Columbia Lake Ecological Reserve #20

Warden Report, 2024

View looking southwest to Columbia Lake and the Purcell Mountains from the clifftops in Columbia Lake Ecological Reserve
(Photo by Jenny Feick, July 19, 2024)

Report completed by: Ian W. Hatter, ER Warden for Columbia Lake Ecological Reserve, and Dr. Jenny Feick, ER Warden for Mt. Sabine Ecological Reserve. All photos were taken in 2024 by Jenny Feick unless otherwise credited.

Report completion date: March 15, 2025

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Figure 1: View west of Columbia Lake and Purcells from northern end of Columbia Lake ER, June 25, 2024.

Ecological Reserve Warden 2024 Trip Report Summary

ER Name: Columbia Lake Ecological Reserve (CLER), **Ecological Reserve #:** 20

Location: 4.5 km N of Canal Flats, **Size:** 32 ha, **Date Established**: May 4, 1971

Trip Dates: April 18, May 17, June 25, July 9, July 19, and Aug. 29, 2024

Field Trip Participant Names: Ian Hatter, Jenny Feick, Gail Berg, Buffy Blakley

Table 1: Field Participants Volunteer Hours

Date	Participants	Driver and Vehicle	Volunteer Hours Logged within ER[1]
April 18	Ian Hatter, Jenny Feick	Ian Hatter, Subaru	1 hr, 40 mins
May 17	Gail Berg, Buffy Blakley	Gail Berg, unknown	1 hr, 45 mins
June 25	Ian Hatter, Jenny Feick	Ian Hatter, Subaru	4 hr, 30 min
July 9	Ian Hatter, Jenny Feick	Ian Hatter, Subaru	2 hr, 30 min
July 19	Ian Hatter, Jenny Feick	Ian Hatter, Subaru	5 hr, 15 min
Aug. 29	Ian Hatter, Jenny Feick	Ian Hatter, Subaru	2 hr, 15 min

1 excludes travel time (~ 2.0 hrs/trip)

Number of Volunteer Hours Logged: ~18 hours total at the CLER plus two hours travel from Invermere to the CLER and return for each trip. (This does not include time spent visiting Mt Sabine ER on Aug. 29). Numerous additional hours (~45) were spent on follow-up action and the report writing.

Summary of the Columbia Lake Ecological Reserve Visits and Survey Routes

Figure 2. Trees cut inside the CLER on April 18, 2024 (Photo by Ian Hatter).

April 18, 2024:

A reconnaissance survey of the CLER revealed that at least seven mature Douglas-fir trees had been cut just inside the CLER close to the access road. We counted six trees cut in one location (N 50° 12’ 02.95” and W 115° 49’ 41.87”, Fig. 1) and one at another location. There were quad tracks and skid marks in the area. From the amount of sawdust, it looked like the felled trees were then cut up for firewood.

We focused our search effort on the lower NW corner of the ER where the trees had been removed. A total of 11 bird species were recorded in eBird. Numerous plants, fungi, and animals (including our first wood-ticks) were photographed and recorded in iNaturalist.

May 17, 2024:

Gail Berg volunteered to conduct a bird survey along the perimeter road of the CLER on May 17th. Weather conditions were poor and no birds were recorded during 1.5 to 2 hours of survey. However, she documented two new plant species, Small Butterwort (*Pinguicula villosa*) and Stiff Yellow Indian Paintbrush (*Castilleja lutescens*).

June 25, 2024:

Search effort was concentrated in the lower SW corner of the CLER where the TUFA_2 deposits are located; as well as the central portion of the ER (Fig. 3). We found an old trail, likely made by Rocky Mountain Bighorn Sheep that faciliated access to the upper portion of the ER. A total of 15 bird species were recorded in eBird. We checked for flowering giant helleborine orchids (stream orchids) but none had flowered by this date. Numerous plants, fungi, and animals were photographed and recorded in iNaturalist.

July 9, 2024:

We focussed our search efforts in the lower SW corner of the CLER (Fig. 4) and conducted a count of flowering giant helleborine (stream orchid) plants. Only 15 flowering plants were observed at the GIANT HELL_1 patch and only six at the GIANT HELL_2 patch. We removed alien invasive species near the two patches. Three ATVs and two mountain bikers were observed on the perimeter road of the CLER. Sow thistle was abundant along the road side. Two rams were observed just outside the ER on the access road. They moved into the ER as we drove off. Numerous plants, fungi, and animals were photographed and recorded in iNaturalist.

July 19, 2024:

We drove to the giant helleborine (stream orchid) patches and conducted a complete count. We conducted three replicate counts in the GIANT HELI 1 patch (N = 178, 163,and 184) for an average flowering plant count of 175, and observed an average of 32 flowering plants (33, 33, 30) at the GIANT HELI 2 patch. We also hiked the south and central sections of the CLER (Fig. 4) and recorded 17 species of birds. Numerous sagebrush mariposa lilies were observed above the upper cliff face, and a large flock (> 12) of violet-green swallows were spotted above the SW facing cliff. Plants, fungi, and evidence of animals were photographed and recorded in iNaturalist. Four ATVs were observed or heard using the perimeter road adjacent to the CLER.

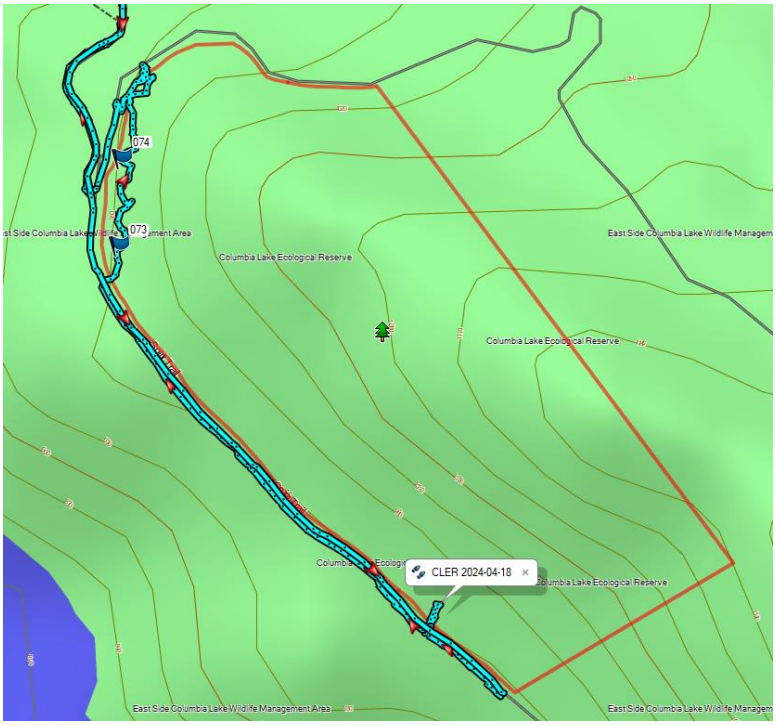
August 29, 2024:

