
d. Habitat Destruction

_____

_____ is trash that has been dumped in oceans and other bodies of water. This trash can cause injury or even death to native wildlife.

a. Point Source Pollution
b. Marine Debris
c. Non-point Source Pollution
d. Habitat Destruction

_____

Which of the following is NOT a type of Point Source Pollution?

a. An oil spill in the Gulf of Mexico
b. A person pours latex house paint down a storm drain.
c. A chemical plant dumping waste into a nearby stream
d. A broken sewerage pie leaks into a pond

_____

*In the community above, a dangerously-high amount of **Sillicic Acid Sodium Salt** is being found in the open Gulf, and some residents have been complaining about stomach pains. You need to find out the cause of the pollution!*

*Move your cursor around the map to "test" the amount of **Sillicic Acid Sodium Salt** in that area. Then choose what you think the source of the pollution may be.*

ii. boats in the harbor (12ppb)
iii. the factory (7ppb)
iv. construction site (76 ppb)
v. neighborhood (12 ppb)

_____

You can help reduce the amount of runoff and trash that can end up in wetlands by:

a. Putting your trash out on your neighborhood trash day
b. Recycling whenever possible
c. Disposing of household chemicals where they belong – in your storm drain
d. Recycling whenever possible and properly disposing of household items

_____

To reduce runoff pollution in wetlands, you should reduce the amount of WHAT in your lawn or garden?

a. Times you mow your lawn
b. Exotic plants
c. Fertilizers, herbicides, and pesticides
d. Water you give plants

_____

Level 3/Section 2 GLE's

Grade 5

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems	49. Identify and give examples of pollutants found in water, air, and soil (SE-M-A3)
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	50. Describe the consequences of several types of human activities on local ecosystems (e.g. polluting streams, regulating hunting, introducing non-native species) (SE-M-A4)

SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	

Grade 6

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems	
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	47. Illustrate how various technologies influence resource use in an ecosystem (e.g. forestry management, soil conservation) (SE-M-A8)

Grade 7

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems	
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	39. Analyze the consequences of human activities on ecosystems (SE-M-A4)
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	43. Identify and analyze the environmental impact of humans' uses of technology (e.g. energy production, agriculture, transportation, habitation) (SE-M-A8)

Level 3 / Section 3 Intro: *Resource Management*

***Carrying capacity**, as you learned, is the maximum limit of resources contained within a habitat that will successfully support all of the plant and animal life that lives there.*

Humans also need places to live, and resources to survive.

But sometimes as we build in an environment, we can reduce the carrying capacity of that habitat, and force the animals to move to other areas and compete for food and shelter with even more animals.

As humans continue to develop land for their own purposes, they need to be aware of how the decisions they make can and will affect that habitat and that community for generations to come.

Level 3 / Section 3 Questions:

Carrying Capacity of an area can be lowered by

a. Urban Sprawl (the spread of cities and suburbs)
b. Coastal Erosion
c. Pollution
d. All of the Above

Match the human activity with its affect on wetlands

a. Introduced species (2)
b. Over fishing (1)
c. Urban sprawl (3)

1. Building too many buildings and homes too quickly without studying the impact on the local wildlife, can cause the loss of habitats and displace numerous species
2. Animals and plants that are not native to a habitat can displace native species. Often there are no natural "checks" on the growth populations. They can "overrun" a habitat, crowding out native species. People release these animals and plants into a habitat by accident or mistake, because they don't understand the damage they can do.
3. Catching too many aquatic animals without taking care to make sure there are enough left in the waters to maintain their numbers, can offset the delicate food web of aquatic habitats.

Read about the causes of coastal erosion in the RESEARCH LIBRARY. Select which of the below are HUMAN CAUSES and which are NATURAL CAUSES of Coastal Erosion.

N Hurricane
H Introduction of nonnative species
H Levee Construction
N Shifts in Mississippi River
H Land Development
H Channeling
H Drainage
N Barrier Island Erosion

For each of the items listed, select whether it's Hydrologic Alteration, Pollution, or Vegetation Damage that causes damage to wetlands. HINT: Check out the RESEARCH LIBRARY to find information on this!

V Grazing cattle
H Draining wetlands
P Air pollution from a factory
P Leaking toxins from an old landfill
V Introduction of non-native plants
H Adding cement surfaces in, around, or in place of wetlands
H Filling in a wetland with mud to develop the land for housing
P Runoff from a city
V Removal of plants from a wetland
H Diverting the flow of water from a wetland
H Damming wetlands to create a pond
P Boat traffic in a marina

Level 3/Section 3 GLE's

Grade 5

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATION**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A2: Demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations	48. Determine the ability of an ecosystem to support a population (carrying capacity) by identifying the resources needed by that population (SE-M-A2)
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	50. Describe the consequences of several types of human activities on local ecosystems (e.g. polluting streams, regulating hunting, introducing non-native species) (SE-M-A4)
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	
SE-M-A10: Identifying types of soil erosion and preventive measures	

Grade 6

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A2: Demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations	
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	47. Illustrate how various technologies influence resource use in an ecosystem (e.g. forestry management, soil conservation) (SE-M-A8)
SE-M-A10: Identifying types of soil erosion and preventive measures	

Grade 7

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A2: Demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations	37. Identify and describe the effects of limiting factors on a given population (SE-M-A2) 38. Evaluate the carrying capacity of an ecosystem (SE-M-A2)
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	39. Analyze the consequences of human activities on ecosystems (SE-M-A4)
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	43. Identify and analyze the environmental impact of humans' uses of technology (e.g. energy production, agriculture, transportation, habitation) (SE-M-A8)
SE-M-A10: Identifying types of soil erosion and preventive measures	

Level 3 / Section 4 Intro: *Responsible Development and Conservation*

We've learned what an important role the wetlands play in our lives; however, the wetlands are eroding at an astonishing rate. The US has lost more than half of its original wetlands. Currently Louisiana loses wetlands at the rate of a football field every 30 minutes! Without intervention, Louisiana will lose between 25 and 35 square miles of wetlands each year, amounting to a projected loss of 527,000 acres by 2040.

