

The Life of a Marsh

Research Questions

- 1 What kinds of wetland ecosystems can be found in Louisiana?
- 2 What kinds of plants and animals do Louisiana's wetlands support?
- 3 How do plants and animals depend on one another and their environment for survival?
- 4 How are changes to Louisiana's wetlands impacting the plant and animal communities that live there?

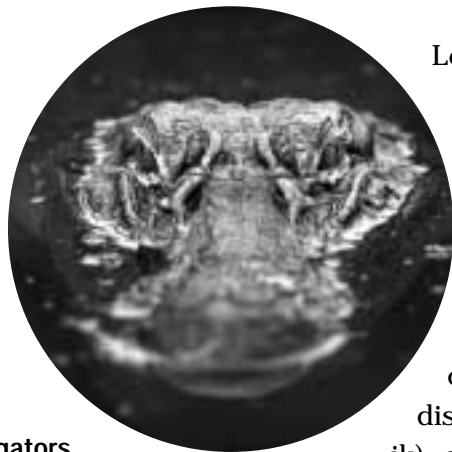
The boat glides away from the dock early one fall morning and its slow journey through the Louisiana wetlands begins. As the boat moves through the dark, murky water, the two yellow eyes of an alligator flash by. The boat navigates its course past the long, thick trunks of 100-year-old cypress trees that stretch from the water. Decorated with masses of Spanish moss, the branches of these majestic trees provide a resting spot for migrating birds in search of food after their long journey south.

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 Soon, the wide-bottomed trunks of the cypress trees are left behind. Host researcher Mark Schexnayder and his team have reached their first sampling site in the Barataria Bay estuary (ESS chu wer ee), an area where freshwater and salt water mix. As they peer beneath the water's surface, they are awed by the abundance of plant and animal life Louisiana's wetlands support.

Back on dry land, host researcher Jacoby Carter is using computer models to study the wetlands. He, too, is fascinated by the wealth of life found there.

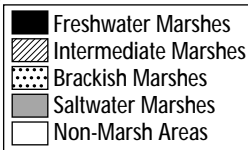
1 What kinds of wetland ecosystems can be found in Louisiana?

Louisiana's wetlands sprawl across an area of about 36,000 km² (13,900 mi²) in the southeastern portion of the state. These wetlands are formed as freshwater from the Mississippi River, runoff, and rainfall flow toward the Gulf of Mexico and mix with sea water flowing inward from the Gulf. Several kinds of wetland **ecosystems**, ranging from forested wetlands to freshwater, intermediate, **brackish**, and saltwater marshes, can be found throughout this area. These ecosystems are distinguished from one another by both their **biotic** (bye OT ik), or living, factors and their **abiotic**, or nonliving, factors.



Alligators are common in the wetlands.

Louisiana's Marshes



Did You Know...?

The barrier islands form a dry upland ecosystem off Louisiana's coastline. They protect towns and cities from hurricanes and storms. They also protect Louisiana's saltwater marshes by breaking up the force of the waves coming in from the Gulf of Mexico.

The most important abiotic factor in wetland ecosystems is probably water. The depth and **salinity** (say LIN i tee) of water, as well as the frequency and duration of flooding in a particular area, largely determine the type of wetland ecosystem that forms. Salinity is a measure of the amount of salt that is dissolved in water. Salinity has a significant influence on the types of **organisms**, or living things, that can survive in an ecosystem.

Water impacts the soil of all wetland ecosystems. Wetland soil is described as **hydric** because it is flooded for much of the growing season. Because it is saturated with water, hydric soil does not hold much oxygen. As plant roots need oxygen to survive, only those plants adapted to grow in oxygen-poor soil are able to survive.

Louisiana's wetlands can be classified into two main categories: **swamps** and **marshes**. Swamps and marshes differ from each other in the types of plant life found there. Swamps support trees; marshes support low-lying plants, such as grasses. Louisiana's swamps, called forested wetlands, are freshwater ecosystems. They are found farthest inland along the banks of rivers, such as the Mississippi and Atchafalaya rivers. They can be further classified into bottomland hardwood swamps and cypress swamps. Louisiana's marshes vary in salinity. In order of increasing salinity, they can be classified as freshwater, intermediate, brackish, and saltwater marshes. These four marsh types occur in bands that run roughly parallel to the ocean shoreline.



Cypress trees grow in Louisiana's wetlands.



ADD TO YOUR Journal

Use your JASON Journal to keep track of the facts you learn about each wetland ecosystem. This will help you remember what you read.