The primary focus of the August 29th survey was to document late flowering plants and fungi in the Mt Sabine ER, but two hr and 15 min were spent within the CLER. We hiked through the central portion of the CLER utilizing an old game trail to access the upper portion (Fig. 5). Birds

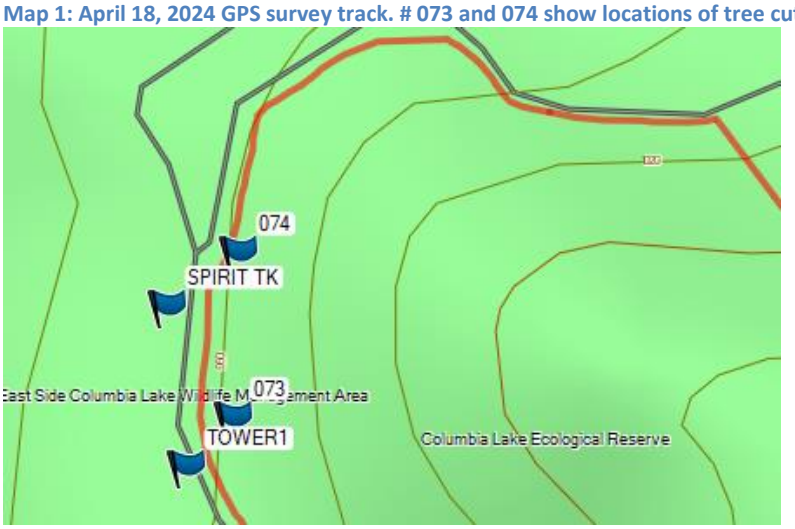
were much less abundant (five species) than during the previous three site visits. We photographed plants, fungi, and animal sign and recorded them in iNaturalist.

Extent of the Ecological Reserve Visited or Tour Route

Road conditions, while rough, allowed us vehicle access to the west side of the CLER. As shown by the GPS tracks (Maps 1–7), we varied our route on each trip although the south and western sides received the greatest amount of effort due to ease of access.

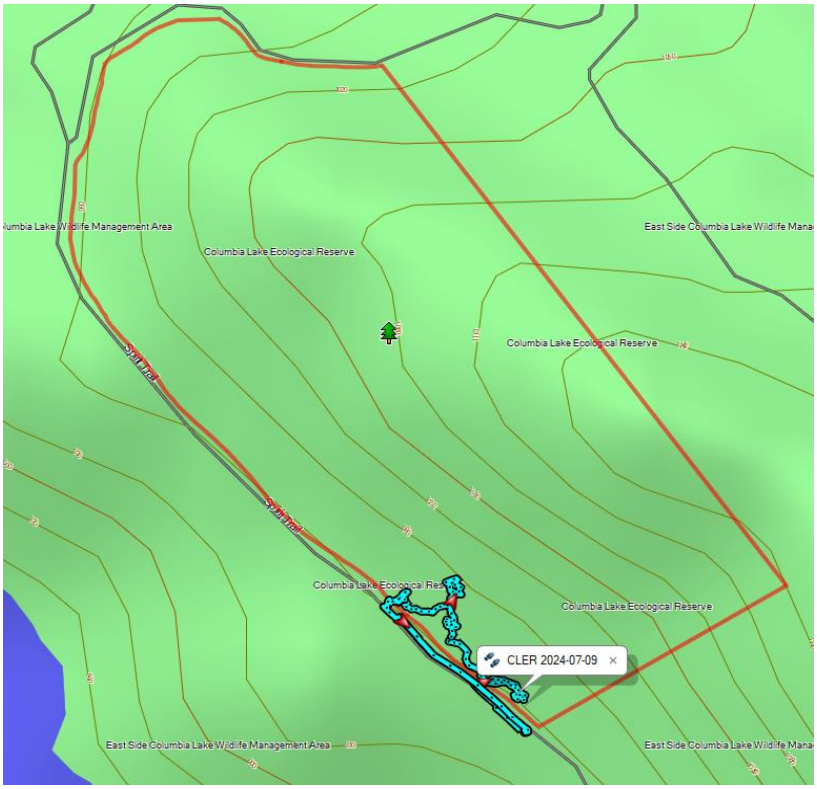


Map 1: April 18, 2024 GPS survey track. # 073 and 074 show locations of tree cutting in the CLER.



Map 2: Close up of where trees were cut in the CLER (see #073 and #074).

