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Instructor Resource Guide: Beavers and Wetland Diversity

Wetlands are unbelievably important to the success of a variety of organisms, and one animal in particular impacts wetland creation more than any other: the beaver. Before we start talking about all of the different types of animals that feel the positive effects of one of nature's greatest engineers, it is important to understand what kind of animal a beaver is and some of the behaviors and adaptations that make them so well-suited for life on land and water.

Beaver description :

- Beavers are rodents; a type of mammal that has one pair of teeth at the front of their upper and lower jaws, called incisors, that grow throughout their lifetime. They are the largest rodents in North America and may grow to four feet long.
- Beavers are herbivores, meaning that they only eat plant materials.
- Beavers are semi-aquatic, meaning that they spend large portions of their lives both in water and on land.

A beaver warning others of danger

Beaver adaptations :

- Padded tail: A beaver's tail is important not only for evening out mud on the dams they create, but also for signaling other beavers when danger is close by smacking it on the water. Also, the tail allows a beaver store excess fat, radiate heat during hotter months (like rabbit ears!) and balance so that they can chew on trees more easily.
- Teeth: The business end of the beaver is one of its greatest assets; a beaver's incisors are large and flat for chipping bark and wood. Amazingly, iron is incorporated into the front end of each incisor so that it is much harder than the back. Whenever teeth chip they stay angled and sharp. Their incisors can also grow up to four feet a year, so a beaver must chew quite a bit to keep them from getting too long. Lastly, a beaver's lips can close behind its incisors for underwater use.
- Fur: A beaver's pelt, when oiled, is meant to keep them completely dry for long periods of swimming. The multiple layers of hair also help to keep them warm during the colder winter months.

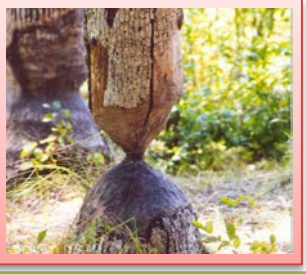
- Eyes: A beaver has clear eyelids that allow it to increase its underwater activity.
- Feet: Webbed feet help propel beavers through water like the flippers that scuba divers wear. Also, their toenails are split (like a comb) and help to spread oil over their fur.

Behavior :

- Beavers cut down large trees to reach new sources of food apart from water plants. It's easy to learn remember just how important trees are by the four B's: branches, bark, buds and building material. A full-grown beaver may take down 300 trees per year!
- Beavers often live on the water in rounded structures made of mud, wood and stone called lodges. There are usually one or two large chambers inside with an underwater entrance.
- Beavers will build in one area until they no longer hear the sound of running water.

A beaver family with kits.

Beavers are often seen as destructive animals because of the large number of trees that they take down, even though they provide many benefits for the immediate area in the short and long term. Discussing the short and long term effects of beavers is vital to understanding their importance in nature.



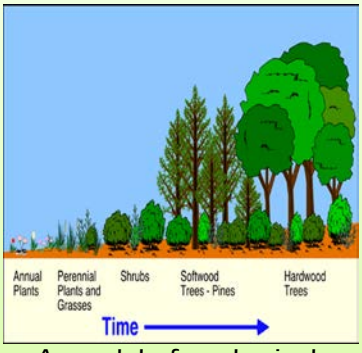
Consequences of behavior :

Short term effects:

- The loss of trees may lead to the destruction of habitats for some birds and insects (harmful).

Long term effects (beneficial):

- While tree supply decreases, wetland formation corresponds to an increase in aquatic plants.
- The accumulation of dead plant material helps to purify water of excess chemicals.
- Processes mentioned above are all part of ecological succession, which means that the community undergoes predictable changes over large periods of time. For instance, wetlands eventually build up riverbed material and partially dry, leading to the formation of meadowlands. Subsequent reestablishment of trees leads to the formation of a forest. With a new source of food and building materials, beavers may start the cycle again!



A model of ecological succession to forest.

- Wetlands contribute to flood control, allowing water to return to the ground at a reduced rate. The removal of wetlands is highly correlated to increasing flood damage in the US.

- Wetlands provide habitats. About one-third of the threatened and endangered species of the US live exclusively in wetlands, and half use wetlands during development.

Although we easily observe the destruction caused by beavers, most do not see all of the good that results from wetland creation. For beavers, the long-term gains offset the short-term costs.

Now that we know that beavers can create wetlands which are essential for the survival of other animals, how many different types of animals truly benefit? The answer isn't simple, for many different animals require wetlands for just as many reasons. Generally, wetlands make a superb home by providing plentiful food and water

The Great Egret is endangered and depends on wetlands

Wetland diversity :

- Migratory birds use wetlands as places to rest, drink and feed. This group includes geese, ducks, bluebirds and many other species. Migration is a tiring process that can span thousands of miles, if birds cannot rest or feed along the way they may not make the journey.

- Over 130 endangered bird species live exclusively in wetlands such as herons, cranes, spoonbills, storks, egrets, eagles and woodpeckers. Many of these are predatory birds that require the plentiful food that wetlands provide such as other birds, fish, amphibians, invertebrates and seeds.

- Mammals use wetlands for feeding on vegetation and for access to water. Deer, raccoons, muskrats and of course beavers all use wetlands during their development.

- Invertebrates (animals lacking a backbone) often feed on plant material and require water for laying eggs. This group is the most inclusive and consists of crayfish, leeches, earthworms, shrimp and many other animals that are generally consumed by other wetland creatures. These animals are incredibly important to the survival of others as a source of energy for the system.

- Reptiles such as turtles and water snakes all depend on wetlands for sources of food and shelter.

- Amphibians such as frogs, toads, and salamanders require a wet environment throughout their lifetimes. Amphibians breathe at least partially with their skin which must remain rather moist throughout their life.

- Fish benefit from wetlands because they provide deeper water to grow and feed. Salmonoids in particular (including trout, salmon and char) have lost much of their spawning grounds through wetland destruction. A healthy fish population also helps to feed other wetland animals.

A Green Water snake native to New York wetlands

Young Rainbow trout

Altogether, freshwater and tidal wetlands are some of the greatest sources of biodiversity in North America. They harbor many different species both common and endangered that often couldn't live anywhere else because of dietary and habitat constraints. The beaver itself (whether or not it is aware) is one of the greatest forces for wetland development and maintenance and should be recognized as an animal with an unbelievably positive impact on the survival of others! Luckily, New York has abundant wetlands throughout the state and you can easily see how beautiful and lively they are for yourself!

Some excellent online resources to find out more!

Animals, Plants and Aquatic Life of New York wetlands – http://www.dec.ny.gov/23.html
More on the beaver – http://animals.nationalgeographic.com/animals/mammals/beaver/
Beavers effects on the environment – http://www.apnm.org/campaigns/beavers/help_wanted.php

Picture sources:

Great egret: http://www.flickr.com/photos/pfsullivan_1056/6596119817/
Canada goose: http://www.flickr.com/photos/mistyblue17/4415972635/
Raccoon: http://www.flickr.com/photos/catsbow/7234605106/
Crayfish: http://www.flickr.com/photos/12619581@N07/5718193575/
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Water strider: http://www.flickr.com/photos/superzeeuw01/6083299106/
Beaver back foot: http://www.kimballstock.com/pix/WLD/06/WLD-06-WF0005-01P.JPG
Beaver family: http://www.familylikeyours.org/images/beavers.jpg
Succession example: http://1.bp.blogspot.com/-Wc8n3KN_Xjw/T9PzoTN25_I/AAAAAAAAAEc/5ZTGucW7nwQ/s1600/succession.gif
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