WALDEN PONDS WILDLIFE HABITAT TEACHER'S GUIDE

SUGGESTED EXPLORATION STATIONS:

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2 What is a Wetland? (between willows and cattails)

3 Plants and Habitat (next bend)

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5 Birds (first bench)

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Exploration Station 1

THE BIG PICTURE

Welcome to Walden Ponds Wildlife Habitat! Your journey begins here. One hundred twenty million years ago, you would be standing in a great inland sea, where limestone and shales were deposited in thick layers on the sea floor. The climate then was humid with frequent storms. You wouldn't have seen the Rocky Mountains as they appear now (look to the west). Those mountains began uplifting 65 million years ago, during the Laramide ***Orogeny*** (mountain-building period). From their lofty summits, millions of years of ***weathering*** and ***erosion*** washed boulders, rocks, and gravels down to where we now stand.

More recently (10 million years ago), ***valley glaciers*** formed in the mountains (above 8,000 feet) and carved the landscape beneath their weight. Notice the rounded stones on the shore before you. These rocks have traveled a long way from the mountains you see to the west, transported, smoothed and rounded by flowing water as the glaciers melted and receded. Thick layers of sediments, deposited at the base of the mountains, were later eroded away. Haystack Mountain and Table Mountain, northwest of Walden Ponds, are remnants of this ancient deposition. The remaining flat lands became part of the ***shortgrass prairie***, cultivated by settlers, and more recently, mined for gravel to make roads. Beginning in the 1970s, these gravel pits were allowed to fill from the underlying water table, and Boulder County Parks and Open Space worked to reclaim this area and create this ***wetland*** you see before you. Without the mountains and the work of glaciers and water, Walden Ponds would not be here today. This dynamic process continues today, as melt-water seeps from the Arapaho Glacier, below the ***Continental Divide***, contributing to Boulder Creek, which flows from the mountains and winds its way past Walden Ponds, continuing the erosion of the Rocky Mountains.

The rocks, soil, water, and plants and animals that live here are connected in a wonderful web of life. Think about these connections as you continue your journey. Be sure to notice the plants growing close to the water. How are they different from those a little farther away? Can you see any animal signs in the mud?

Exploration Station 2

WHAT IS A WETLAND?

Walden Ponds Wildlife Habitat is a special community called a ***wetland***. All wetlands share some basic characteristics:

1) A wetland is ***wet*** at least part of the time. Some wetlands are wet year-round, others have low water levels part of each year. Still others dry up completely for a while and then are refilled as conditions change. Wetlands have many forms and names: swamp, pond, lake, marsh, bog, and estuary (where saltwater mixes with freshwater) are just a few.

2) Wetlands have saturated soils called ***hydrosols***, which are so waterlogged that they contain little or no oxygen and are known as ***anaerobic*** soils. Many small microbes (microscopic living organisms) live in this soil, and combined with dead, decomposing plants and animals, form a rich, often black and smelly organic soil, sometimes called muck.

3) Plants that grow in wetlands include ***hydrophytes***. These are plants which can survive and thrive in water. Some require having their roots submerged all the time. Others do fine at the edge, where the environment changes seasonally from wet to dry. Notice that these plants are not only dependent on the water they live in, but in a larger way, on the climate, seasons, and environment around them.

What are wetlands good for? Rather than smelly, worthless swampland, wetlands have important functions. One is as a natural water treatment plant. The deep, fine soils and the roots of plants absorb sediments, pollutants and more, acting as a filter to cleanse the water. Like a sponge, wetlands hold lots of water in a shallow, wide area, preventing serious erosion and serving as a reservoir. The water can then soak slowly into the soil and replenish the water table, rather than being lost to evaporation or flash flooding.

Wetlands are also very important and productive sources of food and shelter (***habitat***) for wildlife. Many migrating birds and other animals depend on wetlands for their survival.

Exploration Station 3

PLANTS AND HABITAT

Look around you. There are many different kinds of plants at Walden Ponds. Plants help provide homes or ***habitats*** for many kinds of birds and other animals. A habitat is an area that provides an animal with adequate ***food***, ***water***, ***shelter***, and ***living space***. Toward the pond are many ***cattails***. See the dead stalks from last year, and the brown spikes that look like hotdogs? These spikes contain the fuzzy seeds of the cattail plant. Many animals, like ***muskrats*** and ***blackbirds***, live within this thick shelter and use all parts of the plant for homes and food. People have even used cattails in the past for things like flour and diapers!