To investigate the effects of abiotic factors on organisms, turn to the Hypothesis-based Learning Activity, Observing Osmosis, on page 56.

LINK TO... Learn more about what different wetland species need to survive in their habitats. Explore "The Secret Life of the Bayou" by clicking on **Digital Labs** on Team JASON Online at www.jason.org.



2 What kinds of plants and animals do Louisiana's wetlands support?

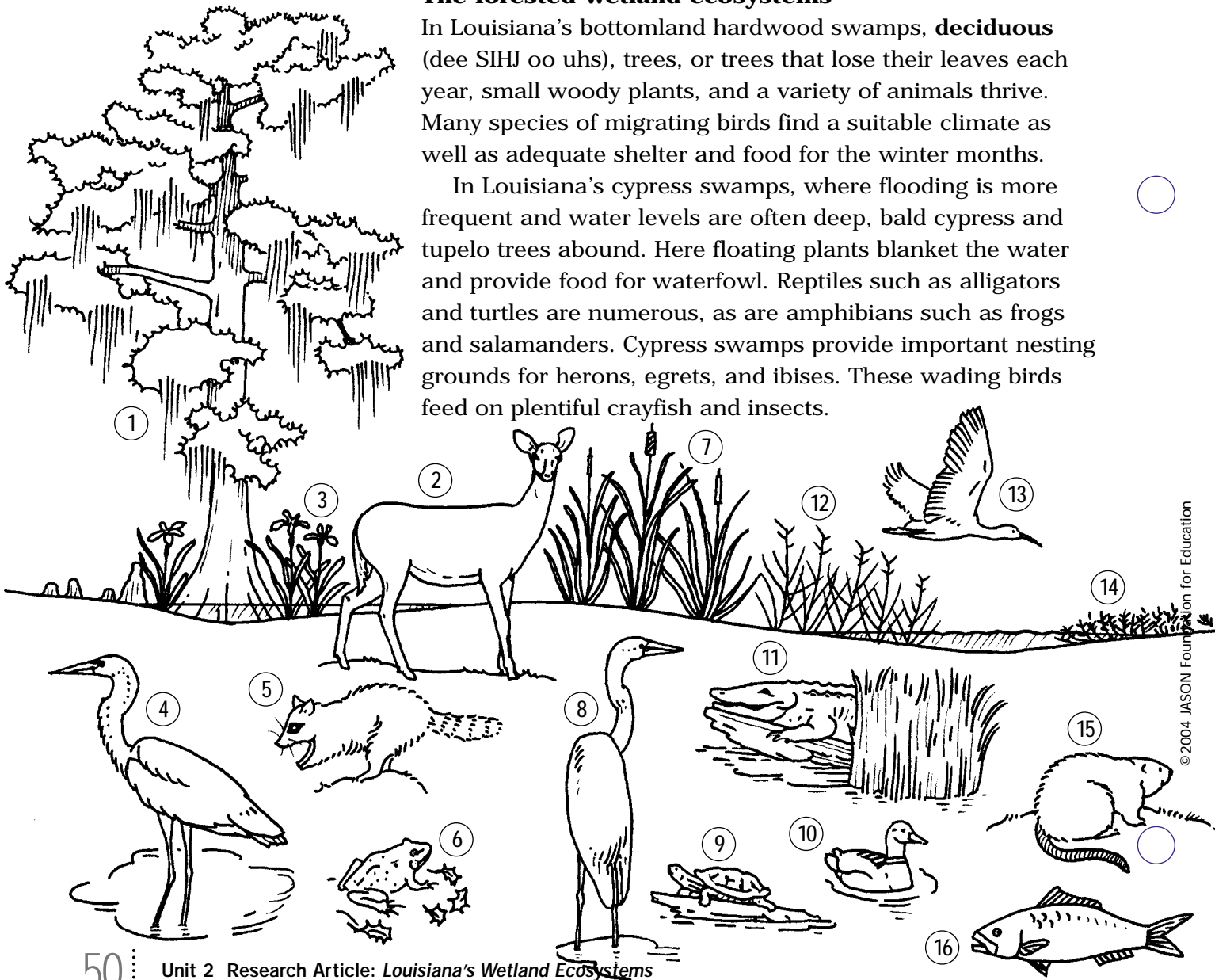
Wetland ecosystems, including those in Louisiana, provide habitats for a diversity and abundance of aquatic life. Animals of all kinds—from wading birds to alligators to muskrats to a host of insect species—find ideal conditions for growth and survival in Louisiana's wetland ecosystems. These ecosystems provide essential nursery grounds for a variety of fish and shellfish. They serve as critical resting stops for millions of migrating birds on their way to and from South and Central America. Each wetland ecosystem also supports a variety of plants that are specifically adapted to the ecosystem's unique conditions.

