



BUILDING A BEAVER: RIPARIAN ADAPTATIONS *2021

Grade: 3rd

Setting: Any Natural Space-preferably one near a beaver lodge/ Indoors

Theme: Beavers are perfectly adapted to their wet environment.

Description: Using a student as a volunteer, the Naturalist will use various props to simulate the adaptations beavers have to thrive under water and on land.

Recommended Time: 30 minutes

State Standards:

- **Life Science 1.2.1:** All organisms have external parts that they use to perform daily functions
- **Life Science 3.2.3:** Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.
- **Life Science 4.2.1:** Organisms have both internal and external structures that serve various functions.

MATERIALS LIST:

- Laminated photos of beavers (4), beaver lodges (2) and lodge diagram
- Beaver pelt (check out from resource room)
- Chewed wood, beaver track print
- Gloves and calendar
- Couple pair of binoculars
- **Costume:** sweatshirt and windbreaker/fur, Beaver tail on belt /tail, goggles/eyes, ear muff/ears, tie-on teeth/ teeth, fins with combs attached/hind feet, chunk of wood to hold/ front paws, picture of lungs/balloons on string/lung capacity

***Nat Note:** Explain to the teacher that you are going to dress up a student to teach the adaptations of the beaver to pond life. Ask the teacher for the name of a student who is cooperative and able to handle the limelight without embarrassment. If the teacher isn't with you, use your best judgment. At the appropriate time call upon this student to help you.*

ENGAGE

- Take out the beaver pictures and begin by asking what mammal this is and for 5 facts they already know about beavers.
- Acknowledge their ideas and state that beavers are fascinating creatures which are perfectly adapted to the wet environment they live in.



- **EXPLAIN:** The word *adapted* is a scientific term meaning “ a change or the process of change by which an organism or species becomes better suited to its environment”
 - Do the following demo to demonstrate an adaptation:
 - Take out the large leather work gloves and the calendar. Choose a small child to help you. Ask them to put the gloves on and then hand them the calendar.
 - Ask them what month they were born and after they tell you have them open the calendar to that month. This *should* be very difficult to do. Sympathize with their fumbling and **ASK** what they could do to make it easier.
 - “Take off the gloves” is the obvious answer.
 - When they do this and can easily open the calendar, explain that they have just *adapted* to their job.
 - **EXPLAIN:** This is a fast example of an *adaptation*, but animals and plants do this too, only way, way more slowly.... Over thousands of years they *adapt* to be able to survive in their environment.

EXPLORE

- Now it is time for the main demonstration. Ask for a student volunteer and choose from those who raised their hands.
 - **EXPLAIN:** The beaver is an incredible collection of very special adaptations that make it perfectly adapted to living in a wet environment.
- Show the beaver pelt and explain that it is a real beaver pelt. (The student helper can carry the pelt around to show as you talk.)

Note: Some children are disturbed by the sight of animal skin and most are genuinely curious. They will ask if we killed the beaver. One technique to handle this is to say “We did not kill the beaver. I’m not sure how it died. There are people who save the pelts of animals when they die and preserve them so that students can see and feel a real beaver. This person is called a “taxidermist”.

- Invite each student feel the fur as you explain this. Talk about how soft and thick the pelt feels. Tell students how the pioneers who settled the west thought the beaver pelt was so valuable they called it “Soft Gold.” Ask the students to speculate on why the beaver pelt was so valuable. Ask the students to look closely and see that there are two layers of fur in the beaver’s coat. Ask if they ever wear layers of sweaters and jackets in the winter. Agree that more layers keep you warmer.
- **2-Layer Pelt**
 - Hand the sweatshirt to the student helping you and ask them to put it on. Ask if they think this would help to keep them warm. Add, but the beaver also needs to stay dry! That is what his outside coat does. Ask the student to put on the windbreaker over the sweatshirt.



- **ASK:** Does the group agree that will help keep “our beaver” warm **and** dry?

- **Beaver Tail**
 - Now put on the beaver tail belt. Ask the group what this is and show the tail on the pelt. Now ask what they think the beaver uses this big flat tail for. (You may get digging mud as an answer and that is NOT true but a common misconception.)
 - The three main uses for beaver tails are **communication, swimming, and balance**.
 - **Communication:** Try this demonstration with the students to demonstrate: Hold out one hand flat with palm up. Ask the students to do the same. That hand is the surface of the water. Now take your other hand and hold it out flat palm down. This hand is the beaver’s tail. When everyone is ready, on the count of three have the group slap their beaver tail/hand on the water/other hand. That makes a loud noise and it warns all the other beavers that danger is near and they should dive!
 - Repeat this demo using a muskrat’s tail which is long and thin like a rat. Use one finger as the muskrat tail and slap it on the water/other hand. There is very little sound; not nearly as good a warning signal.
 - **Swimming:** The beaver also uses this wonderful tail to help steer and swim when in the water.
 - **Balance:** On land, beavers are less agile, so their tail is used as a prop to help stabilize them while they stand on hind legs.

- **Ear Flaps**
 - Put on the ear muffs. Are these to keep the beaver’s ears warm? NO! Ask if anyone swims underwater like a beaver. Do they have trouble getting water in their ears when they dive?
 - The beaver has special ear flaps that close when it swims to keep the water out of its ears. Add that they have these special flaps to close off their noses and throats too. This keeps the water out of their ears, noses, and throats when they swim underwater.