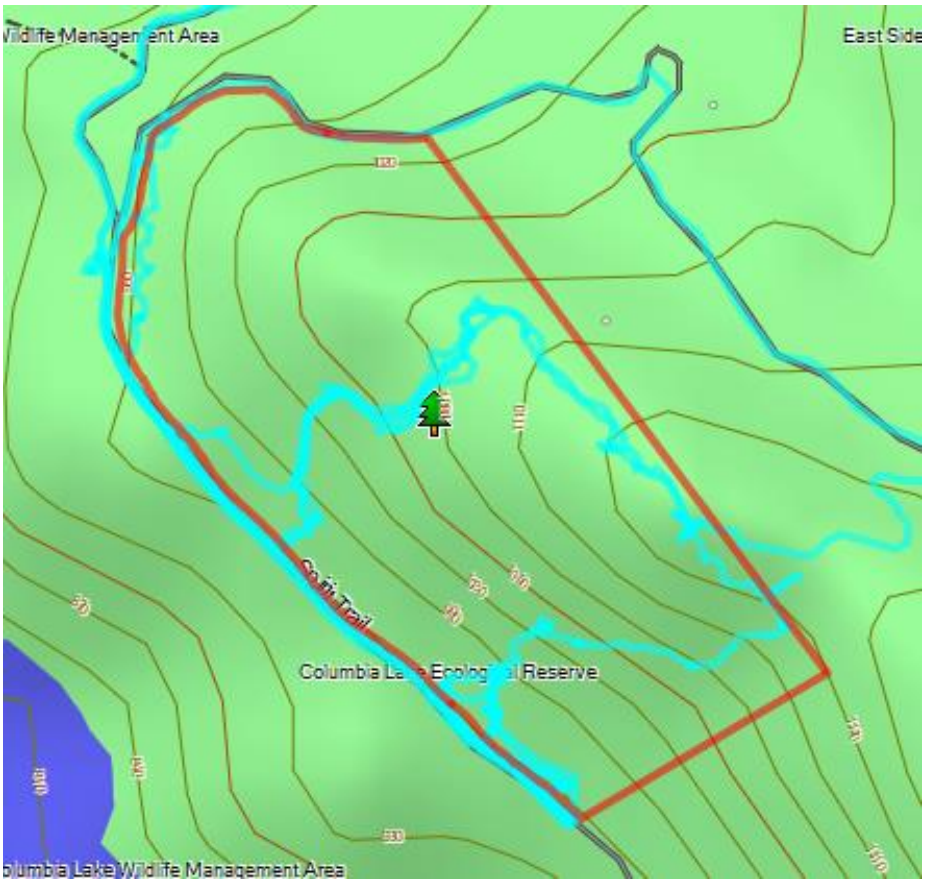
Map 3: June 25, 2024 GPS survey track. The location of the tufa formation (TUFA_2) and the Giant Helleborine patches (GIANT HELLI_1 and GIANT HELLI_2) are also shown.



Map 4: July 9, 2024 GPS survey track.

Map 5: July 19, 2024 survey track.

Map 6: Aug 29, 2024 survey track.



Map 7: Map showing all GPS tracks in the CLER during 2024.

Purpose and Objectives for Site Visits

Purpose: To assess the condition of the CLER since our last visit in 2023, to continue to explore and learn about the CLER, to record natural history observations, and to monitor giant helleborine (also called stream orchids) in the patch identified as GIANT HELLI (see cover photo).

Objectives:

1. Check the state of the access road and compare it with its condition in 2023.
2. Assess if the boundaries of the CLER are adequately identified/marked, and if not, what needs to be done to better demarcate the boundaries;
3. Assess the basic condition of the CLER, identify any obvious damage and threats, and remove litter and alien species where feasible;
4. Record natural history observations (evidence of wildlife and vegetation, especially the species/plant communities related to the purpose for establishing the ER). Take pictures and post natural history observations on iNaturalist. Post bird sightings and/or calls on eBird.

5. Conduct a count of the giant helleborine (*Epipactis gigantea*) or stream orchids at the GIANT HELLI patch.
6. Search for and identify tufa deposits in and outside of the CLER.
7. Monitor the condition of limber pine (*Pinus flexilis*), an endangered species. Specifically look for the presence of white pine blister rust.
8. Discuss potential ideas for research, inventory and monitoring activities for 2025.

Key Findings

Objective 1: The Camp One road, the main access road, continues to be rugged but still passable for our AWD Subaru Forester from the southwest corner of the CLER to the Spirit Trail turnoff. The road then deteriorates rapidly after the turnoff and is only passable along the north side of the CLER with an ORV. The road is in worse condition than in 2023 with running water creating numerous gullies. In one location before the ER, erosion has narrowed the road width significantly above a steep treacherous drop off.

Objective 2: The two signs along the access road on the west side, and one along the north side, continue to be in good shape. There continues to be no signs marking the CLER on its upper east side.

Figure 3: Illegal cutting and removal of mature Douglas-fir trees from the CLER and erosion from ATVs accessing the cut trees.

Objective 3: The illegal cutting and removal of nine mature Douglas-fir trees from the CLER is concerning. Although this incident was immediately reported to BC Parks Area Supervisor Darin Welch, I heard nothing back about it or what if any follow-up was taken to reduce the risk of this happening in future. ATVs continue to make frequent use of the access road. Several different alien invasive plant species are intruding into the CLER from the margins of the access road and along trail bike tracks. We removed some of them but did not have time to remove all. Litter was found and removed in the CLER near the access road on most visits. Trail bike tracks were once again observed going up very steep inclines on both the north and south sides of the CLER as well as on top. A local mountain biker on the Camp One Road reported that she has seen and heard a guy trail biking up and down the steep slopes in the CLER several times.

Objective 4: During site visits, we documented sightings and other evidence of numerous mammals (primarily sign such as scat, tracks, bones, or rodent nests/squirrel middens), recorded sightings of birds, as well as evidence of birds (feathers, scat), bird calls and bird songs (confirmed with the Merlin app), noted arthropods (mainly insects and arachnids), and kept a record of lichens, fungi, non-vascular and vascular plants observed (see species lists in appendices A and B). We posted observations to iNaturalist and eBird.

Objective 5: We made several site visits to monitor two giant helleborine patches (marked as GIANT HELLI_1 and GIANT HELLI_2 in Fig. 2). We saw no evidence of these plants flowering on June 25th. On July 9th, we observed that flowers were just starting to emerge (15 flowering plants at GIANT HELLI_1, and 6 flowering plants at GIANT HELLI_2. In 2023, most giant helleborine plants were in bloom on that date. On July 19, we conducted three replicate counts in the GIANT HELI 1 patch (178, 163, and 184) for an average flowering plant count of 175, and observed an average of 32 flowering plants (33, 33, 30) at the GIANT HELI 2 patch. Virtually all plants had lost their flowers and gone to seed on the Aug. 29th site visit.

Figure 4. Giant helleborines (stream orchids) on July 19, 2024. GPS waypoint marked as GIANT HELLI.

Objective 6: We did not identify any additional TUFA deposits, either within or outside of the CLER. We visited known sites.

Figure 5. Tufa deposit (TUFA1) inside the west boundary of the Columbia Lake ER. (See Map 1 for location).

Objective 7: We saw no evidence of white pine blister rust on limber pine we observed in the CLER but were only able to check a few trees due to the ruggedness of the terrain. The majority

of the limber pines are found on the steep limestone cliffs within the CLER, which makes it extremely difficult to examine the trees up close (See Fig. 7).

