

# MEADOWWATCH

*A Citizen Science Project  
Exploring Wildflower Phenology  
At Mount Rainier National Park*

## Reflection Lakes



[www.meadowwatch.org](http://www.meadowwatch.org)



## Background

The goal of **MeadoWatch** is to collect high quality data on the seasonal timing of flowering (i.e. wildflower phenology) in the high mountain meadows of Mt. Rainier. Scientists like us need this kind of data to gain an understanding of the biological impacts of climate change, and we cannot do it without your help! As volunteers, you will help us by monitoring the phenology (see picture below for different ‘phenophases’) of several plant species over a large gradient in elevation (and climate). This information helps us understand how climate change might alter wildflower phenology, and eventually, could aid resource managers at Mt. Rainier National Park prepare for climate change. By participating, you get the chance to engage in scientific research, and (we hope) gain an understanding of the potential impacts of climate change. Thank you for your help!

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**Phenology** is the study of the timing of recurring life stages (e.g. budding, flowering, fruiting, and releasing seeds) – in other words, the biological manifestation of the seasons. Phenology is frequently cued by climatic variables (e.g. snow disappearance, temperature), and thus, will likely be sensitive to climate change. **Phenophases** are stages of phenology, as illustrated below by Mountain Daisy.

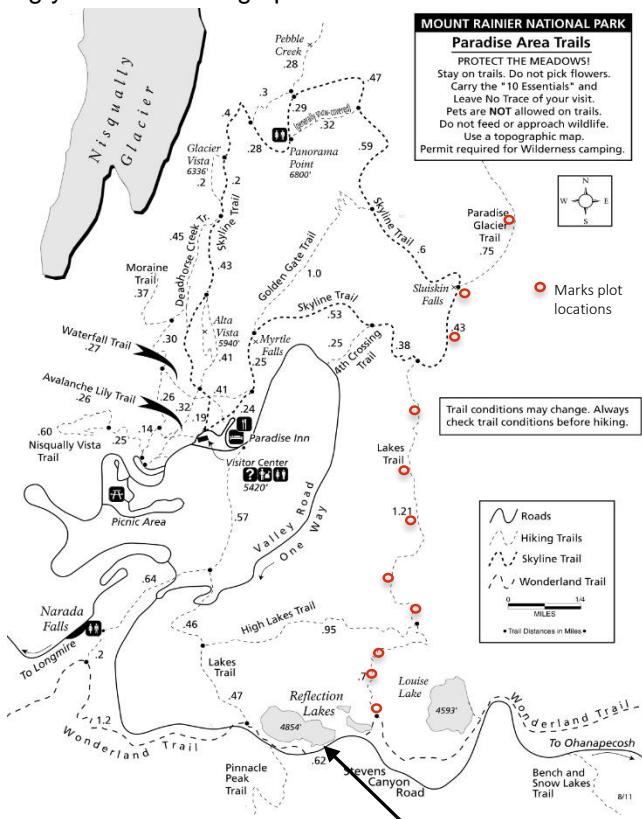


## Directions to Reflection Lakes Hike

To help us collect data, you will:

- 1) Hike along a system of trails to reach the eleven plots (detailed directions on pages 5-15)
- 2) identify the phenophases present and absent for ten focal species (descriptions and photos on pages 18-37)
- 3) record what you see on a data sheet (which you should have with you)
- 4) then return your data sheet to the brown metal box outside building L-112 at Longmire or mail it back to us.

The eleven plots are located along the east branch of the Lakes Trail, part of the Skyline Trail and the Paradise Glacier trail (see map below). Your hike is 5.5 miles roundtrip and approximately 2,000 feet (600 meters) of elevation gain. To start your hike, park at the easternmost Reflection Lakes parking lot (there are 2) and walk east along the road ~0.1 miles. Follow directions to the Wonderland Trail and High Lakes Trail, and then directions to the first plot (page 5). Our directions to each plot are written assuming you will be hiking uphill.



