



WETLAND ANIMAL ENGINEERS

Wetlands are a challenging place to live! How do animals living in wetlands change their ecosystem in order to better survive?

LESSON AT A GLANCE

GRADE LEVEL

- Kindergarten - 2nd grades

CORRELATING STANDARDS

- SC.K.7.2.C
- SC.1.6.2.C
- SC.2.7.2.C

ACTIVITY TIME

- 20 min - Warm Up:
 - Structure Sort
- 20 min - Main Activity:
 - Design a Nest

MATERIALS

- 15 sets of photo cards
 - In 1 set:
 - 12 structure cards
 - Word cards
 - Nest, den, lodge, web, case
- Choice of:
 - Blank paper & coloring supplies
 - Play Dough
 - Natural materials from outside

INTRODUCTIONS

Wetlands are unique aquatic ecosystems in Nebraska. The diverse species that live there have incredible methods for survival. These adaptations can be physical (on their bodies) or behavioral (how they act). Often, these are tied closely together. For this lesson we're taking a closer look at the species that have adaptations to engineer structures that allow them to survive in a very unique habitat - wetlands!

OBJECTIVES

This lesson was designed to be used in partnership with the video "Wetland Animal Engineers". The video and lesson will allow students to better understand that some Nebraska species can address their environmental challenges well by engineering a home or shelter that will meet their needs.

As a result of this lesson:

- Students will understand that there are different types of homes engineered by living organisms in wetlands.
- Students will know that these engineered shelters can be nests, dens, lodges, webs and cases.

BACKGROUND INFORMATION

What is a Wetland?

How do we define wetlands? This type of habitat is made unique by three key characteristics:

- 1. Vegetation** - water loving plants adapted to growing in highly saturated conditions grow here
- 2. Hydric soils** - soils found here have developed under saturated conditions that limit oxygen (anaerobic conditions), they often carry a rotten egg smell
- 3. Hydrology** - wetlands are saturated by water at some time during the growing season (the time when plants are actively growing)

Wetlands in Nebraska include marshes, lakes, river and stream backwaters, oxbows, wet meadows, fens, forested swamps, and seep areas. These wetlands vary greatly in nature and appearance due to physical features such as geographic location, water source, water permanence, and chemical properties. At some points during the year we may find that some wetlands are bone dry while others always contain some amount of water. There are instances where we may come back after a steady rain and the wetland will be filled to the brim with water. Some wetlands receive their water from groundwater aquifers while others are totally dependent on precipitation and runoff. And finally, the water chemistry of wetlands ranges from fresh to saline (salty), and from acidic to basic. These descriptions identify the extremes of wetland characteristics. Nebraska's wetland resources possess these extremes and virtually every combination in between.

The vegetation, soils, and water that make up a wetland provide habitat for our native species. The wildlife that depend on these habitats for survival often face challenges due to living in such a dynamic environment. Many of these organisms have incredible adaptations that allow them to act as engineers, changing their environment to fit their needs. Using special structures on their body, they construct incredible feats of engineering. From nests above water and below, to dens, lodges, webs and casings, a wide variety of species are capable of making these fascinating changes to their wetland environment in order to meet their needs and survive.



Begin by watching the video Wetland Animal Engineers found at:

https://youtu.be/rFU21Or_jEo
or scan the QR code



Types of Engineering in Wetlands

Nests

Several wetland species in Nebraska build nests in order to create a safe space to raise their offspring and survive. But not all of these nests are created in the same way! Birds are a great example of these types of nest-building engineers found living in wetlands and their nests can look very different. Some birds build directly on the ground like swans, geese, killdeer and avocets. Yellow-headed Blackbirds, Red-winged Blackbirds and Marsh Wrens are mid-height weavers, interlacing strips of plants together to create a cup-like nest in the cattails and sedges growing on the edges of the water. Moving into the trees we find the acrobatic Baltimore Oriole who weaves fibers into a sock-like pouch while the Great Blue Heron gathers in groups at the treetops building their nests out of sticks and dried grasses. The methods of building each nest differ, but for most the function is the same. To provide a protected home in which to raise young and continue their life cycle. Did you know that birds aren't the only ones building nests? Take a dip under the water's surface and you'll find that some fish species like the Bluegill will carve out a nest in the sandy bottom of a lake or pond. After the eggs are laid, the males will protect them until they are ready to hatch.

Dens and Lodges

When we imagine an animal engineer, it's nearly impossible not to think of beavers. We have lots of them here in Nebraska, and they are capable of drastically changing the environment in order to meet their needs. Whether they are building a dam to stop or slow water, a lodge to live in, or even a den in the bank of a wetland - these mammals sure know how to design a variety of natural architecture. Beavers are incredibly skilled wetland engineers, and there are others too! Smaller with a rat-like tail, the Muskrat is also a common mammal found in wetlands engineering mound-like lodges and dens all around the water's edge. Other species like ducks, geese, and swans can also use these mounds to grab a better vantage point, and may even build their own nest upon them! Of course, we can't leave out the American river otter, another member of the den engineering team. They like to grab a hollow space under tree roots or claim an abandoned den, which they alter to fit their needs and can access from under the water for extra security.