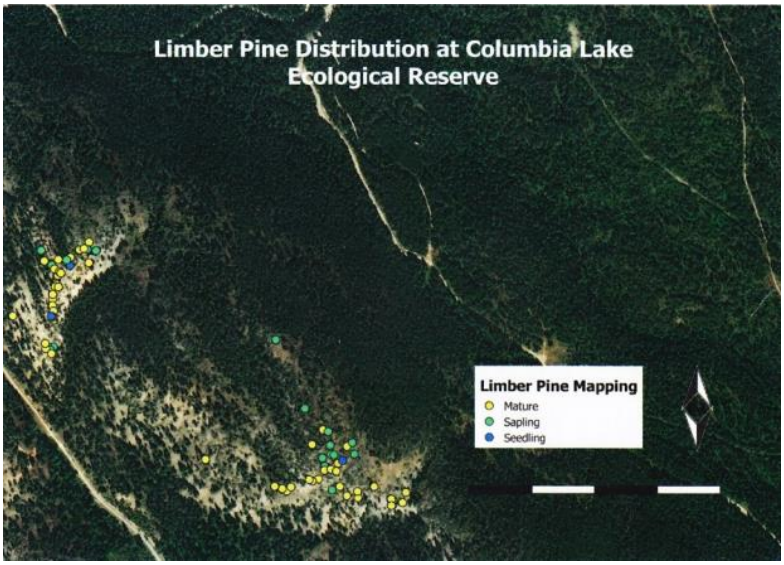


Figure 6. Limber pine distribution in the CLER documented in Randy Moody's report (139 concentrated at N & S ends of ER).

Figure 7. Limber pine on inaccessible limestone ridge in the south end of the CLER.

Objective 8: In late August 2023, Ian Adams offered to set up bat detectors at Columbia Lake. However, there was insufficient time in September, 2023 to both deploy and take down the detectors at CLER and they were used elsewhere in 2024. Ian Adams will have them back in 2025, and we hope to deploy them during the 2025 field season. Area Supervisor Darin Welch notified ER wardens about the deadlines for submitting an application to the BC Parks Enhancement Fund (PEF). This would have been a good opportunity to try to acquire and set up a wildlife camera to document wildlife use of the area for a specified time with a schedule for accessing, downloading and sharing the pictures obtained. Unfortunately, the call for proposals was issued in early May with a May 31st deadline and Jenny Feick and I were in the UK from late April until early June. I will consider submitting a proposal in 2025.

Animal and Plant Species Observed

iNaturalist Observations

As in 2022 and 2023, in 2024 we surveyed the biodiversity of the CLER using iNaturalist observations (see https://www.inaturalist.org/projects/columbia-lake-ecological-reserve). As of March 14, 2025, there are 1657 observations of 342 species by 13 observers and 180 identifiers. This compares with 671 observations of 212 species made by seven observers and verified by 95 identifiers in 2023. Research grade has been assigned to 869 or ~53% of the observations (i.e. identification has been verified or corrected by an expert/identifier). Note: these figures change each time another observation is added or a review is done. See map (Appendix C) for locations of observations. The iNaturalist project for the CLER is part of the overall iNaturalist BC Parks Ecological Reserves Project.

A four-person team of summer naturalists from the BC Parks iNaturalist Project[1] visited CLER on June 8, 2025 as part of their "Big Summer" project. Unfortunately, no one notified me or Mt Sabine ER Warden Jenny Feick that this crew would visit the CLER and when. It would have been an excellent opportunity to learn from one another and we could have directed them to search in specific locations and spend more time on certain categories of observations (e.g., the sometimes confusing array of paintbrush, goldenrods, and asters). The crew added many new species to the list, especially in the categories of arthropods and vascular plants.

Appendix A: Tracking Biodiversity – Toward a Species List for Columbia Lake Ecological Reserve lists 432 species identified to date in the CLER (76 species of arthropods, 38 bird species, 11 mammal species, 33 lichen species, 22 fungi species, 27 species of moss, and 226 vascular plant species, including eight ferns and fern allies, ten conifer species and 208 flowering plants) based on iNaturalist, eBird, and personal observations by ER wardens during site visits (Ian Hatter, Jenny Feick) with assistance from others (Gilnockie ER Warden Wayne Stetski, Ian Adams and Trevor Kinley in 2023, Gail Beck in 2024).

[1] Finn McGhee (iNaturalist name fmcghee; crew leader; botanist, Vancouver); Rebecca Reader-lee (iNaturalist name rebeccareaderlee, INaturalist Curator; field biologist, licensed bird bander, University of Victoria); Abby Hyde (iNaturalist name abbyhyde, BSc geography and environmental studies, University of Victoria; and Jack Bindernagel (iNaturalist name jbindernagel; Biology undergrad at University of Victoria).

Animals

Invertebrates

Arthropods

Millipedes and Centipedes

We saw a curious object on the perimeter of the CLER during our April 18th visit that we were initially unable to identify via iNaturalist. To us, it looked like the cast off exoskeleton casing of a millipede. We later verified this with naturalist Peter Allen. According to the literature (Shelly, 2002)[2], in Canada, mountains are too cold for many millipede species to survive. Among the more than 40 diplopod species currently known from Canada, only one to two appear to be endemic. Species native to the Rocky Mountains were eliminated during the Pleistocene glaciations. Once we posted it as a millipede (Class *Diplopoda*) on iNaturalist, jfmantis identified it as a molt from a round-backed millipede, from the SuperOrder *Juliformia*.

Figure 8: Molted exoskeleton from a round-backed millipede, April 18, 2024.

Arachnids

We saw our first wood ticks in the CLER on April 18. We observed a lot of evidence of gall mites on various deciduous shrubs during visits in July and August. While we saw a couple of webs of filmy dome spider and another set of webs on the cliffs that we could only identify to the Infraorder level, the BC Parks iNaturalist Project crew was more successful in finding spiders to photograph and identify.

Figure 9: Rocky Mountain wood tick, April 18, 2024.