## Finding the Plots

Use the directions and photos within the following pages to find each of the eleven plots. The location of the plot will also be marked by an orange or yellow plastic survey washer located in the trail (see picture right). However, these survey markers might not be present early in the season, although you may see flagging marking our buried microclimate sensors. They may also get covered in trail dust or well-meaning visitors may remove them (we will check this and regularly replace any missing markers). We also provide GPS coordinates (if you have your own unit – WSG 84 datum), but you should be able to find the plots without a GPS unit. Directions to some plots describe streams or small drainages, which may be dry in late summer (but the ditch where the stream once ran will still be visible).



Once at the location, stand with the survey washer between your feet, facing in the direction explained in the plot-specific directions. You will be observing the phenology of our focal species in a rectangular plot made with your arm span as the length of the plot and one arms' length as the width of the plot (see below).

**Please help maintain this beautiful natural resource by staying on the trail at all times (you will never need to leave the trail to collect data).**



## Plot 1

After leaving the road, proceed ~0.1 miles along the Wonderland Trail to the junction with the Lakes Trail (there will be a sign post on the left). Plot 1 is about 20 feet before the turnoff, on your right. The center of plot 1 is on the first of the two erosion beams that make a triangle in the trail.

**GPS:** 46.77011 lat 121.72317 long

**Elevation:** 1496 m



## Plot 2

Continue from Plot 1, taking the junction left after the sign to go on the Lakes Trail for ~0.2miles. You will be walking uphill gradually with wooden steps throughout (thank goodness for trail maintenance!). The first time that the trail descends (after leaving Plot 1) you will approach a large stream crossing. In the springtime this stream can be shin-deep and in the summer it is dry – climate does amazing things to our world! (Be cautious while crossing this stream as rocks may be slippery and unbalanced and spring snow bridges may be thin). Plot 2 is on your left as you descend to the stream crossing (but before you cross it). Straddle the wooden beam leading down to the stream and the plot is directly in front of you.

**GPS:** 46.77334 lat 121.72337 long

**Elevation:** 1540 m



**UW Biology postdoc (2012-2015)**

## Plot 3

Continue across the stream from Plot 2 and up the trail ~0.3 miles to Faraway Rock. On a clear day you will have a great view of one of the Reflection Lakes and Steven's Canyon Road. Immediately after Faraway Rock you will pass a pond on your right. Continue uphill for ~0.1 miles and you will come to a switch back to the right (a switchback is a turn in the trail that is nearly 180-degrees). Right after the switchback there will be wooden steps and a series of rocks in the trail. Plot 3 is just past the switch back on the left, after the 2<sup>nd</sup> step past a small boulder on the left that is the size of a large pillow.

**GPS:** 46.77499 lat 121.71969 long

**Elevation:** 1605 m



## Plot 4

Continuing from plot 3, walk uphill toward the junction with the High Lakes Trail (~0.15 miles). You will pass through a stand of trees and the sign for the High Lakes Trial will be on the right of the trail. About 20 feet after you pass the sign, plot 4 will be located on your right.

**GPS:** 46.77573 lat 121.72025 long

**Elevation:** 1612 m

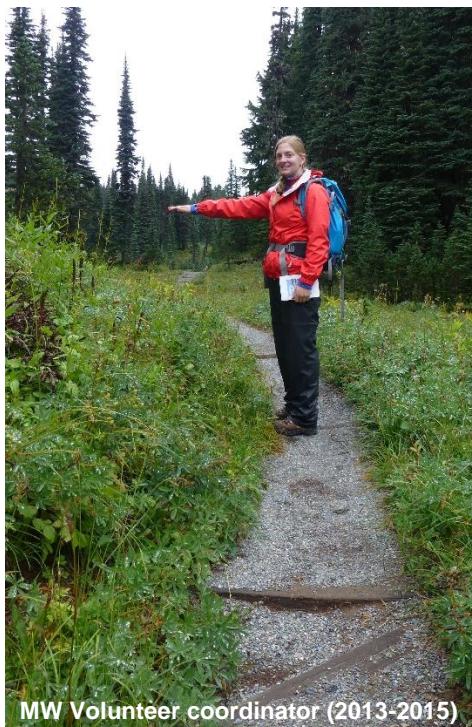


## Plot 5

Continue on the Lakes Trail towards Paradise by taking a right at the trail junction. Pass a small pond on your left, and then gradually ascend ~0.2 mi to a large pond on the right. Continue your ascent ~0.1 mi. Just past the pond, the trees will start to thin. On your left, there will be several fallen trees on a hillside. Once you see the triangular-erosion-prevention beams, take four more steps until you reach the next single beam. You will place your feet on each side of this beam and turn to your left to find plot 5.