Now turn around and look at the ***willows***. These are the more tree-like plants with thin, green leaves. They provide food and shelter for songbirds, and other animals. Notice that all these plants are growing from very wet ground. That's why we have a boardwalk here - so you can be ***in*** the wetland without getting wet or harming the habitat. You can see the tall ***cottonwood trees*** on higher ground near the road. They grow near water but need to be on dryer ground than the plants closest to the boardwalk. ***Sedges***, ***bulrushes***, and certain kinds of ***grasses*** also grow on the edge of the wetland. There's a saying to help you remember these three: "Sedges have edges, rushes are round, grasses have ligules under the ground". (ligules are the membranes where the grass blade meets the leaf stalk).

Farther out into the water are plants that grow ***under*** the water. Ducks and other waterfowl eat these plants and the small animals that live in their shelter. Are you beginning to notice that there are many different habitats within this wetland ***ecosystem***? Can you see the different ***partitions***, or parts of habitats, as one goes from the deep water to the shallow, to the shore, to dryer ground? The types of plants change as the moisture and soil type changes. As you continue exploring Walden Ponds, notice how many different kinds of plants you can see. What different ways do you think the animals use plants?

Exploration Station 4

METAMORPHOSIS MAGIC

Take a close look into this body of water. Watch for a minute -- have any **camouflaged** animals (those that blend in with their environment) revealed themselves to you? This is a good place for smaller animals seeking shelter. Imagine all of the great hiding places if you were a minnow or tadpole -- under the boardwalk, behind a stand of cattails, beneath a fallen log, or within a clump of algae. Can you discover any more hiding spaces? Why do you think you would want to be in this place if you were a small animal? The water in this small pond remains calmer than the rest of the marsh. It is also warmer -- can you guess why?

We have three different species of frogs at Walden Ponds: the striped chorus frog, the northern leopard frog and the bullfrog. In the spring, leopard frogs and bullfrogs emerge from their winter sleep on pond bottoms, and chorus frogs awaken from their underground hibernation. During the warmer months, you may hear the sounds of the males making their mating calls. The striped chorus frogs begin their chorus -- a slow, staccato trill -- soon after emergence in the spring, attracting females to the breeding ponds. The northern leopard frog makes a call that sounds like a snore followed by quick stuttering croaks. You may hear the bullfrogs' deep "m-rum" calls resonating through the ponds May through August.

After mating, female frogs lay their eggs in an area where the water is shallow and there is plenty of vegetation to hide the vulnerable embryos. Bullfrogs lay around 20,000 eggs, however, many do not survive to adulthood because of **predation** and environmental conditions. Great blue herons, water snakes, pelicans, robins and smallmouth bass all prey on frogs and tadpoles in this marsh.

You may see some very large tadpoles -- these are most likely bullfrog tadpoles, which may take two years to change into frogs. Do you notice any legs or arms beginning to appear on the bodies of the tadpoles? Just like their parents, these tadpoles spend the winter in the mud before they turn into adults. Northern leopard frogs **metamorphose**, or change from tadpoles to frogs, in several weeks. Can you imagine growing from a baby to an adult in just three weeks?! Striped chorus frog tadpoles change quickly too, but only about 12-20 of the 450 tadpoles survive metamorphosis to enter adulthood.

Chorus Frogs and Leopard Frogs eat a wide variety of invertebrates, including flies, springtails, mites, bugs, spiders, beetles, and ants. Bullfrogs, which are not native to Colorado, will eat any animal that can be captured and swallowed, including native frogs and each other.

Even though survival odds don't seem very promising for the frogs, they have a much better chance of having some of their young survive in this protected area, than in more exposed parts of this marsh. In fact, this is an ideal spot to observe the magical change from egg to tadpole to frog -- a truly amazing act of nature!

Exploration Station 5

BIRDS

By now you may have figured out that the wetland is ***alive***! How many animals can you find? Are there spider webs under the boardwalk? What life can you see on the water and on the shore? What about that dead tree? Who might live there, or use it as a perch?

Let's think about birds for a moment. Can you see any birds on the water? What special adaptations do water birds need for an aquatic life? What kind of bills or feet do they need? How do they stay dry? What do they eat? We have many birds at Walden Ponds, and they live in many different ways.

Look at the cattails and bulrushes surrounding you. These plants are home to Red-winged and Yellow-headed Blackbirds, as they weave their nests into this vegetation every spring. The red-orange shoulder patches of the Red-winged Blackbird, and bright yellow hood of the Yellow-headed blackbird help the males stake out nesting territory and attract females for mating.

