



Lily Lake Phenology Walk

WELCOME TO LILY LAKE

Thank you for helping with this project.

Whether you are a one-time or frequent visitor to Lily Lake, your participation as a community scientist can play a vital role in helping park resource managers better understand our changing natural environment and help to inform management decisions. This project involves answering simple questions and should only add approximately 20 minutes to your walk around Lily Lake.

How can you become a community scientist?

It's simple! Walk around Lily Lake in a counterclockwise direction, stop at seven observation points described below, and record your observations by answering the questions listed for each stop. You can choose to record observations at all seven stops or just a handful of stops.

What is phenology?

Phenology is the study of the seasonal timing of important events such as animal migration, plant flowering, and when leaves change color. The timing of such events is closely linked to climatic and environmental variables. By collecting phenology data, we can gain a better understanding of how plants and animals at Rocky Mountain National Park respond as the environment changes.

What are the questions you can help the park answer?

Over time, as we collect your observations throughout the seasons, we will be able to answer several important questions:

1. Has there been a shift in phenology in different plant species at Rocky Mountain National Park?
2. Has there been a shift in the timing of breeding vocalizations of birds and frogs?
3. Has there been a shift in the time snow is present on the ground at different elevations?

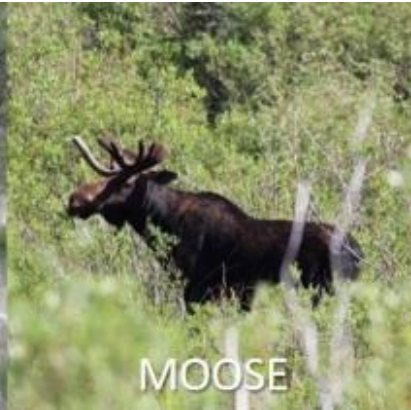
WILDLIFE OBSERVATIONS

As you make your way around the lake, please note if you see the following types of wildlife. The last activity at Stop 7 will allow you to check off the ones that you have observed while you walked around the lake.

- Elk (*Cervus canadensis*) – Elk typically spend summers at elevations higher than the lake and spend winters at the lower elevations within the park all the way down to the front range.
- Moose (*Alces alces*) – Moose within the park are contrary to elk in that they typically spend winters at higher elevations and summers at lower elevations. Moose often are attracted to Lily Lake's aquatic vegetation, willows and aspens.
- Tiger Salamander (*Ambystoma tigrinum*) – Tiger salamanders are one of only four amphibian species found within the park. Though adults spend most of their lives underground, larvae remain aquatic for months during the spring and late summer within the bodies of water in which they hatched.
- Hummingbirds – The broad-tailed hummingbird (*Selasphorus platycercus*) is the park's most abundant hummingbird species and is typically observed in the spring and summer.
- Ducklings/Goslings (only babies, not adult ducks or geese) – The lake is typically home to mallards and ring-neck ducks year-round and attracts many other waterfowl species during the spring and fall migrations.



ELK



MOOSE



HUMMINGBIRD



SALAMANDER



DUCKLING

STOP 1: WILLOW

Use the images and map below to navigate to the WILLOW.



As you enter the Lily Lake trail, the willow is on the right side of the trail growing behind a wooden fence.

Willows (*Salix* spp.) are dominant shrubs near lakes and streams in the park. There are a number of different species, ranging in size from a few inches to over 10 feet tall. Willows are important food sources for elk & beaver and support a large number of bird and butterfly species.

Is the WILLOW present? PRESENT ABSENT UNSURE



Do you see BREAKING LEAF BUDS? YES NO UNSURE



Typically seen April - May. A bud is considered breaking once the green leaf tip is visible at the end of the bud. Do not include buds with fully unfolded leaves.

Do you see LEAVES? YES NO UNSURE



Typically seen May - October. Leaves are elongated in shape and can be bright green, yellow, orange, gold or reddish in color.

Do you see FALL COLOR leaves? YES NO UNSURE

Example: Yellow leaves to the right in the picture above. Typically seen September - October. Fall color leaves are yellow, orange, gold or reddish.

Do you see CATKINS? YES NO UNSURE



Willows are dioecious, meaning that individual plants are either female or male. The plant at this stop is female. Female catkins, which start as "pussy willows" and develop into flowers and fruits in pendant shapes that hang from branches, are typically seen May - June.



Do you see RECENT CATKIN DROP?