[2] Shelley, R.M., 2002. "The millipedes of central Canada (Arthropoda: Diplopoda), with reviews of the Canadian fauna and diplopod faunistic studies", *Canadian Journal of Zoology*. 80(11). https://www.researchgate.net/publication/263217508_The_millipeds_of_central_Canada_Arthropoda_Diplopoda_with_reviews_of_the_Canadian_fauna_and_diplopod_faunistic_studies

Insects

Figure 10: Abundant large daisy aphids on Engelmann aster leaves, June 25, 2025.

Figure 11: Inland floodwater mosquitos, July 9, 2024.

Unlike previous years, we saw a lot of aphids on forbs on June 25 and during both visits in July, as did the BC iNaturalist Project crew on June 8. There were major outbreaks of aphids elsewhere in the Columbia valley. Mosquito activity was also intense in July, especially in the vicinity of the cold springs and giant helleborine patches during July when the orchids bloomed. We saw carpenter ants, grasshoppers, and a variety of beetles, bees, butterflies, moths, and dragonflies. The dragonflies elude photographers and neither we nor the BC Parks iNaturalist Project crew posted a picture of any odonate. This was the first year we saw evidence of cicadas as did the BC Parks iNaturalist Project crew. Insect activity had lessened significantly by our Aug. 29th visit.

Figure 12: Soldier beetle on mountain death camas flower, July 9, 2024.

Figure 13: Delicate cycnia moth on Western snowberry blossoms, July 9, 2024.

Vertebrates

Birds

We recorded a total of 33 bird species in 2024. Species observed in 2024, but not in 2023, included the American kestrel, black-billed magpie, Canada goose, Clark's nutcracker, Hammond's flycatcher, violet-green swallow, red-naped sapsucker, red-tailed hawk, ruby-crowned kinglet, and yellow-rumped warbler.

Figure 14: Red naped sapsucker on Douglas-fir, July 19, 2024.

Table 2: Birds recorded (observed or heard) in the CLER in 2024.

P = at least one individual of the species was recorded.

CODE	Species	18-Apr	17-May	25-Jun	9-Jul-	19-Jul	29-Aug
AMKE	American Kestrel				P		
AMRO	American Robin			P			
BAEA	Bald Eagle	P				P	
BBMA	Black-billed Magpie				P		
BCCH	Black-capped Chickadee				P		
CAGA	Canada Goose	P					
CAVI	Cassin's Vireo			P	P	P	
CHSP	Chipping Sparrow			P	P		
CLNU	Clark's Nutcracker				P		
CORA	Common Raven	P					P
DEJU	Dark-eyed Junco	P		P	P	P	P
DUFL	Dusky Flycatcher			P	P	P	
GCKI	Golden-crowned Kinglet					P	P
HAFL	Hammond's Flycatcher			P	P		
MAWA	MacGillivray's Warbler					P	
MOCH	Mountain Chickadee	P		P	P	P	
NOFL	Northern Flicker	P		P		P	
PISI	Pine Sisken			P	P	P	
PIWO	Pileated Woodpecker	P					P
VGSW	Violet-green Swallow					P	
RBNU	Red-breasted Nuthatch	P		P	P		
RNSA	Red-naped Sapsucker					P	
RTHA	Red-tailed Hawk						P
RCKI	Ruby-crowned Kinglet	P		P	P		
RUHU	Rufous Hummingbird				P		
RUGR	Ruffed Grouse				P		
SPTO	Spotted Towhee				P	P	
SWTH	Swainson's Thrush				P	P	
TOSO	Towsend's Solitaire	P		P			
TUVU	Turkey Vulture	P				P	
WAVI	Warbling Vireo			P	P	P	
WETA	Western Tanager			P	P	P	
YRWA	Yellow-rumped Warbler			P	P	P	
	TOTAL SPECIES	**11**	**0**	**15**	**20**	**17**	**5**

Mammals

We only observed evidence of six mammalian species in 2024 (Table 2) compared to 10 in 2023. We missed observations for American black bear, bushy-tailed woodrat, red fox, and white-tailed deer. Last year, we recorded the least chipmunk, but checking references for the yellow pine chipmunk's range and habitat use in SE BC it seems likely that most, if not all chipmunks, in the CLER are yellow-pine chipmunks. We saw a lot of shed mule deer hair on April 18 as well as a small group of mule deer. We saw bighorn sheep in the vicinity of the CLER on every visit. On June 8, the BC Parks iNaturalist Project crew observed evidence of red fox, snowshoe hare, Western chipmunks, and mule deer.

Figure 15: Rocky Mountain Mule deer (left) and shed hair (right), April 18, 2024

Table 3: Mammals recorded in the CLER in 2024.

O = mammal observed. S= scat of mammal observed.

Species	18-Apr-	17-May-	25-Jun	9-Jul	19-Jul	29-Aug
Chipmunk[1]	O	O		O		
American Red Squirrel			O	O		
Rocky Mountain Elk	S	S	S	S	S	S
Bighorn Sheep	S	S	S	S	S	S
Rocky Mountain Mule Deer	S	S	S	S	S	S
Snowshoe Hare			S		S	
TOTAL SPECIES	**4**	**4**	**5**	**5**	**4**	**3**

[1] These were most likely Yellow-pine Chipmunks (*Tamias amoenus*).

Fungi and Lichens

Fungi

Nineteen more species of fungi were added to the species list in 2024, particularly during our Aug. 29th visit. Examples included: eight types of rust fungus, as well as the species that causes corky bark disease, which we found, and an important leaf litter decomposer, the map fungus, which was identified by Rebecca Reader-Lee from the BC Parks iNaturalist Project team. We

found several agarics, or common gilled mushrooms, including tiny ones such as the pinelitter gingertail and lilac bonnet. One of the most interesting looking fungi we saw was the rounded earth star.

Figure 16: Multi-floral rose rust on prickly rose hip, July 19, 2024.

Figure 17: Rounded earth star, Aug. 29, 2024.

Lichens

Thirteen more species of lichens were added to the species list in 2024, particularly those in the genus *Cladonia*, the pixie cup and reindeer lichens, as well as blushing scale, and the mountain wolf lichen, which is the *Letharia* species that grows above 800 m asl[3].

Figure 18: Blushing scale lichen, July 19, 2024.

Figure 19: Mealey pixie cup lichen, Aug. 29, 2024.

[3] Columbia Lake is at 808 m asl and the CLER is on average 150 m above the lake, so around 958 m asl.