Wetland Ecosystems

The forested wetland ecosystems

In Louisiana's bottomland hardwood swamps, **deciduous** (dee SIHJ oo uhs), trees, or trees that lose their leaves each year, small woody plants, and a variety of animals thrive. Many species of migrating birds find a suitable climate as well as adequate shelter and food for the winter months.

In Louisiana's cypress swamps, where flooding is more frequent and water levels are often deep, bald cypress and tupelo trees abound. Here floating plants blanket the water and provide food for waterfowl. Reptiles such as alligators and turtles are numerous, as are amphibians such as frogs and salamanders. Cypress swamps provide important nesting grounds for herons, egrets, and ibises. These wading birds feed on plentiful crayfish and insects.



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The marsh ecosystems

Each of Louisiana's marsh ecosystems supports a unique community of plants and a unique community of animals that depend on those plants for food and shelter. As the salinity in the marsh increases, the diversity of plants and animals decreases. This is because fewer plant and animal species are able to tolerate high levels of salt.

With 93 species of plants, Louisiana's freshwater marshes have the most diverse plant life of the marshes. They are home to many animals, including turtles, alligators, snakes, muskrats, egrets, herons, and ducks. In contrast, Louisiana's saltwater marshes support only about 17 species of plants and a narrower range of animals. That range includes blue crab, speckled trout, redfish, and shrimp.

Louisiana's intermediate and brackish marshes are home to a mixture of grasses and reeds. These plants provide important nurseries for commercially valuable fish and shellfish, such as gulf menhaden and shrimp. In the shallow waters, young fish and shellfish find plentiful food and protection from predators.

Host researcher Mark Schexnayder is busy collecting data about the plants and animals that live in the wetlands. He is interested in monitoring fish and shellfish species and creating a balance between the needs of commercial fishermen and the preservation of the diversity of life found in the wetlands.



Get your feet wet with Mark Schexnayder and his team as they map the fish and shellfish species at different sites! Turn to Activity 2.1, Mapping Ecosystems and Organisms, on page 58.



You can learn more about aquatic species'

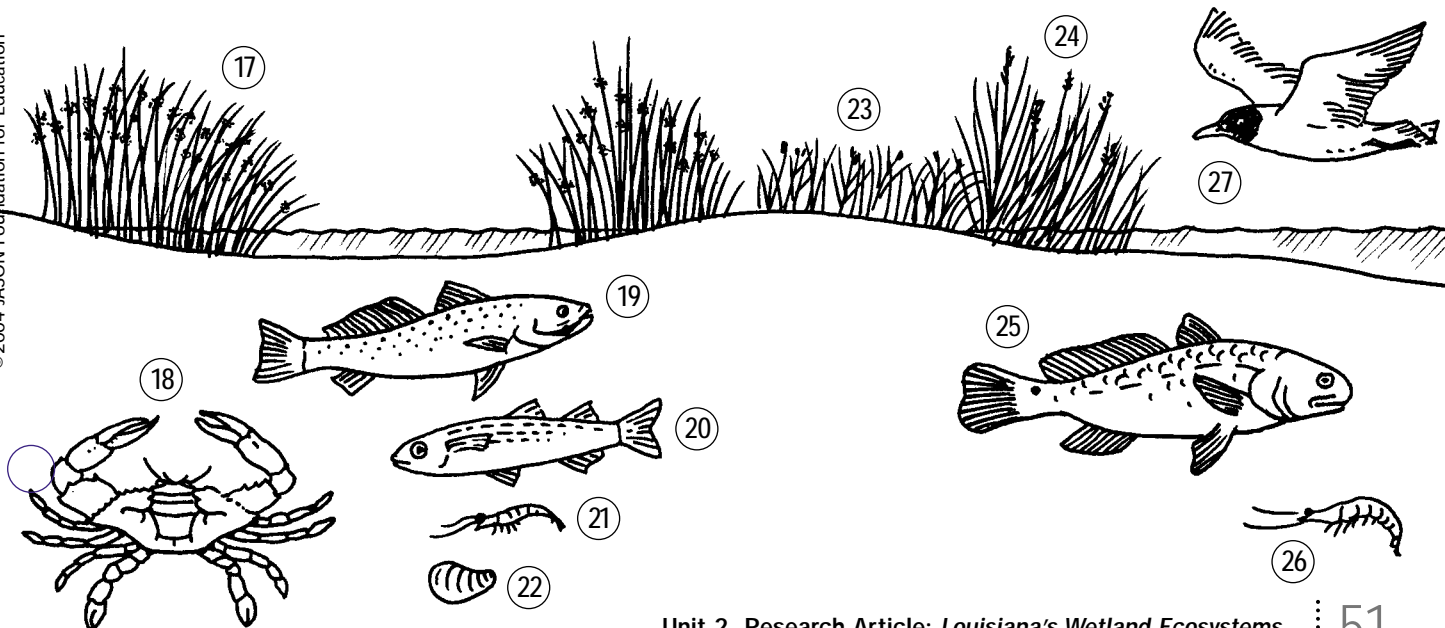
habitats and habitat protection in the wetlands from **NOAA's Habitat Protection Division**. Log onto Team JASON Online at www.jason.org and click on **Resources**.