Out in the pond, you may see ***diving ducks***, such as Redheads and Ring-necked Ducks disappearing beneath the water to find their food. Also, watch for ***dabbling ducks***, such as Mallards and American Wigeons, who just dip their heads underwater to eat, leaving their tails sticking up in the air.

Most ***wading birds*** are large and have long legs that allow them to wade in shallow water to catch fish and other aquatic prey. The wading bird you're most likely to see at Walden Ponds is the Great Blue Heron. If you see a large, gray-blue bird with long legs slowly stalking through the shallow water, that's a Great Blue Heron looking for a meal! During migration we are sometimes visited by White Pelicans, large white birds with large bills for scooping up fish. White Pelicans sometimes fish cooperatively, herding small fish into shallow water for capture. Another fish eater is the Osprey, a white and black ***bird of prey*** that nests in high places near water, and swoops down to snatch fish from the water.

Shorebirds live and feed on the shore and mudflats around water, where aquatic insects and other food can be found. Listen for Killdeer as they call out their name. Sometimes they can be seen pretending to have a broken wing. They are trying to distract you from finding their eggs, which are laid on the ground. Remember the dead tree? A woodpecker might peck a hole there to make a home, and other birds may use the hole later for nesting. A Belted Kingfisher might perch on the branches, watching for fish in the water.

As you have seen, different birds live in different habitats at Walden Ponds. There are so many birds that depend on wetlands for food, water, shelter and space to live. It is especially important for birds that migrate in the spring and fall - providing resting places, food, and nest sites.

Exploration Station 6

MAMMALS OF THE MARSH

What is a mammal? Mammals are ***vertebrate*** animals (animals that have a backbone), with hair on their bodies. Mammals are ***warm blooded*** (they can generate their own body heat), they nurse their young, have large, advanced brains, and have four-chambered hearts to carry oxygen-rich blood throughout their bodies.

By now, you have probably seen insects and birds on your journey, but who has caught a glimpse of a mammal that lives in this marsh? Most of you probably haven't seen a beaver, muskrat, raccoon, fox or coyote. Why? Because most of these animals are ***crepuscular*** or ***nocturnal***. Crepuscular animals are active mainly at dawn or dusk. Even if we don't see them during the day, we have evidence of mammals living in the marsh. Who can find a cattail that has been gnawed on? That is probably the work of the muskrat, whose main food source is the tender cattail reeds and roots. The muskrat also has a home here in the marsh. On the other side of the hill next to the boardwalk is the entrance to the muskrat's home. The entrance to their burrow is underwater so that the muskrats can feed under the ice in winter and other animals won't discover the entrance. Although muskrats are more active at dawn and dusk, you may see one during mid-day. Look for an animal that looks like a small beaver swimming through the marsh.

Although this park is closed at night to people, it is open for wildlife! This is when nocturnal mammals come out to feed. Some mammals, like raccoons and skunks, are ***omnivorous*** and eat many different types of food. Raccoons stand along the water's edge, searching for fish, frogs and whatever else they can find. Some scientists think that raccoons rinse their food to aid their sense of smell. Striped skunks also prowl Walden Ponds at night, searching for insects, rodents, bird eggs, plants, fruits and berries to eat. A red fox may bring its young, called ***kits***, to the marsh to hunt for rabbits. The howl of the coyotes may also be heard as they roam the wetland at night in search of almost anything edible.

Some mammals that come out at night do not walk on four legs -- they fly! Bats, the only flying mammals, are major predators of night-flying insects such as moths, beetles and mosquitoes. Some bats can catch over 1,000 insects in one hour! Some bats are also ***pollinators***, helping in the reproduction of plants. Bats are prey for other nocturnal predators, such as owls and skunks.

While many of our marsh mammals lead secretive lives, they play vital roles in maintaining the ecological balance in the dynamic wetland community.

Exploration Station 7

INCREDIBLE INSECTS

Insects are incredible! They are found everywhere on earth, from the tropics to the tundra, in water, trees, plants, soil, and even inside of other animals. There are many different types of insects that live at Walden Ponds, from the minute midge fly to the regal dragonfly, and all play an essential role in the ***food chain*** of this ecosystem. What exactly is an insect? Insects are small, ***invertebrate*** animals (animals without backbones), with three distinct body parts (head, thorax, and abdomen), six legs, wings and an ***exoskeleton***, a hard outer-covering to help protect internal organs and to help prevent drying out.