**GPS:** 46.777801 lat 121.721638 long

**Elevation:** 1650 m



MW Volunteer coordinator (2013-2015)

## Plot 6

After leaving plot 5, you will pass through a large clearing and a tree-sprinkled meadow on the left. Then you will climb a small hill out of the meadow and pass another, much smaller pond on the left. In a few more minutes (~0.2 mi) you will climb two small hills. On the second hill there are many cut logs, dead trees and old stumps. Plot 6 is on the left, directly between the log with many branches and the straight one to its left.

**GPS:** 46.78170 lat 121.71968 long

**Elevation:** 1680 m



## Plot 7

Moving on from plot 6, you will walk out of the clearing and toward a small stand of trees. You will pass a wonderful view of Steven's Canyon on your right. Proceeding on, you come to some stone stairs that lead up into a large open meadow with magnificent views of the Rainier summit! Plot 7 is located on your left about 50 feet after the last stone stair. There will be an erosion beam across the trail, stand 1 step uphill from this beam. There is a small Subalpine fir sapling and patch of Pink Mountain Heather just outside and on the uphill side of the plot.

**GPS:** 46.78403 lat 121.72019 long

**Elevation:** 1711 m



## Plot 8

Continue on from plot 7 up the trail, at this point, trees are very patchy. You will pass two sparse stands of Subalpine fir on your left as the trail gently winds upward. Keep an eye out for a large fallen log (~25 feet long and 5" in diameter), it is on the left side of the trail. The log is on the last rise before the trail descends into an outwash basin. Plot 8 is at the apex of this hill, about 30 feet beyond the log, on your right.

**GPS:** 46.78736 lat 121.71936 long

**Elevation:** 1745 m



**MW Volunteer (2013-present)**

## Plot 9

Proceed ~0.2 miles to the junction with the Skyline Trail and turn right onto the Skyline trail toward Panorama point. Proceed ~0.2 miles along the Skyline Trail and after ascending a hill, you will see a large, flat-topped rest boulder on the right side of the trail (this boulder is not to be confused with a 2-boulder rest stop on the left you will pass earlier). Plot 9 is on the right just before the zig-zag in the trail and in the gap between a line of baby trees and the last patch of baby trees, approximately 2/3 of the way towards this last patch of trees.

**GPS:** 46.79190 lat 121.71693 long

**Elevation:** 1805 m



## Plot 10

Proceed up the wooden steps (and uphill) about 0.2 miles, or a ~10 minute hike from Plot 9. You will reach the Van Trump Monument that provides a nice place to sit with a beautiful view of the summit. Plot 10 is on the back side of the monument, looking out into the valley. Facing the bench, move to the back left corner and imagine your left hip at the back edge corner of the Monument. You will see some broader stones to your left. The Mount Rainier summit will be directly behind you.

**GPS:** 46.79403 lat 121.71604 long

**Elevation:** 1840 m



**UW Biology Intern (2012)**

## Plot 11

Just past the Van Trump Monument, you will come to the junction with the Paradise Glacier Trail (there is a large flat boulder in the center of the junction). Turn right along the Paradise Glacier Trail and proceed ~0.4 miles. You will come to a small stream with a pile of large rocks leading up to it. (Warning: the stream may be dry late in the summer.) After about 25 steps from the small stream crossing there will be a big boulder on your right that is half covered with vegetation. Stop 0.5 meters beyond the boulder – Plot 11 is on the right side of trail so your back is to the mountain. You made it to the end!