Not sure if you are registered on Team JASON Online? Check with your teacher.

Wetland Ecosystems Key

- | | |
|-------------------|----------------------|
| 1 cypress | 15 muskrat |
| 2 deer | 16 menhaden |
| 3 Louisiana iris | 17 needrush |
| 4 heron | 18 blue crab |
| 5 raccoon | 19 speckled trout |
| 6 green frog | 20 mullet |
| 7 cattails | 21 juvenile shrimp |
| 8 egret | 22 oyster |
| 9 turtle | 23 salt grass |
| 10 duck | 24 smooth cord grass |
| 11 alligator | 25 red fish |
| 12 wire grass | 26 adult shrimp |
| 13 ibis | 27 laughing gull |
| 14 alligator weed | |



Did You Know...?



In oxygen-poor environments, some soil bacteria use sulfates to process food. A byproduct of this is hydrogen sulfide — the chemical responsible for the rotten-egg smell you may notice in the wetlands.

3 How do plants and animals depend on one another and their environment for survival?

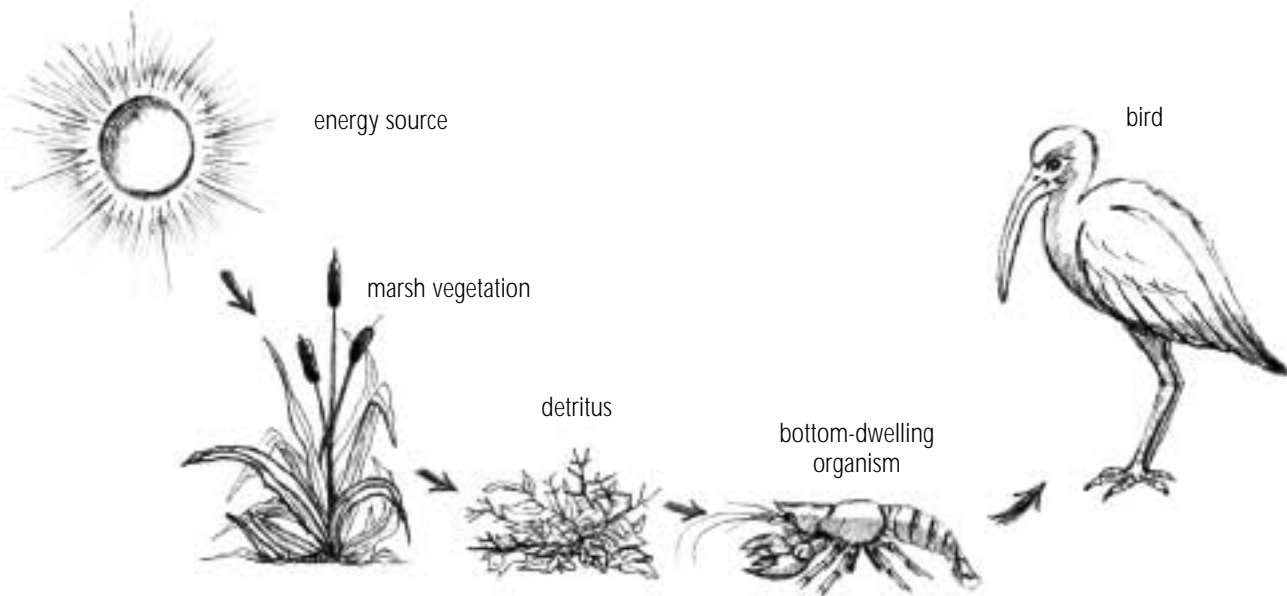
All organisms need energy in order to survive and grow. This energy passes from one organism to another through the **food chain**.