Plants

Non-Vascular Plants

Figure 20: Rock moss, July 19, 2024.

Mosses

We made observations of mosses on every visit. We added six new species to the list. However, very few of our observations have reached research grade in iNaturalist yet. More time is needed to take close-up pictures to make identification to the genus and species level more possible. The BC Parks iNaturalist Project crew had the same issue, judging by their entries in the Columbia Lake ER iNaturalist Project.

Vascular Plants

Ferns and Fern Allies

While clambering around on the cliffs in July and August, we found a lot more cliffbrake ferns in 2024 than previous years. It is challenging to identify them to the species level but we learned what we need to look for so in 2025[4] we can adapt what we photograph to make identification in iNaturalist easier.

Figure 21: Gastony's cliffbrake on limestone cliff, June 25, 2024.

Gymnosperms

The only new conifer species identified in 2024 was the Engelmann spruce. Rebecca Reader-Lee, one of the BC Parks iNaturalist Project crew members, made the observation on June 8, and it has not yet been verified by an identifier. Also, identifiers in iNaturalist re-labelled some

[4] Gastony's cliffbrake has a more upright growth form, and leaflets with heart-shaped base at stalk. Also, that species' leaflets have distinct black stalks into a cordate base. For more information from iNaturalist experts, see https://www.inaturalist.org/observations/69445376.

of our common Douglas-fir observations as the subspecies Rocky Mountains Douglas-fir. Many of the conifers are showing signs of heat stress and attacks by insects (e.g., bark beetles, carpenter ants, Douglas-fir adelgid and various gall moths and gall wasps) and different species of rust fungi, included those producing witches' brooms.

Figure 22: Juniper broom rust on Rocky Mountain juniper, April 18, 2024.

Figure 23: Carpenter ants inside Rocky Mountains Douglas-fir tree trunk.

Angiosperms

Twelve of the species of flowering plants found in the CLER are alien invasive species[5]. They have expanded noticeably from what we observed in previous years, proliferating near the access road as well as along the now more numerous trail bike paths in the ER. Four of these species, alfalfa, knapweed, ox-eye daisy, timothy grass, were observed for the first time in 2024.

The floral highlights of our April 18th visit were the prairie pasqueflowers and hookedspur violets. The BC Parks iNaturalist Project team saw many more species in bloom on June 8. While we identified the inland sedge on June 25, the BC Parks iNaturalist crew identified it and seven other species of sedge on their June 8th visit[6].

Figure 24: Close-up of prairie pasqueflower, Aug. 18, 2024.

[5] Alfalfa, cheatgrass, common dandelion, common lambsquarters, common mullein, knapweed, ox-eye daisy, perennial sow thistle, timothy grass, white sweet clover, wild blue flax, and yellow salsify.

[6] This is ironic, considering that nearby Mount Sabine ER was supposed to be set aside to protect a sedge meadow surrounded by a mature Engelmann spruce forest, and that to date, the ER wardens have found no sedges.

We saw many species in flower on June 25, July 9 and 19. Besides the many wood lilies, another highlight of our June 25th visit was the number of Menzies' catchfly plants we discovered on a few of the north facing steep forested slopes. We checked the white clematis vines but no blooms had yet appeared. Mark Egger, an expert in *Castillega*, noted on iNaturalist that the divergent variety of paintbrush species and hybrids in this area should be thoroughly studied.

Figure 25: Menzies' catchfly, June 25, 2024.

Due to the cooler, damper weather in May and June, 2024, flowering appeared to be delayed by a week or two for several species, especially the stream orchids. The open hillsides were festooned with sagebrush mariposa lilies on our July 19 visit, the same day that the stream orchid bloom peaked.

Figure 26: Sagebrush mariposa lily on the left and stream orchid on the right in bloom, July 19, 2024.

After the intense summer heat, by August 29, most flowering plants had gone to seed. Just the rubber rabbitbrush, and some of the asters and goldenrods, were still in bloom.

Figure 27: Seeds of Wooley groundsel on the left and hairy false goldenaster on the right, Aug. 29, 2024.

Public Access Issues

The Camp One access road continues to be rugged, but still passable for our AWD Subaru Forester from the southwest corner of the CLER to the Spirit Trail turnoff. The road then deteriorates rapidly after the turnoff and is only passable along the north side of the CLER with an ORV. The road is in worse condition than in 2023 with running water creating numerous gullies. In one location before the ER, erosion has narrowed the road width significantly above a steep treacherous drop off. ORVs can access and have accessed the CLER from the road.

Figure 28: View of eroding narrow part of the access road from inside our car, June 25, 2024.

Figure 29: ER Warden Ian Hatter walking the access road above the Spirit Trail turnoff along the northeast side of the Columbia Lake ER, Aug. 29, 2024.

Signage Issues

The perimeter of this ER is well marked on the south-western side with signs and there is also an ER sign on the northwest perimeter. However, the remaining boundary is not marked, and public confusion continues about where exactly the CLER boundaries on the northeast, east, and southeast sides are located. Trees were cut down inside the CLER within 300 metres of an existing sign that specifies that removal of plant or other materials is not permitted.

Figure 30: Illegal tree cutting took place within 300 metres to the left (north) of this Ecological Reserve sign, April 18, 2024.

Maintenance Issues

The access road to the CLER (Camp One Road) has deteriorated since 2023. On our first visit (April 18, 2024), we had to remove numerous small boulders from the road in order to reach

the CLER perimeter. Water runs down and across the road and in places, pools on the road. Once past the Spirit Trail junction, the access road's condition is no longer passible by vehicles, other than ATVs. Clearly, no maintenance is being done on this road. The Town of Canal Flats still posts its sign denoting it as an "unmaintained trail".

Within the ER, alien invasive plants species are proliferating in number of species and extent of coverage. Maintenance may need to include a focused attempt to remove these plants.

Visitor Activities

The Camp One access road is used frequently by recreational ATVs. We observed many quads while on the road and heard a few others while we were in the ER. We saw the occasional 4WD truck along the access road up to the Spirit Trail junction. We found litter within the CLER close to the access road. We saw evidence of increased trail bike and campfire use inside the CLER.

Figure 31: ATV passing ER Warden Ian Hatter on the Camp One Road near the Columbia Lake ER, July 19, 2024.