**GPS:** 46.79654 lat 121.71194 long

**Elevation:** 1880 m



# Collecting Phenology Data

Our ten focal species and their phenophases (see below) are described in the following pages. The ten species we chose represent a wide variety of plant families, rely on a wide range of pollinators, and bloom at different times of the summer.

Additionally, they are relatively abundant (each is in more than one plot, but not in all plots – as will be obvious from your data sheet). Finally, while some of these species have ‘look-alikes’ in the park, we chose plots for censusing that do not contain any species whose flowers are easy to confuse with our ten focal species.

At each plot, you will collect phenology data by noting which of four phenophases (defined below) are present in the plot. You will often find multiple phenophases – just record which are present and absent – no need to rank their abundance anymore! Of course, these phenophases are a continuum of plant development, and you may observe some bud/flowers/fruits that appear to be between stages. We are trying to categorize the entire process of reproduction into discrete stages. If this is the case, trust your instinct and categorize the plant in the stage you think it is ‘closest’ to. If you are very unsure, there is a place on the data sheet to note your uncertainty.

## **Wildflower phenophases you will observe:**

*Budding* – The beginning growth of the flower. The bud will turn into a flower but hasn’t yet opened.

*Flowering* – Usually the showy part of the plant that holds the reproductive parts (stamens and pistils). A plant is flowering when the petals have opened, and the reproductive parts are visible and available for pollination and reproduction.

*Ripening Fruit* – A fruit develops from the female part of the flower. As the fruit ripens, the seeds within it develop. Fruits can take many forms, from a hard, fleshy capsule to a juicy berry to a feathery tuft on the end of a seed.

*Releasing Seed* – After the fruit ripens, the seeds are released to begin the next generation. Fruits can be carried away (or dispersed) by gravity, by wind, or by animals.

Each of the focal species pages include a line drawing of each species, drawn by Kari Berger, followed by an individual photo and description of each phenophase (which differs by species).

## Additional Data to Collect: Snow

We are asking you to collect other information that can also influence our data, and thus, our ability to understand the link between climate and wildflower phenology.

**Snow:** We have already found that the timing of wildflower phenology is tightly linked to the date of snowmelt. We have microclimate sensors at each plot which help us monitor the date of snowmelt, but these sometimes fail or go missing. Please help us verify snowmelt dates by noting whether a plot is fully covered by snow (write 'Y' in the snow column), half covered (write ' $\frac{1}{2}$ ' in the snow column), or free of snow (write 'N' in the snow column).



## Additional Data to Collect: Herbivory

### Herbivory / Damage:

Many of our focal species are quite tasty to meadow mammals, including deer, elk, and marmots. Often that means that entire stalks will disappear mid-development. If you notice that a reproductive stalk of a focal species is obviously broken, please mark a 'Y' in the herbivory column for that species. Because there could be multiple stalks per species per plot, there may still be other actively reproductive stalks in the plot (continue to monitor those stalks

according to the phenophase(s) they display). Don't spend extra time looking for herbivory, and only note this information if it is obvious - it will be easiest to observe in species with tall stalks, like Sitka Valerian (top-right), Western Anemone (bottom-left), and Bracted Lousewort (bottom-right).



## American Bistort

*Polygonum bistortoides*



Stem leaf



Basal leaf



Karen Boyce

### Plant and Leaves:

- Plant tall (12-24 inches), with long unbranched stem
- Leaves mostly basal with distinct petioles (stalks); oblong 4-8 inches long with distinctly light colored midrib. Stem leaves reduced with sheath attachment in place of petioles.

# American Bistort

*Polygonum bistortoides*



## Budding:

- Many small buds cluster on top of a stem that is 1-2 feet (30-60cm)



## Flowering:

- Flowers are white, bristle-brush-like
- 8 stamens protrude from each blossom, looking like bristles
- The flowers smell awful (this plant is fly-pollinated and this is how it attracts pollinators)



## Ripening Fruit:

- The flowers stay attached to the fruits but if you were to touch them they would feel hard (don't touch in the plots!)
- You know the plant is fruiting when the base of each flower turns reddish



## Releasing Seed:

- The white flower-looking structures fall off leaving the bare stalk
- The stalk is rusty-red and still appears hairy