YES NO UNSURE



Typically seen June-July. Do you see any ripe catkins that have fallen off the tree? Ripe catkins often look white and fuzzy.

STOP 2: LIMBER PINE



Continue counter-clockwise around the lake. The limber pine is approximately 400 feet (120 meters) from the willow on the left side of the trail growing on a steep slope adjacent to Lily Lake.

Limber pine (*Pinus flexilis*) is a five-needle white pine whose seeds are an important food source for birds, small mammals, and bears. The Clark's Nutcracker, a member of the Jay family, caches thousands of seeds in the fall to serve as a winter food source. Forgotten seed caches have a chance to germinate, making this an important means of seed dispersal. The scientific name, *Pinus flexilis*, comes from the branch's ability to bend and flex in high winds.

Is the LIMBER PINE present? PRESENT ABSENT UNSURE

Do you see YOUNG NEEDLES? YES NO UNSURE



Typically seen May - July. Young needles are light green in color and are found in tight bunches at the ends of branches.

Do you see POLLEN CONES? YES NO UNSURE



Limber pine are monoecious, meaning that individual plants bear both female and male cones. Typically seen May - July. Small, red male cones bear yellow pollen. LOOK CAREFULLY, pollen cones are very small.

Do you see POLLEN RELEASE? YES NO UNSURE



Typically seen May - July. Shake a branch with pollen cones to see if yellow pollen is released.

Do you see UNRIPE SEED CONES? YES NO UNSURE



Typically seen May - July. Look for green cones often found near the ends of branches. Female unripe seed cones are green with scales closed tightly.



Do you see RIPE SEED CONES? YES NO UNSURE



Typically seen July - August. Ripe cones are yellow-brown in color. Do not include empty cones that have dropped all their seeds.

STOP 3: WAX CURRANT



The Wax Currant is located approximately 350 feet (106 meters) from the Limber Pine on the path that leads to the bench. Wax currant (*Ribes cereum*) is a common shrub growing 3 to 5 feet tall. The stems are gray and bear no spines or prickles. The pink or white tubular flowers attract hummingbirds, while small mammals and birds feed on the red berries.

Is the WAX CURRANT present? PRESENT ABSENT UNSURE

Do you see BREAKING LEAF BUDS? YES NO UNSURE



Typically seen February - March. Bud is considered breaking once green leaf tip is visible at the end of the bud. Do not include buds with fully unfolded leaves.

Do you see LEAVES? YES NO UNSURE



Typically seen March - November. Glossy and dark green, yellow, orange or reddish in color. Lobed leaves with 3 - 5 lobes. Do not include fully dried or dead leaves.

Do you see FALL COLOR leaves? YES NO UNSURE

Typically seen September - November. Leaves turn yellow, orange, or reddish.

Do you see FLOWERS or FLOWER BUDS? YES NO UNSURE



Typically seen May - June. Pink or white tubular flowers often occurring in clusters. Do not include wilted or dried flowers.

Do you see OPEN FLOWERS? YES NO UNSURE

Flowers are open when reproductive parts (stamens and pistils) are visible. Look at photograph above to see open and not open flowers.



Do you see FRUITS? YES NO UNSURE



Typically seen July - August. Fruit is a berry that changes from green to red.

Do you see RIPE FRUITS? YES NO UNSURE



Typically seen July - August. Fruit is ripe when it has turned orange – red.

WILDFLOWERS:

The next stop (Stop 4) is on the north side of the lake. As you are walk to this next stop, please observe and document the types of wildflowers that are along the trail between Stop 3 and Stop 4.



One of the most popular phenological events of spring and summer in Rocky Mountain National Park is the blooming of the hundreds of wildflower species throughout the park. As you are walking to the next stop, look next to the trail, note the types of BLOOMING wildflowers you see, and whether there was snow along the trail. NOTE: we only want to identify BLOOMING wildflowers, DO NOT include any you are able to identify that have not bloomed yet or are no longer blooming.



What BLOOMING WILDFLOWERS did you see along the trail?

As you are walking to the next stop (the aspen tree before the boardwalk), look next to the trail and check the BLOOMING wildflowers you noticed between Stops 3 & 4 (images of the flowers typically found at Lily Lake are shown below). Checkboxes next to the wildflowers shown below and add other that you see to the "Other" box.