Over a million different species of insects have been identified worldwide, more than all other animal species combined. Over 100,000 species of insects live in North America. Some of the common insects that live at Walden Ponds include: dragonfly, damselfly, stonefly, mayfly, alderfly, dobsonfly, cranefly, caddisfly, mosquito, water-dwelling beetle, water boatman, predacious diving beetle, giant water bug, water striders, back swimmers, and whirligig beetles.

Insects have many predators just waiting to eat them, so it is no wonder that they have developed ways of protecting themselves and their young. It is not often that you will see an insect egg, but if you were able to count all the eggs within a few miles of this marsh you would find that there are millions of them! Many of the insects that live here lay their eggs in the water. The male giant water bug has many reasons why he comes up for air, and they are all attached to his back! The female cements her eggs to the male's back and, for a week, until the eggs hatch, he must make sure the eggs get plenty of oxygen. Mosquito eggs float on the surface of the water. They hatch into larvae that develop into comma-shaped pupas. The larvae cannot absorb oxygen from the water, as fish can. Instead, they hang upside down and poke a tube through the surface tension of the water and breath air -- like a swimmer using a snorkel!

You may notice some damselflies hitched together -- abdomen to abdomen. They are dropping off their eggs! The mother goes beneath the surface of the water to lay her eggs. Then, when the eggs are laid, the male pulls the female out of the water!

Why are insects important? Many insects are beneficial or helpful: they are plant pollinators, especially for fruit; they provide honey, beeswax and silk; they provide food for birds, fish and other animals; they are good indicators of water pollution; they provide information on heredity, evolution, biochemistry and other important science topics; and they are fascinating to watch! Can you name any more reasons? Insects are one group of animals that we can easily observe and enjoy. Take time along the boardwalk to get up close to these small creatures that provide a large link in the wetland food chain!

Exploration Station 8

LIVING ON THE EDGE

Where the marsh water meets the land, and where the air comes in contact with the surface of the water, is a ***transition zone***. Many of the plants and animals that live here at Walden Ponds are uniquely adapted to living between two worlds.

Water striders are supported by the surface of the water (***surface tension***), because water molecules are strongly attracted to each other. This allows them to skate across the thin line of the transition zone between water and air! The water strider's legs have many soft feelers on the ends to disperse their weight. You may see small green plants floating on the surface of the water -- this may be duckweed, one of the smallest flowering plants on earth. Duckweed growing in a pond is also an indicator that the water quality is good. Dabbling ducks, the waterfowl that feed at or just below the water surface, feed on this important source of nutrients.

Some animals that live in the marsh are comfortable both in the water and on land. Take the northern water snake for instance. You may see this brown mottled reptile sunning itself on a mat of dead cattails or gliding through the water in search of an unsuspecting frog. Canada geese, mallards and other waterfowl are adept in three zones: the water, land and air. Snapping turtles, some as large as trashcan lids, spend time on land, but also spend time underwater. They hunt for small fish to eat and also dead creatures that have settled to the bottom. Muskrats and beavers are also adapted for life both on land and in the water. Can you name some of the special ***adaptations*** they have for this dual life?

Edges, or transition zones are important; where two types of habitat meet, diversity increases. It is here that land animals come to drink, hunt and find shelter. Animals that live in these transition zones have the benefit of two or more homes. That often means twice as much room and twice as much opportunity to eat and seek shelter. This is important in the wild world where competition for the necessities of life can be demanding!

Exploration Station 9

TRANSITION AREA: TRACKS AND SIGNS

As we leave the boardwalk, we continue into a somewhat different ***transition zone***, where dry and wetland ecosystems blend from one to the other. This overlap of communities provides for a rich diversity of plant and animal life. What changes do you notice about the plants and the landscape? Is the ground dryer and higher? How does this change habitat?

What are some animals that you might find here? You may see a snapping turtle making its' way from one pond to another, or a bull snake crossing the path. (Remember to give them lots of space, for everyone's safety!) Often, we do not actually see wildlife, because they see us coming first. Also, though some animals are most active by day (***diurnal***), many animals are not seen because they are most active at night (***nocturnal***), or at dawn and dusk (***crepuscular***), when people are not around. The signs they leave give clues to their presence and activities and can be just as exciting as seeing the animal itself! Footprints of rabbits, foxes, or deer, droppings (***scat***) of animals along the path, a tree that a beaver has gnawed through - these are all signs that you may find if you are careful and observant. Don't forget to look up! There might be a bird nest or a paper-wasp nest up in those trees. This is also a good place to see yellow- headed and red-winged blackbirds nesting in the cattails in spring and summer. They are hard to miss, with their loud territorial calls and bright colors, and sometimes you can see the babies too!