Organisms called **producers** form the basis of most food chains. Producers are organisms that can make their own food. Plants and algae are producers that use energy from the Sun to make food. In the wetlands, as in most ecosystems, plants form the basis of the food chain.

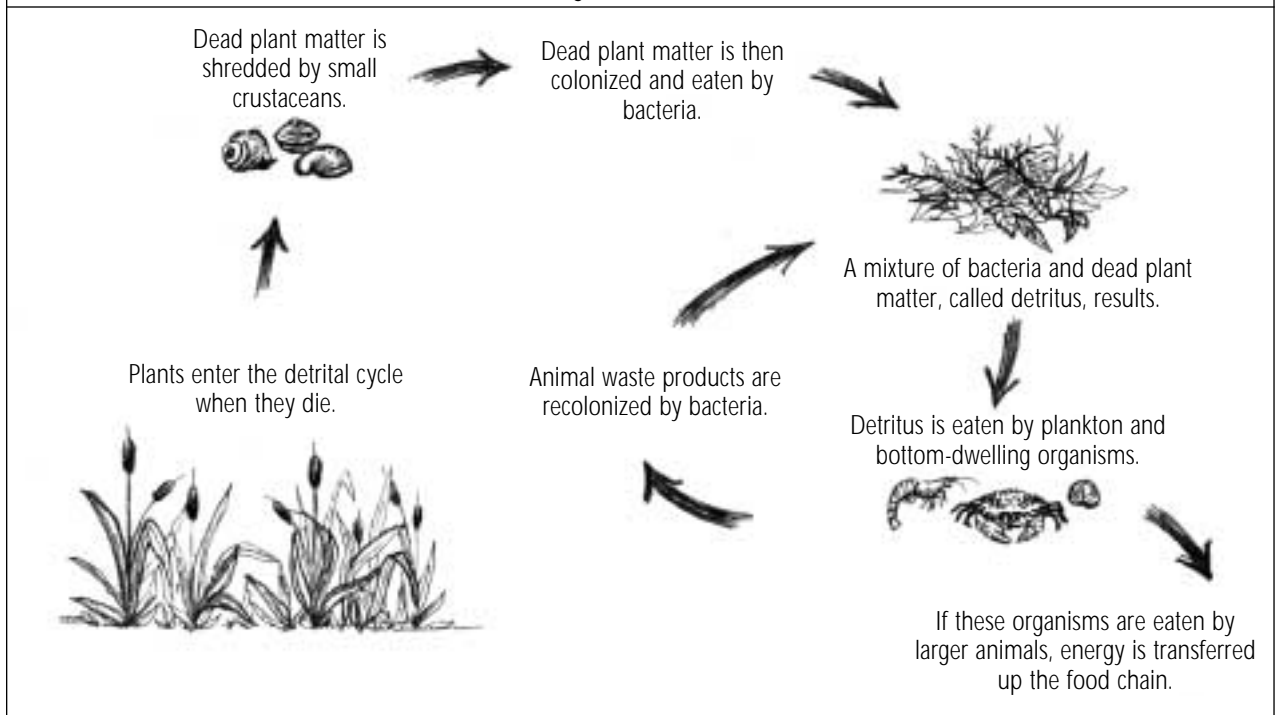
Organisms called **consumers** are unable to make their own food and must eat other organisms to obtain energy. All animals are consumers. In other words, they must eat plants, other animals, or both to survive. When producers and consumers die, bacteria and other microorganisms in the soil feed on them. These bacteria and other microorganisms are called **decomposers**. They break down chemicals in dead organisms and return important nutrients to the environment. Plants then use these nutrients to make food and grow. In this way, plants and animals are dependent on one another and their environment for survival.

In most ecosystems, energy is transferred from plants to animals through grazing. In the wetlands, however, in

Freshwater Marsh Food Chain



The Role of Plants in the Detrital Cycle



Detritus food chains depend on microorganisms to break down plant or animal matter and on scavenging animals found in the sediment along the wetland floor.