<input type="checkbox"/>	Pasqueflower (<i>Pulsatilla patens</i>)
<input type="checkbox"/>	Wild Iris (<i>Iris missouriensis</i>)
<input type="checkbox"/>	Tall Chiming-Bells (<i>Mertensia ciliata</i>)
<input type="checkbox"/>	Wild Rose (<i>Rosa acicularis</i>)
<input type="checkbox"/>	Indian Paintbrush (<i>Castilleja coccinea</i>)
<input type="checkbox"/>	One-sided Penstemon (<i>Penstemon secundiflorus</i>)
<input type="checkbox"/>	Other: _____



Was there SNOW along the trail? YES NO UNSURE



STOP 4: SOUNDSCAPE



The Soundscape stop is located approximately 1000 feet (304 meters) from the wax currant on a bench between the trail and the lake.

Record the sounds you hear in one minute

Sounds in the park change with the seasons. Singing birds are a sign of spring and bugling elk are a sign of the fall. Natural sounds are an important resource that the park works to manage and protect. Human associated noise can negatively impact wildlife and your park experience.

Instructions: Spend one minute listening, put a check in the box for all of the sounds you hear (do not include sounds you make) and note if there are any periods of silence.

- Bird Singing
- Elk bugling
- Frogs
- Insects
- Bird (non-singing sounds) or other animal sounds
- People
- Airplane
- Motorized Vehicle
- Other: _____

Was there a period of SILENCE or NO SOUND? YES NO

If YES, how long did the period of SILENCE or NO SOUND last? 10 seconds 10-30 seconds 30+ seconds



STOP 5: ASPEN



There is a large aspen tree located on the right side of the trail across from a very large log on the left side of the trail. If you find yourself at the wooden boardwalk/bridge then you have gone too far.

Quaking aspen (*Populus tremuloides*) is a deciduous tree that provides important habitat for a large number of plant, butterfly, and bird species in the park. Aspen usually reproduce through suckering, where young shoots, call suckers, emerge from the roots and eventually grow to become trees. As a result, aspen stands are typically clones comprised of trees that are genetically identical.

Is the ASPEN present? YES NO UNSURE

Do you see BREAKING LEAF BUDS? YES NO UNSURE



Typically seen April - May. A green leaf tip is visible at the end of the bud. Do not include dormant buds or buds with fully unfolded leaves.

Do you see LEAVES? YES NO UNSURE



Typically seen May - October. Leaves are dark green in color with pale green underside during the summer and yellow, orange, gold or reddish during the fall.



Do you see FALL COLOR? YES NO UNSURE

Typically seen September - October. Leaves turn yellow, orange, gold or reddish.

Do you see CATKINS? YES NO UNSURE



Aspens are also dioecious, meaning that individual plants are either female or male. Catkins are typically seen May - June.

Do you see RECENT CATKIN DROP? YES NO UNSURE



Typically seen April - May. Do you see any ripe fruits (as pictured) that have fallen off the tree?

STOP 6: VIEWSHED



The viewshed stop is located approximately 300 feet (100 meters) from the aspen on the boardwalk.



What is the level of SNOW COVER of Longs Peak?

Snow cover plays an important role within ecosystems. Snowmelt at high altitudes determines the beginning of the growing season and an early snowmelt in the spring can have a rippling effect within ecosystems at lower altitudes. Earlier snowmelt can lead to frost damage to flower buds, which can lead to fewer flowers, which can lead to a decrease in available nectar for birds and butterflies.

Instructions: Walk along the boardwalk for a view of Longs Peak. Compare the snow cover of what you see with the pictures below. Check the choice that best represents the current snow cover based on the pictures. You may also take and submit your own photo of Longs Peak's snow cover.



LOW MEDIUM HIGH NOT VISIBLE UNSURE

STOP 7: WILDLIFE



The WILDLIFE stop is located approximately 1000 feet (300 meters) from the viewscape at the dock near where you started. The dock offers a final opportunity to look for tiger salamanders in the water.

What WILDLIFE did you observe during your walk?

Please select the types of wildlife you saw as you made your way around the lake as mentioned at the beginning.

- Elk
- Moose
- Tiger Salamander
- Hummingbirds
- Ducklings, Goslings (ONLY babies, NOT adult ducks or geese)

DATE of Observations (mm/dd/yy): ____/____/____

Rocky Mountain National Park

National Park Service
U.S. Department of the Interior



Approximate TIME of observations: MORNING AFTERNOON EVENING

Please remember to upload your survey information to <https://arcg.is/DbnLq>

Thank you for participating!