Please note that the area to the north of the gravel path is a ***critical wildlife habitat*** which has been set aside - where no people or dogs can enter - protecting the wildlife from disturbance. This is an important goal of our County parks - providing protected areas for wildlife as well as for peoples' enjoyment and recreation. If you proceed quietly and are aware, perhaps you will be rewarded by a wild sight!

Exploration Station 10

OUT OF SIGHT POND LIFE

Look at the surface of Duck Pond. It looks calm, but wait -- what is happening *under* the water? A dragonfly larva may be shedding its skin, a water flea may be munching on pollen that has blown into the water, the cells in the midge egg are busy multiplying, and algae is turning the energy from the sun into food by means of ***photosynthesis***, which helps animals live and grow. Just imagine -- there is a hidden world under the pond!

Once your group begins to pond-dip, you can start by asking "what do you see in the water you have scooped into your container?" Within your container you are most likely holding the keys to life in the pond -- water and algae. The thin green threads of algae have no leaves, stems or roots, but these small plants support the rest of the ecosystem by providing rich food and also by making oxygen. The algae are gobbled up by insect larvae and small fish. And who eats the insects and small fish? The painted turtles sunning themselves on the log, the bass gliding through deeper waters, the Great Blue Heron patiently fishing in the shallows, and many other creatures of the marsh.

Some may find more than algae in their container. A spring tail may be hopping its way across the surface of the water. Springtails are so light they only dent the surface of the water. You might see a water strider skating across the water, sensing vibrations on the surface of the water to know when it's time for a snack! Or maybe you'll find a miniature raft of mosquito eggs. Mosquito eggs float on the surface of the water, enabling the growing embryos to get plenty of oxygen to develop into adults. These creatures, as well as hundreds of types of microscopic plants and animals, make the pond their home.

Has anyone seen a cluster of eggs that look like a bunch of grapes? If you have, it may be a mass of frog eggs. Can you guess where many frogs go during the cold months? To the bottom of the pond to bury themselves into the cozy mud! Fortunately, the pond doesn't freeze from the bottom up. The top layer of water actually insulates the animals living beneath the surface. If the pond does freeze from top to bottom, the mud still protects the creatures that are buried in it. Can you think of any other pond animals that bury themselves? Turtles also spend the winter in a deep sleep buried in the mud. While buried over the winter, frogs and turtles hardly breath and their hearts barely beat. The little energy they need comes from stored body fat. Most fish in the pond can withstand the cold temperatures, as long as they keep moving.

No matter what time of year you come to visit Walden Ponds, life under the pond is full of fascinating creatures, large and small. And each of these creatures depends on the others to survive in this wonderful watery world!

Exploration Station 11

SUCCESSION AND THE FUTURE

If you have time to stop here, it's a good place to contemplate what you have seen and consider some other concepts.

Ricky Weiser Wetland is the most recently reclaimed wetland at Walden Ponds. You can observe the difference between a pond and a marsh by comparing Ricky Weiser Wetland with Bass Pond to the north. Notice the gently sloping banks of the marsh. Can you see the varying edges caused by seasonal drying and filling? Because it is shallow, drying or filling result in more drastic changes in water depth. Ricky Weiser Wetland is not a very good fishing hole. Fish need deeper water with debris at depth for shelter, such as has been provided by old Christmas trees added to some of the deeper ponds. True wetland plants such as the sedges, rushes, and grasses mentioned earlier will thrive better in the marsh. See if you can identify any of these, using that saying we learned earlier, but be careful! Ground-nesting birds such as killdeer, geese, avocets, and northern harriers prefer this type of habitat. Level ground, and protective vegetation provide a safe, camouflaged place for their eggs.

In nature, a lake or pond slowly fills with sediments and decaying organic matter, becoming a marsh, and then a meadow, and eventually becoming a field of rich soil. This gradual process of change is called ***succession***, and takes hundreds to thousands of years to complete.

As you have learned, the diverse and wonderful habitats at Walden Ponds have been designed and created by people. Restoration and habitat protection have become increasingly important as human development has displaced much of the habitat that formerly existed. Protection of remaining wildlife habitat from the plains to the mountains is an important goal of Boulder County Parks & Open Space, for future generations to enjoy and for the survival of both plant and animal communities.

Thank you for visiting Walden Ponds! We hope that your stay has been enjoyable, and that you have gained a greater awareness, understanding and respect for nature. Please come again and bring your family to share what you have learned here today!

Updated June 2020, Larry Colbenson, BCPOS Natural History Program Coordinator