Types of Engineering in Wetlands

Dens and Lodges Continued...

There's even a tiny den-digging organism called the salt creek tiger beetle that has earned its place as an engineer. This endangered insect relies on Saline wetlands near Lincoln, Nebraska to complete its life cycle. The larvae burrow underground, spending around two years growing there until they are ready to emerge as an adult beetle.

Species digging dens and building lodges in these ways can dramatically impact the environment at large, while smaller tunneling can affect the micro-habitats that exist within the larger habitat. From mammal to insect, each species is altering their environments to meet their needs and live well in their ever-changing surroundings.

Webs and Cases

Often small and overlooked, insects are incredible engineers that make alterations to their environment in order to survive. One such insect is the caddisfly larvae. While this insect ultimately grows into a winged, moth-like adult insect, they actually begin their life cycle underneath the water as a worm-like larva. Being in such a vulnerable state, the caddisfly larva can become easy prey for fish and other aquatic insects. To avoid becoming a snack, the caddisfly actually builds a casing around its body made out of sand particles, gravel, bits of wood and even plants. Whatever can be found in the underwater environment is taken by the caddisfly and built up around its fragile body to become a case that acts as both camouflage and protection. Amazing!

Additionally, an arachnid often found engineering in wetlands is the long-jawed orb weaver. This spider uses its strong silk to weave a circular web, perfect for trapping winged insects. Webs built on the edges of wetlands like this are an ingenious way of capturing insects commonly found flying nearby.



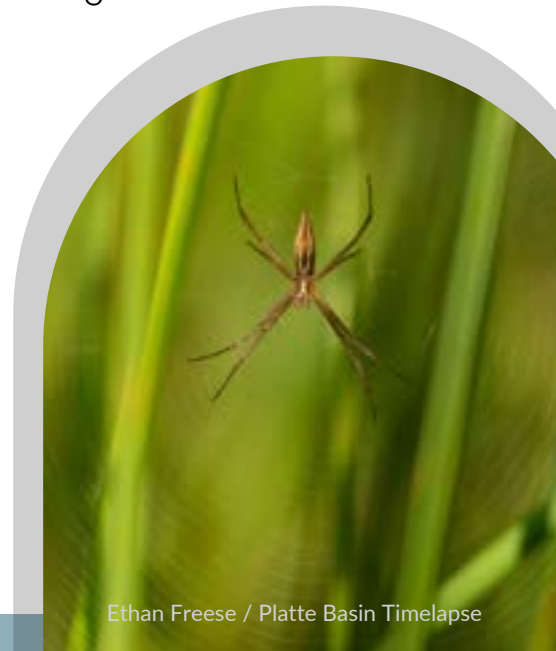
ACTIVITY PROCEDURES

Warm Up Activity:

Categorizing Engineered Structures (15 minutes)

Setting: Indoors

1. In this activity students will work to categorize images of structures that are engineered by animals in wetland habitats.
2. Instruct students to work in partner groups of 2 or 3, or on their own if they prefer it.
3. Hand out 1 set of the photo cards to each group.
4. Students will first look at the cards with the words: Nest, Den, Lodge, Web, Case
5. If needed, talk through these terms with students to make sure that they understand them.
 - Nest - a structure made or chosen by an animal to lay its eggs and shelter its young, sometimes on the ground, other times built high in shrubs and trees.
 - Den - a hole created or found by an animal underground to birth and shelter its young.
 - Lodge - A dome-shaped collection of plants and mud, generally built in or at the edge of water that contains space inside to shelter and care for young, usually with an entrance found underwater.
 - Web - a network of fine threads constructed by a spider from fluid secreted by its spinnerets, used to catch its prey.
 - Case - a protective form built around the insect body using an adhesive silk to stick together pieces of the surrounding environment, including gravel, sand, wood and other plant materials.
6. Ask students to look through the photos they were given and determine together which images go under which category. Give students about 10 minutes to do this with their partners.
7. Allow students to present their results first with another pair of students or to the larger group without giving them feedback on right or wrong answers.
8. Discuss as a large group after students share:
 - Ask students which photos they put under each category. Do they all agree with the placements? What evidence do they have to support their decisions?
 - When students are ready, go through the answers with a set of cards at the front of the room.