- **Clear Eyelid/Nictitating Membrane**
 - Put on the goggles. Are these safety glasses? NO! Ask if they have ever tried to open their eyes underwater when they swim. Has anyone ever used a swim mask to be able to see?
 - Explain that beavers have a special “nictitating membrane” or a clear eyelid that they can close but still see through that helps them see underwater. This is like the swim goggles we wear to see underwater.
 - **Review** eyes, ears, nose, and mouth adaptations.

- **Teeth**
 - Now put on the teeth over the mouth (NOT in the mouth). The beaver is famous for its teeth. They are huge and bright orange in color. They continue to grow all through the beaver's life. But all the chewing and cutting of trees that the beaver does helps to keep those teeth short and sharp. The teeth actually stick out in front of the beaver's lips and mouth. That is an adaptation that allows the beaver to carry sticks in its teeth while it swims and still have its lips closed! Pretty cool.
 - The teeth are hard on the front side and soft on the back so when they chew the back wears away faster than the front and that makes the bottom edge razor sharp. Beavers eat a lot of wood so their teeth get lots of use. Beavers also like the plants that grow along the edges of the ponds and in the water. Water lily roots are a favorite. No wonder these teeth are famous.
 - **Show** the beaver skull and point out the teeth

- **5-Digit Front Paws**
 - Get out the chunk of wood and ask the student to hold it in their hands. Ask the group why this is pretty easy for "our beaver" to do?
 - Point out in the picture that beavers have front paws with five digits like our hands and they can grasp sticks to carry them and place them in the dams and lodges they build.
 - Have the students think about their pets and how their paws look. Could a cat or dog carry a stick in their paws?

- **Webbed Back Feet**
 - Lay the swim fins on top of the student's shoes. The beaver has adapted to have back feet that are perfect for swimming. No wonder beavers are able to swim and dive fast to get away from enemies. No wonder they can build such big dams and lodges.
 - Now pick up one of the fins and point out the **comb** attached. Ask if anyone can think why the beaver would need a comb. Yes! It's the heavy fur coat. He needs to keep it combed and untangled so he can swim fast and he needs to spread oil through the fur to keep it water resistant. He preens his fur sort of like a bird or duck preens its feathers or we comb our hair.
 - **Review** the adaptations specific to the feet.

- **Beaver Lungs**
 - Get out the picture of the lungs and balloons and clip it to the front of "our beaver's" jacket. Ask if they know what this is. (*lungs*) Do they also have lungs? Where are their lungs? Why do they think you have balloons attached? (*Because we can take a deep breath and puff up our lungs and then hold that breath to swim underwater.*)
 - The beaver can do the same thing only they can hold their breath for much longer, up to 15 minutes!



- **ASK** the students to take a deep breath and try to hold it for 60 seconds. (Have the MNA continue timing for 15 minutes to show how long that really is) Keep going with your demonstration but periodically ask if the beaver is still holding its breath? These great lungs are an adaptation to allow the beaver to survive his enemies.

EXPLAIN

- **Review** all of the adaptations and then thank the student volunteer for their help and give them a round of applause!

ELABORATE

- **ASK:** “What are beavers most famous for building?”
 - Beavers are famous for building dams and lodges. Ask the students what happens when beavers build a dam? Explain the importance of the beaver dams to other pond animals and to people too.
 - Help maintain wetlands to soak up flood waters
 - Lessen erosion of flowing water
 - Raise the water table
 - Help clean water by filtering it slowly
 - Help plants grow because they have water
 - Create an environment for other pond residents like ducks, frogs, and fish

Explore the Area for Signs of Beaver:

- Use this opportunity to look for signs of beaver around whichever particular riparian habitat you are in (best to identify prior to program).
 - Things to look for include:
 - Chewed stumps
 - Dam activity
 - Bank den or traditional log lodge (typically near or in pond)
 - Plunge Pool (hole created on dry land near water that beavers will dive into and use the underground tunnel as a corridor to the water)
 - Beaver Slick (area of grass and mud that has been matted down near the waters edge and used as a “slide” by the beaver)
 - Fur or other bodily signs

Get out the pictures of the dams and lodges and discuss that when the beaver goes underwater he is escaping from enemies, but also going to his lodge or getting a stick he has saved in the mud at the bottom of the pond to eat.

- Talk about how the beaver uses his teeth to cut down small trees and branches, chop them up and carry them to the water to use either for his dam to close off the flowing river and create a pond or his lodge where he lives and has his family and stores his extra food.
- The beaver uses the wood he has chopped and carried and layers of mud to build very strong houses and dams. They are strong enough to not be washed away by



the water or broken by a big enemy like a coyote jumping on it. Sometimes the lodges are like islands out in the middle of the water and sometimes they are built into the bank of the river or shore of a lake. We see them more often by the banks of rivers here. Use the pictures to show what you are explaining if beaver signs do not exist.

EVALUATE

- **ASK** the students if they can tell you what an adaptation is?
- **ASK** students to explain different beaver adaptations and why that helps them survive in a wet environment.