In addition to the transfer of energy from producers such as plants and algae, energy is transferred through a process known as the **detrital cycle** (di TRY tahl SIGH kel). In the detrital cycle, decaying plant or animal matter in marsh sediment is broken down by bacteria, fungi, and other microorganisms. The resulting mixture of bacteria and broken-down plant or animal remains, called **detritus**, is eaten by plankton and bottom-dwelling organisms, such as shrimp, crabs, and crayfish. Wastes from these organisms are then reprocessed by bacteria and eaten again in an ongoing cycle. Energy is transferred up through the food chain when larger animals, such as birds and fish, feed on the bottom-dwelling organisms. It is transferred further up the food chain when even larger animals, such as alligators, eat these organisms.

“ If someone can understand a small ecosystem and how it reacts to things like wet and dry periods, disturbances, etc., it is easier to understand larger processes. To me, the best time to see a wetland come alive is at night. It is almost magic to see all of the animals in action that are mostly hidden in the day.”

—Mark Schexnayder



Be a scientist in your backyard! Explore a body of water near your home with activities from the Field Research Digital Lab on Team JASON Online.



4 How are changes to Louisiana's wetlands impacting the plant and animal communities that live there?

As a result of human activities and natural processes, Louisiana is losing about 44 km² (17.2 mi²) of wetlands every year. That means an area about the size of a football field is lost every 30 minutes! As their habitats are destroyed, plant and animal communities are increasingly threatened. You have learned that plants and animals depend on one another and on their environment for survival. Now you'll learn how natural processes and human activities are threatening the plant and animal communities living in wetland environments.

Saltwater intrusion is one example of an environmental change that is speeded up by human activities. It is particularly harmful to the health of wetland plant and animal communities. Saltwater intrusion is the process by which salt water moves inland from the ocean toward freshwater environments. As coastal wetlands disappear, they provide less protection from ocean water moving inland. This increases the level of salt in waters upstream. The building of navigational **channels**, or waterways, from the Gulf of Mexico through the wetlands speeds up the increase in salt levels in freshwater areas by allowing ocean water to move inland. Plant and animal species not adapted to survive in saltier water must either shift to areas with lower salinity levels or die.



Saltwater intrusion is a contributing factor in the disappearance of Louisiana's wetlands. The building of channels speeds up saltwater intrusion.



The introduction of **alien** (or non-native) **species** is another human activity that is harming the wetlands. Alien species are organisms that are introduced into an ecosystem. These organisms often thrive in their new environment because they are free from the predators that live in their

native homes. With few or no predators present, and abundant food resources, populations of alien species can grow rapidly. Often these populations “take over” the new environment and drive out native species that are unable to compete for food and space. Eventually, these alien populations may become so large that the environment is no longer able to support them.

Although many alien species have been introduced into Louisiana’s wetlands, nutria (NEW tree uh) seem to be among the most destructive. Nutria were introduced into Louisiana in the late 1930s for their valuable fur. These large rodents can severely degrade the marshes. Nutria contribute to a process known as **eat out**. Eat out occurs when animals feed on plant roots and the lower portions of plant stems and in so doing break up the roots. Plant roots hold soil together and slow down erosion. After an eat out, plants and soil are washed away when the marsh is flooded because there are no roots to hold them in place. A hole is left in the marsh. What was once land now becomes open water.

Saltwater intrusion and the introduction of alien species are but two of the many factors that have contributed to the disappearance of Louisiana’s wetlands. Without intervention, these conditions may prove disastrous to the plants and animals that make their homes there. People can help keep the wetlands healthy by reversing some of the effects of human activities. Jacoby Carter is working to keep the wetlands healthy by trying to determine the number of nutria Louisiana’s wetlands can support. His goal is to help control nutria populations and thereby prevent the destruction of wetlands as a result of eat outs.



Nutria, a non-native species the size of a large house cat, was introduced to Louisiana’s wetlands in the 1930’s.



Review the facts about the wetlands that you listed in your JASON Journal as you read this article. Use these facts to write a persuasive essay convincing people that we should work to save the wetlands. Share your writing with a classmate.



Take a spin around the marsh and find out how Jacoby Carter is helping to keep the wetlands healthy. Turn to Activity 2.2, How Many Nutria Are Too Many Nutria? on page 63.

Fieldwork in Your Neighborhood

Find out how Louisiana’s wetland organisms compare to the aquatic organisms living in your community by doing the Fieldwork Activity, Observing Invertebrates, on page 67.