## Avalanche Lily

*Erythronium montanum*



### Plant and Leaves:

- Among the first meadow plants to flower, and frequently through the snow. Plant is 6-16 inches tall (15-40 cm)
- Two sole basal leaves; 4-8 inches long and half as wide; leaves fleshy and true green

# Avalanche Lily

*Erythronium montanum*



## Budding:

- A small white to pinkish bud emerges from a leafless stalk with two basal leaves



## Flowering:

- 1 to 2, occasionally 3+ white flowers on 6-16 inch (15-40 cm) stem
- 6 petals sweep back to show the yellow center and the 6 long anthers with stamens
- Flowers frequently face down



## Ripening Fruit:

- Three sided capsule at the end of a long stalk
- Capsule starts green and small (0.2 in or ~0.5 cm) and eventually develops into a larger red-brown capsule (up to 1.5 in or 4 cm)



## Releasing Seed:

- The capsule opens at the top to release the small round seeds
- The stalk sounds like a rattle when the seeds are releasing because the capsules, seeds, and stems are so dry (this also acts as a catapult for long-distance dispersal)

## Bracted Lousewort

*Pedicularis bracteosa*



Karen Bryan

### Plant and Leaves:

- Often the tallest meadow plant, reaching 3 feet (90 cm)
- Leaves are fernlike, dark green to purple

# Bracted Lousewort

*Pedicularis bracteosa*



## Budding:

- Buds cluster in groups of up to 40 on the tall spike-like inflorescence

## Flowering:

- Yellow flowers crowd together on a long spike on top of the stem
- If you look closely, each small flower has a hood and a lower lip – some say it looks like a parrot's beak
- Stem and leaves are hairless but the inflorescence is typically hairy

## Ripening Fruit:

- The flowers turn into small, green, ball-like capsules that contain the seeds
- There may still be remnants of the flower parts left on the fruits, but the flower parts will be wilted and turning brown
- As the fruit develops the capsules turn from green to brown

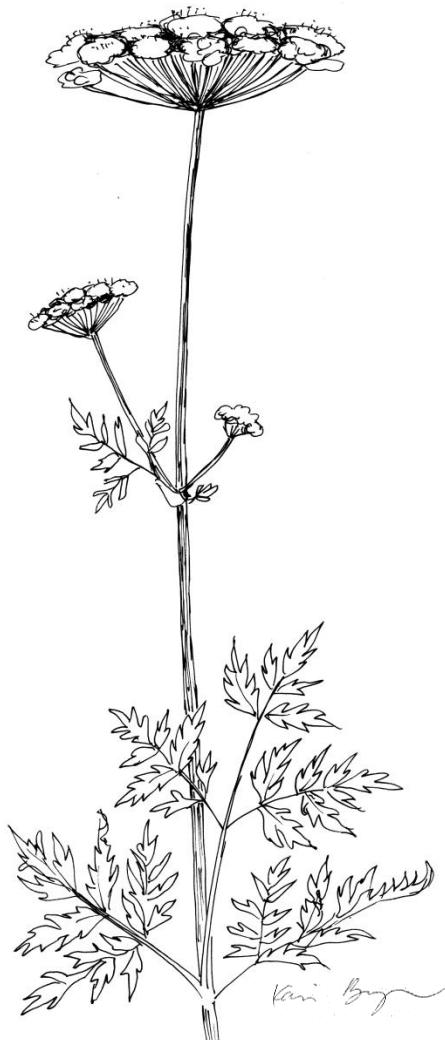
## Releasing Seed:

- The fruits crack open at the top (like an urn) and release small seeds
- The stalk sounds like a rattle when the seeds are releasing because the capsules, seeds, and stems are so dry

\*\*\* NOTE \*\*\* It is common for individual *Pedicularis* stalks to have multiple phenophases – make careful observations & be sure to consider which phenophases are present and absent.