ACTIVITY PROCEDURES CONTINUED

Answers

4 nest photos:

- Photo 3 - Baltimore Oriole (hanging cup nest)
- Photo 5 - Red-Winged Blackbird (woven cup nest)
- Photo 6 - American Avocet (ground nest)
- Photo 10 - Bald Eagle (platform nest)

2 den photos:

- Photo 7 - insect
- Photo 8 - Muskrat or otter

2 lodge photos:

- Photo 2 - Beaver
- Photo 9 - Muskrat

2 web photos:

- Photo 1
- Photo 12

2 casing photos:

- Photo 4
- Photo 11

9. Do students notice a trend? There are more photos in the nest category than in the others. That's because there are so many different types of nests that can be engineered!

Main Activity:

Design a Nest (20 - 30 minutes)

Setting: Indoors or outdoors

1. Ask students what a nest is. Can they describe the key features of this type of engineered structure? Who lives there? Who might build a nest in a wetland?
 - Remember that wetlands usually have special soils that tend to be unique in color, aquatic plants, and the presence of water at least some times of the year.
 - Remind students what a wetland in Nebraska looks like by referencing or re-watching the video associated with this lesson. Looking at images from the wetlands project would also be helpful visually for students. Image galleries can be found at nebraskawetlands.com by clicking on any of the wetland types.



ACTIVITY PROCEDURES CONTINUED

2. Nests are important because they provide shelter to adults and young, especially fragile eggs. In a habitat, a shelter like a nest is something many animals have to have in order to survive. What are the other features that animals need from their habitat?
 - Food, water, and space!
3. In this activity, students are going to design their own nest based on what they already know about them. Hand out the appropriate materials depending on what you have in class that students can use to design a nest.
 - If Inside: This could include drawing utensils like markers/crayons or you could provide each student with a small tub of playdough.
 - If Outside: Take students outside and have them gather the necessary materials from nature (ask students to avoid picking plants that are actively growing)
4. As students create or build their nest, they should think about what type of animal it is for. If they would like to make up their own imaginary animal, that's okay too.
5. Give students 15 minutes to work on designing their nest. Encourage creativity and unique design.
6. Come back together as a class. Ask students to take 5 minutes to share their nest with a partner and explain it. What makes their nest unique? What type of animal would build this nest, and how do we know this? Student should be able to show that they thought about their nest design in-depth.

Wrap Up:

Discussion Questions (5 minutes)

1. What are some examples of living things that will build a nest in a wetland?
2. What is an animal engineer you found interesting and why?
3. What sort of things do humans build to meet their needs?

Check out the Entire Wetlands of Nebraska Project:

Take a deep dive into Nebraska's best wetlands resources, including expanded website content, documentaries featuring Nebraska's five main wetland types, printed guides and more!

Find it at www.nebraskawetlands.com, or scan the QR code.



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Nest

Den

Lodge

Web

Case

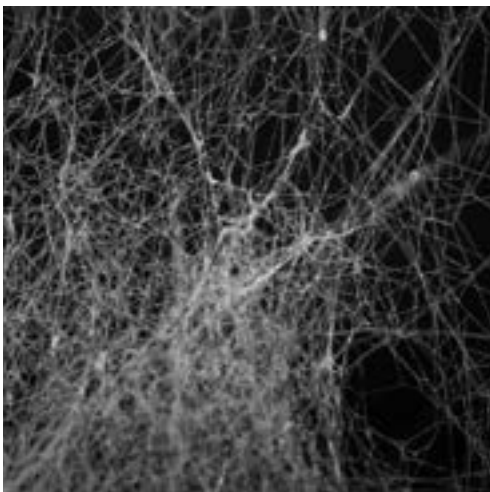
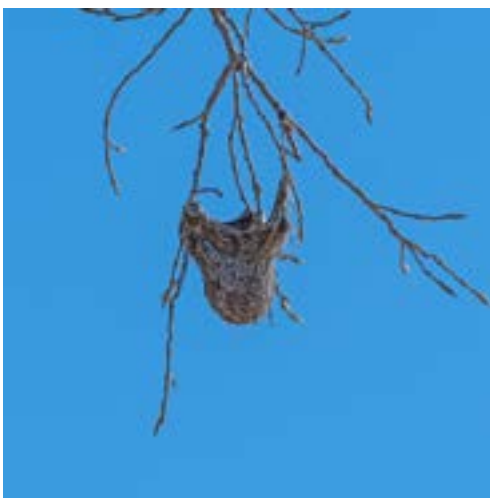
Nest

Den

Lodge

Web

Case



3

2

1

6

5

4

9

8

7

12

11

10

Answer Key. Matches photo grid as it appears on screen.

Baltimore
Oriole
Nest - 3

Beaver
Lodge - 2

Spider
Web - 1

American
Avocet
Nest - 6

Red-winged
Blackbird
Nest - 5

Caddisfly
Case - 4

Muskrat
Lodge - 9

Den - 8

Insect
Den - 7

Spider
Web - 12

Caddisfly
Case - 11

Eagle
Nest - 10