Figure 32: Robust new campfire pit on top of the bluffs in the eastern part of the Columbia Lake ER, July 19, 2024.

On April 18, 2024, our reconnaissance survey revealed that at least seven mature Douglas-fir trees had been illegally cut just inside the CLER close to the access road in the northwest corner. We counted six trees cut in one location (N 50° 12' 02.95" and W 115° 49' 41.87", Fig. 1) and one at another location. There were quad tracks and skid marks in the area. From the amount of sawdust, it looked like the felled trees were then cut up for firewood. Fig. 2 shows where the trees had been removed. The trees may have been felled without the individuals knowing that they were within an ecological reserve, although a sign specifying that removal of plants and other materials was not permitted was nearby (within ~200 m). There is also evidence that people are hunting within the CLER as we found a discharged shotgun shell.

Figure 33: On April 18, 2024, ER Wardens discovered seven mature Douglas-firs had been cut and removed from the ER since their last visit on Oct. 20, 2023.

Warden Activities

Over the course of six visits in 2024, we attempted to explore as much of the CLER as possible. However, steep limestone cliffs occupy a significant portion of the interior of the CLER, and would require difficult scrambling and technical rock climbing (or a drone) to investigate. We recorded observations of plant, fungi and lichen species, as well as birds on each visit. We noted other evidence of animal species (excavations, middens, vocalizations, scats, etc.). Bird observations were posted eBird report – see https://ebird.org/checklist/S141934910. We both took pictures of organisms and we each posted our observations to iNaturalist (see map in Figure 40 on the following page). We did two inventories of two patches of giant helleborine (stream orchid) in July. We also picked up litter, which typically was alongside the access road, and removed some of the increasingly prevalent alien invasive plants species.

Figure 34: ER Wardens Ian Hatter on the left and Jenny Feick on the right (Photo by Ian Hatter) exploring the rugged CLER, July 19, 2024.

Wardens' Conclusions, Proposals and Suggestions

Conclusions

Almost all of the CLER is only accessible by foot. Due to the ruggedness of the terrain, the CLER is not well suited for hiking and there are no formal walking trails. There are game trails made by deer, elk and bighorn sheep that are rugged and not suitable for leisurely hiking. Evidence of human impacts includes erosion from off road motorcycling, two campfire circles, and the felling of seven trees and associated ground disturbance. Natural features for which the CLER was established (e.g. calcareous mineral springs, tufa outcrops, and limestone cliffs), are largely undisturbed by human activity along the access road. Unfortunately, several excellent tufa deposits occur outside of the CLER and lack the protection of an ecological reserve.

Major progress was made in adding new species to the biodiversity lists in 2024. The BC Parks iNaturalist Project team helped increase those numbers. Had they contacted the ER Wardens in advance, and collaborated with them, their time could have been more focused and efficient.

Evidence shows that adverse effects of human activity are increasing in the Columbia Lake ER, including cutting and removal of mature trees, presumably for firewood, and increased off road motorcycling inside the ER, with alien invasive plant species colonizing the disturbed eroded areas. There is also evidence that people are hunting within the CLER as we found a discharged shotgun shell. There is additional campfire use in this arid area. Litter near the access road continues to be a problem.

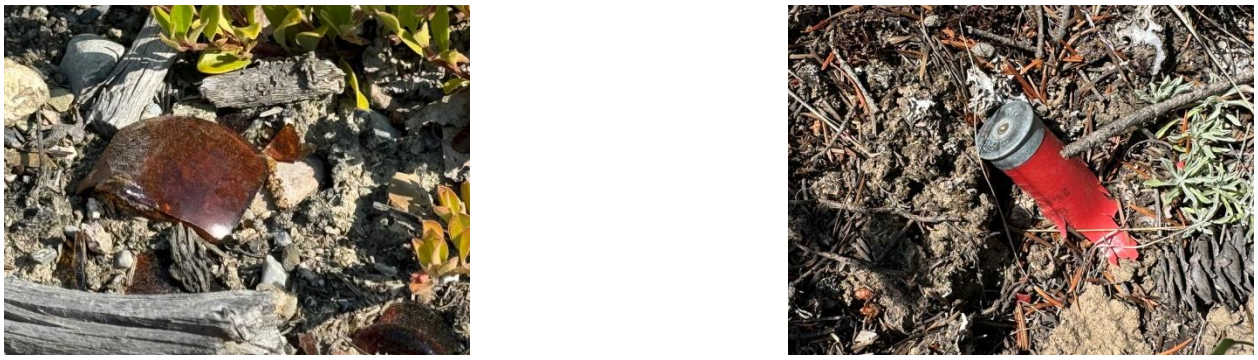


Figure 35: Broken glass from a tossed beer bottle (left) and a shotgun shell casing (right) found inside the Columbia Lake ER, July 9, 2024.

With the press of priority issues, including forest fires, occupying the time of regional staff and the vacancy in the regional Community Liaison Officer position, communications between the ER wardens and BC Parks staff deteriorated in 2024. To retain committed volunteers, BC Parks should acknowledge receipt of emails and reports from ER Wardens, especially if they concern reports of illegal activity in an ER, and inform the ER Warden of follow-up actions taken.

Follow-up on ER Warden Suggestions Made in 2022/23

Regional BC Parks employees were busy with other higher priority duties in 2024, including the Mount Morro wildfire, N21014, in Top of the World Provincial Park, which started on July 17, 2024. They had no time for a site visit to the CLER before or after that event, or to communicate with ER Wardens to acknowledge the reporting of the seven cut trees and what if any response was carried out, or to supply additional information about signage issues, the status of the access road, etc. The BC Parks regional Community Liaison Officer position remained unstaffed for the rest of 2024 following the departure of the incumbent Stephen Bercek on May 3, 2024 to become an Advisor, First Nations Relations with the Ministry of Water, Lands and Resource Stewardship (WLRS). Nevertheless, some progress was made on action items.