## Gray's Lovage

*Ligusticum grayi*



### Plant and Leaves:

- Plant 8-24 inches (20-60 cm) tall
- Leaves mostly basal; divided into leaflets with narrowly pointed lobes; carrot-like

# Gray's Lovage

*Ligusticum grayi*



## Budding:

- Small white-pinkish buds, clustered in groups of 20-50 at the end of an umbel (upside down umbrella)



## Flowering:

- An umbel with many white flowers with 7-10 rays each
- One stalk holds 1 or 2 umbels



## Ripening Fruit:

- Green pod- or seed-like structures replace each flower; many pods on each the umbel
- Fruits look like anise or fennel seeds – which isn't surprising because they are all in the same plant family!



## Releasing Seed:

- Green pods turn brown and split open length-wise
- Fruits fall off leaving a white, lacy, hair-like structure

**\*\*NOTE\*\*** It is common for individual *Ligusticum* stalks to have multiple phenophases – make careful observations & be sure to consider which phenophases are present and absent.

## Magenta Paintbrush

*Castilleja parviflora*



Karen Bryan

### Plant and Leaves:

- Small plant, ~6-12 inches (15-30 cm) tall
- Leaves 1-2 inches (2-4 cm) long with 1 or 2 slender, finger-like lobes

# Magenta Paintbrush

*Castilleja parviflora*



## Budding:

- The red/magenta bracts are closed into a loose, dark-red ball; there are no yellow projections



## Flowering:

- The magenta, brush-like looking “flowers” are not petals, but are called bracts (modified leaves)
- The true flowers are yellow projections that extend beyond the red bracts
- Count the plant as flowering when you can see the yellow projections



## Ripening Fruit:

- Initially, fruits start out green at the base of the dying flowers
- Eventually fruits turn into brown, dead looking fruit capsules on the stalk



## Releasing Seed:

- The seeds release when the capsule cracks open and you can see small brown seeds that look like little pellets. They are no larger than the bullet point to the left
- The stalk sounds like a rattle when the seeds are releasing because the capsules, seeds, and stems are dry.

## Mountain Daisy

*Erigeron peregrinus*



### Plant and Leaves:

- Plant ~12-24 inches tall (30-60 cm), unbranched, short stems.
- Basal leaves are alternate, stalked, spoon-shaped 2-8 in. long (5-20 cm). Stem leaves are smaller, lanceolate.

# Mountain Daisy

*Erigeron peregrinus*



## Budding:

- The small pink petals look undeveloped and enclose the yellow center



## Flowering:

- Usually one flower head per stem, 1-1.5 inch broad, with ray flowers ("petals") lavender to rose-purple surrounding yellow disc flowers (the center of the daisy)
  - See Glossary for definition of Ray and Disc flowers



## Ripening Fruit:

- A brown head on a single stalk
- No more ray flowers attached, or if so are reflexed back and brown
- Disc flowers are swelling into fruits



## Releasing Seed:

- When some of the seeds have started to disperse, you can see the bare head underneath
- Much like Dandelions, Mountain Daisy is wind-dispersed

**\*\*NOTE\*\*** *Erigeron* and *Microseris* can look similar when in fruit and releasing seed, but *Erigeron* seeds are more densely packed.

## North Microseris

*Microseris alpestris*



### Plant and Leaves:

- Plant erect each stem holding a single flower head; stem hairless below cup of green bracts that hold flower head.
- The leaves are basal, hairless, spoon-shaped to lanceolate, 2-6 inches (5-15 cm) long with a few slender to many teeth

# North Microseris

*Microseris alpestris*



## Budding:

- The green sepals enclose the yellow flowers



## Flowering:

- Bright yellow flower heads are solitary on a leafless stem
- Composed of ray flowers only, heads are 0.7-1.4 inches (2-3.5 cm) broad



## Ripening Fruit:

- The fruits are replacing the flowers, and begin as hair-like structures concealed in a loose 'bud'. If you gently peek inside the bud you will see white (not yellow)
- Fruits develop to long white bristles, resembling a dandelion

## Releasing Seed:

- When the seeds start to disperse, you can see the bare head underneath
- Much like Dandelion and Mountain Daisy, *Microseris* is wind-dispersed

**\*\*NOTE\*\*** *Erigeron* and *Microseris* can look similar when in fruit and releasing seed, but *Microseris* seeds are less densely packed.