Why are they disappearing?

Here are some of the causes of wetland loss in Louisiana:

EROSION

For thousands of years the Louisiana swamps would seasonally flood. This annual flood cycle has been a natural force regenerating the swamps and marshes with fresh water and nutrients. Many years ago, we began building ***levees*** *to reduce flooding, but this has hurt the wetlands. Without floods to refresh the wetlands with fresh water and soil they simply compact and sink.*

SALTWATER INTRUSION

As you learned before, many plants can't survive in water that is too salty, and our wetlands have been the buffer protecting plant life on land from ocean saltwater. Without seasonal flooding to replenish the fresh water, our Brackish Marshes (with part-fresh and part-salt water) just gets saltier and kills the plants that hold the land together.

Also, long navigation channels were cut through the marshes for boats and laying pipeline, but these channels have become expressways for saltwater to rush inland, killing the freshwater plants.

INTRODUCED SPECIES

Many years ago, people brought nutria into Louisiana from Argentina for the fur trade. Nutria reproduce very quickly and consume wetland plants faster than they can grow back….so much so that as their population grows, the marsh grass declines.

The balance of an ecosystem is thrown in peril when a new species is introduced.

For instance: cypress trees have adapted to prevent animals from eating them while they are young saplings…

The bark of a young cypress tree tastes awful to the native animals.

This is the cypress tree's tactic to ensure they grow.

However, nutria that are new to the Louisiana Wetlands enjoy the taste of the young cypress.

Nutria are very well adapted well to our wetlands, but the wetlands have not yet adapted to them.

So what can we do to preserve the wetlands in our own backyard?

By keeping ourselves informed and understanding how our actions can impact a habitat, we can make better choices that will minimize our impact on local wildlife.

We can urge our lawmakers to pass laws that protect our native habitats and support development projects that are environmentally friendly.

Most importantly, each of us can do our part right in our very own home, by recycling paper, glass, batteries, and plastics.
We can also find out about the proper way to dispose of paint, motor oil, and other household chemicals so that they do not end up in our rivers and lakes.

*And if your family celebrates Christmas, then make sure that AFTERwards, your Christmas Tree gets picked up for the **Christmas Tree Fence Program** which uses trees in fence-structures to help protect state's coastal wetlands. The fences provide an effective wave-break that can reduce erosion and benefit the wildlife.*

More information should be available around the holidays at your school.

Level 3 / Section 4 Questions:

Map Compare and Contrast
Use the maps of Cocodrie, LA in the research library to answer the following question:
Which map has the most saltwater marsh?

a. 1956
b. 1978
c. 1988
d. 1995

_____

Map Compare and Contrast
Which map has the most urban development?

a. 1956
b. 1978
c. 1988
d. 1995

_____

Map Compare and Contrast
What created the biggest change in the landscape in 1978?

a. The increase in residential areas.
b. The harbor channel that was cut into the marsh.
c. An increase in the amount of forested wetlands
d. A decrease in forested wetlands

_____

Map Compare and Contrast
What other habitats are included in the 1956 map?

a. Forested wetlands and Upland Scrub Shrub
b. Upland Forests
c. Flats and Beaches
d. Scrub Shrub Wetlands

_____

Map Compare and Contrast
What new habitat began to develop after the channel was constructed in 1978?

a. Flats and Beaches
b. Forested Wetlands
c. Upland Scrub Shrub
d. Scrub Shrub Wetlands

_____

Map Compare and Contrast
What new habitats began to develop in 1988?

a. Scrub Shrub Wetlands and Forested Wetlands
b. Flats and Beaches and Forested Wetlands
c. Upland Forest and Flats and Beaches
d. Upland Forest and Upland Scrub Shrub

Map Compare and Contrast
Which map has the smallest amount of saltwater marsh?

a. 1956
b. 1978
c. 1988
d. 1995

Can This Item Be Saved?!
For each item listed, select whether it can be **recycled** or if it is **non-recyclable**. Check out the RESEARCH LIBRARY for more information about recycling.

Mattresses
Plants and Pots
Junk Cars
Junk Mail
Furniture and Bulky Items
Leftover or Used Building Materials
Tires
Metal and Large Appliances
Computers and Electronics
Styrofoam Peanuts
Shrubbery and Tree Trimmings
Cardboard Toilet Paper or Paper Towel Rolls

The correct answer for each is RECYCLABLE.

Level 3 FINAL INTERACTIVE: A radial "snake" game.

Level 3/Section 4 GLE's
Grade 5

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	50. Describe the consequences of several types of human activities on local ecosystems (e.g. polluting streams, regulating hunting, introducing non-native species) (SE-M-A4)
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	
SE-M-A10: Identifying types of soil erosion and preventive measures	

Grade 6

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	47. Illustrate how various technologies influence resource use in an ecosystem (e.g. forestry management, soil conservation) (SE-M-A8)
SE-M-A10: Identifying types of soil erosion and preventive measures	

Grade7

STANDARD 5: Science and the Environment - In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems	
SE-M-A4: Understanding that human actions can create risks and consequences in the environment	39. Analyze the consequences of human activities on ecosystems (SE-M-A4)
SE-M-A8: Investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem	43. Identify and analyze the environmental impact of humans' uses of technology (e.g. energy production, agriculture, transportation, habitation) (SE-M-A8)
SE-M-A10: Identifying types of soil erosion and preventive measures	