## Sitka Valerian

*Valeriana sitchensis*



Stem leaves



Basal leaves



### Plant and Leaves:

- Plant 12-48 inches tall (~30-120 cm); robust, dark purplish green stem with leaves and flowers / fruits cluster.
- Leaves 1-3 inches (3-8 cm) long, coarsely toothed and lanceolate to ovate / roundish; basal leaves have long stalks. Basal leaves on non-reproductive plants are more rounded.

# Sitka Valerian

*Valeriana sitchensis*



## Budding:

- Small white/pinkish buds on top of a square stem that can be 1-4ft (30-120cm tall)



## Flowering:

- The flowers are white and fragrant, and sometimes pink
- Each corolla is 6-8 mm long and has 3 stamens
- Flowers cluster into slightly-rounded umbels



## Ripening Fruit:

- Flowers fall off, leaving a vase-like structure which is the fruit



## Releasing Seed:

- When fruits release, feathery hairs protrude from the vase for wind dispersal

**\*\*NOTE\*\*** It is common for individual *Valeriana* stalks to have multiple phenophases – make careful observations & be sure to consider which phenophases are present and absent.

# Subalpine Lupine

*Lupinus arcticus*



Karen Bryan

## Plant and Leaves:

- Hairy stems are 6-16 inches (15-40 cm) tall and usually un-branched
- The long, stalked, compound leaves bear 5-7 slightly hairy oblanceolate leaflets, 0.6 - 1.4 inches (1.5-3.5 cm) long

# Subalpine Lupine

*Lupinus arcticus*



## Budding:

- Small purple buds
- Early stages have hairy sepal lining the back of the bud



## Flowering:

- The flowers are blue to blue-violet and occasionally have white centers
- Each inflorescence has multiple rows (1-6) of 5 flowers encircling the stem



## Ripening Fruit:

- Green pods that look like beans replace the flowers
- They are fuzzy and develop to brown pods ~ 1 inch (3cm) long



## Releasing Seed:

- Once brown, the pods split open, and each half curls back onto itself

**\*\*NOTE\*\*** It is common for individual *Lupine* stalks to have multiple phenophases – make careful observations & be sure to consider which phenophases are present and absent.

## Western Anemone

*Anemone occidentalis*



### Plant and Leaves:

- Plant is clothed with shiny, silvery hairs, grows continuously throughout the season (up to 24 inches, 60 cm tall)
- Leaves basal and on stem, 4-8 inches (10-20 cm) long, feathery-looking, deeply divided into linear segments

# Western Anemone

*Anemone occidentalis*



## Budding:

- When budding, this is a small plant with a fuzzy, bulbous top
- This is one of the first species to emerge in spring with buds often close to snow



## Flowering:

- 6-7 petal-like white sepals with many yellow stamens and many yellow-green pistils in the center
- Flower head is heliotropic, meaning it follows the sun – sometimes you can see insects warming themselves on the flower



## Ripening Fruit:

- The plant looks like a “mop top” or “mouse on a stick” (or a truffula tree from Dr. Seuss!)
- Once the petals fall off, each “hair” starts small at 0.4 in (~1cm) and develops to nearly 2 inches (5 cm)
- Each “hair” of the mop has one seed at the bottom



## Releasing Seed:

- When the fruits/seeds or “hairs” start to fall off, the plant is releasing its’ seeds.
- When this occurs, the bare yellow stalk shows below the “hair”

## Identification Tips

- American Bistort (*P. bistortoides*), pictured on the left, can often be confused with Showy Sedge (*Carex spectabilis*), on the right. Showy Sedge has thin, long grass-like/sedge leaves while American Bistort has larger wider leaves that are dark green with a white midvein. Showy Sedge has smaller white flowers that tend to only be ‘showy’ on the lower half of the inflorescence (note, showy part are actually male anthers!), while American Bistort tends to flower synchronously within a stalk.



- Mountain Daisy (*E. peregrinus*), left, can often be confused with Cascade Aster (*A. leophyllum*), on the right. Mountain Daisy has shorter, more densely packed, and numerous ray flowers (these are what look like the purple flower petals) than Cascade Aster. Mountain Daisy has more basal leaves, which are also wider than Cascade Aster leaves. Plots generally do not have both species (although this is variable).



- The fruit and seed phenophases of Mountain Daisy (*E. peregrinus*) and North Microseris (*M. alpestris*) can look similar at first glance. The fruit and seed on Mountain Daisy are more condensed than North Microseris, which are more loosely packed. The foliage is also quite different (see species descriptions on previous pages for pictures).

## Species occurrence across plots

	1	2	3	4	5	6	7	8	9	10	11
American Bistort			✓		✓	✓	✓	✓	✓	✓	
Avalanche Lily	✓			✓	✓	✓	✓				
Bracted Lousewort		✓	✓	✓	✓		✓	✓			
Gray's Lovage	✓		✓	✓		✓	✓	✓			
Magenta Paintbrush		✓		✓	✓	✓	✓	✓		✓	✓
Mountain Daisy	✓						✓	✓	✓		✓
North Microseris						✓		✓	✓		✓
Sitka Valerian			✓	✓		✓	✓		✓		
Subalpine Lupine		✓	✓		✓	✓	✓	✓			✓
Western Anemone								✓	✓	✓	✓

## Glossary

- Anther** – A sack where pollen is stored; found at the end of the stamen filament
- Basal** – Positioned at the base; “basal leaves” are a cluster of leaves at the base of the stem
- Bracts** – A specialized leaf, usually at the base of the flower, usually green but can be colored
- Calyx** – All the sepals of a flower
- Compound Leaf** – A single leaf that is made up of many smaller leaflets; for example, one lupine leaf is made up of 5-7 leaflets
- Corolla** – All the petals of a flower
- Disc Flower** – The central flowers of a flower in the sunflower family; for example, on a daisy each of the small yellow things is a single flower
- Filament** – The stalk of a stamen that holds the anther
- Flower** – The reproductive part of the plant; houses the male and female parts
- Inflorescence** – A cluster of flowers
- Lanceolate** – Shaped like a blade of a spear; used most often to describe a leaf shape
- Oblanceolate** – A shape that is opposite of lanceolate, where the widest part is at the top; used most often to describe a leaf shape
- Oblong** – An elongated, rectangular shape
- Obovate** – Egg-shaped, the widest part above the middle
- Ovary** – The expanded basal part of the pistil, containing the ovules
- Ovate** – Egg-shaped, the widest part below the middle
- Ovule** – An unfertilized fruit
- Petal** – An individual part of the corolla, generally colored
- Pistil** – The female part of the flower, consisting of an ovary, a style, and a stigma
- Ray flower** – Outer, showy flower of a flower in the sunflower family; each “petal” is actually a flower!
- Sepal** – An individual part of the calyx, usually greenish and underneath the petals
- Sheath** – A thin tissue at the base of a leaf that encircles, or partially encircles the stem
- Stamen** – The male part of the flower, usually a stalk-like filament with a pollen-producing anther on top
- Step** – When walking normally, each time either foot hits the ground is one step. For example, Left, Right, Left, Right is counted as 4 steps.
- Stigma** – The portion of the stigma where pollen lands to start the fertilization process
- Style** – The slender stalk that connects the stigma to the ovary
- Umbel** – An inflorescence in which multiple flower stalks radiate from a common point

## **NOTES**

# Thank you!

We hope that you enjoyed your hike and we appreciate your help in discovering how climate and climate change influence the wildflowers of Mt. Rainier National Park.

Please don't forget to return your data sheet!  
Drop it off in the brown metal MeadowWatch box on the porch of building L-112 at Longmire or mail it to us at:

MeadowWatch  
University of Washington - Department of Biology  
Box 351800, Life Sciences Building  
Seattle, WA 98195-1800

## Questions? Comments?

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All photos taken by Natasha Lozanoff or the HRL lab.  
Hand drawn wildflowers by Kari Berger.



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