Status of Tasks Remaining from 2022/23

1. BC Parks Ranger with assistance from ER Warden(s) – Obtain generic BC Parks Ecological Reserve signs and clearly mark the upper boundary of the CLER so that it is clear when people enter it. Use the CLER boundaries that appear in the BC Data Catalogue. **No new CLER signs were obtained and installed by BC Parks.**
2. BC Parks Ranger – Move the sign that is in the wrong place. **It looks like the sign that was causing confusion was replaced by a different sign with a more accurate map, but this needs confirmation from BC Parks.**
3. BC Parks Regional Staff and ER Wardens - Clarify which agency (e.g. Village of Canal Flats, a timber company, or the Ministry of Forests District Office in Cranbrook) is responsible for road maintenance in the area and see if some minimal level of maintenance can be done at least to correct drainage issues. **BC Parks Area Supervisor Darin Welch volunteered to do this at the March 4, 2024 East Kootenay ER Warden AGM but has not told ER Wardens if he found out anything.**
4. ER Wardens and BC Parks - Discuss acquiring and setting up at least one wildlife camera to document wildlife use of the area. **BC Parks Area Supervisor Darin Welch suggested submitting a project proposal to the Park Enhancement Fund but ER Wardens were in the UK when the PEF call for proposals and deadline occurred.**
5. ER Wardens and BC Parks – Discuss using a drone to help to monitor the less accessible portions of this CLER (e.g. limestone cliffs). **The issue was discussed at the March 4, 2024 East Kootenay ER Warden AGM and BC Parks did not support the use of drones for monitoring in ERs.**
6. BC Parks – Inventory Indigenous cultural and archaeological resources (location and significance) in collaboration with the Ktunaxa First Nation. **The ER Wardens received no information on whether or not this idea was pursued by BC Parks.**

Suggestions from 2024

1. When ER Wardens report violations of the *Ecological Reserve Act* and regulations in an ER (e.g., illegal tree cutting for firewood), BC Parks should acknowledge that they have received the information and report back on what, if any, action is being taken to address the issue.
2. The BC Parks iNaturalist Project Team should contact ER Wardens in advance of their site visit and if possible, visit the site with the ER Warden(s).
3. Alien invasive plants are becoming a significant problem in the CLER and warrant focused attention.

Plans for the 2025 Field Season

1. ER Wardens - Contact BC Parks iNaturalist Project Team and suggest that teams scheduling biodiversity blitzes contact the ER Wardens in advance of their site visit and if possible, visit the site with the ER Warden(s).
2. BC Parks Ranger and ER Wardens - Undertake a joint site visit to the CLER. This could include installation of ER boundary signs if BC Parks can supply the signs.
3. ER Wardens - Apply for PEF grant to purchase and install a wildlife camera in the CLER.
4. ER Wardens – Contact Ian Adams regarding installation of bat monitoring devices.
5. ER Wardens - Conduct annual monitoring of Giant Helleborine (stream orchid) within the CLER.
6. ER Wardens - Make natural history observations, especially in areas of the CLER not yet visited, as well as the different paintbrush species. Post observations to iNaturalist and eBird.
7. ER Wardens – Survey for presence of alien invasive plants near areas adjacent to access roads and along off road motorcycle routes. Remove alien invasive plants when observed during site visits. Devote on site visit to alien invasive plant species removal.
8. ER Wardens – Assess ongoing health of any accessible limber pine trees (e.g. evidence of white pine blister rust), to follow up on the "Columbia Lake Ecological Reserve Limber Pine Survey" by R. Moody.
9. ER Wardens – Investigate adjacent Crown land in the East Side Columbia Lake Wildlife Management Area for ecological and biological values, particularly the calcicolous vegetation growing in the wet sites along the spring-fed stream on the west and south sides of the CLER and below the access road.
10. ER Wardens - Continue to look for evidence of adverse human intrusions into the CLER (e.g. removal of trees) and remove garbage within and adjacent to the CLER. Report any significant damage to BC Parks.

Figure 36: View to the west down to the towers above Columbia Lake from the ER, July 19, 2024.

Appendix A: Tracking Biodiversity – Toward a Species List for Columbia Lake Ecological Reserve (updated with 2024 observations)

This list includes both the common and scientific names for species documented as occurring in the Columbia Lake Ecological Reserve (CLER). The list is arranged within its taxonomic category in alphabetical order according to common name. A second set of lists in Appendix B is arranged within its taxonomic category in alphabetical order according to scientific name. Naming protocols follow iNaturalist and eBird. An asterisk* indicates an alien invasive species.

Species Lists with Common Name First

Animals

Arthropods

Myriapods (Centipedes and Millipedes)

Diplopods (Millipedes)

Round-backed millipede (Superorder *Juliformia*)

Arachnids

Bowl-and-doily spider, (*Frontinella pyramitela*)
Entelegyne spider, (Infra-order *Entelegynae*)
Filmy dome spider, (*Neriene radiata*)
Gall and rust mite, (*Eriophyes sp.*)
Goldenrod crab spider, (*Misumena vatia*)
Jumping spider, (*Evarcha sp*.)
Mesh weaver spider, (family *Dictynidae*)
Plum finger gall mite, (*Eriophyes emarginatae*)
Rocky Mountain maple felt mite, (*Aceria calaceris*)
Rocky Mountain wood tick, (*Dermacentor andersoni*)
Running crab spider, (*Philodromus sp.*)
Sheet-weaver spiker, (*Pityohyphantes sp*.)
Stealthy ground spider, (*Gnaphosa sp.*)
Velvet mite, (family *Erythraeidae*)

Figure 37. Rocky Mountain woodtick, April 18, 2024.

Insects

Ant, (*Formica subpolita*)
Anthemid aphid, (*Macrosiphoniella* sp.)
Aphid (Family *aphididae),* "green aphid"
Aphid (Subfamily *aphidinae*) "red aphid"
Aphid (Tribe *aphidini*), "black aphid"

Bee, (Epifamily *anthophila*)
Bee-mimic beetle, (*Trichiotinus assimilis*)
Cicada, (*Okanagana sp.*)
Cicada, (Subfamily *tibicininae)*
Cicada, (Subtribe *tibicinina*)
Click beetle, (*Prosternon bombycinum*)
Crackling forest grasshopper, (*Trimerotoropis verruculata*)
Cyclorrhaphan fly, (Infraorder *Cyclorrhapha)*
Delicate cycnia moth*, (Cycnia tenera)*
Distinct lace bug, (*Corythucha distincta*)
Douglas fir adelgid, (*Adelges cooleyi*)
Fall webworm moth, (*Hyphantria cunea*)
Field crescent butterfly*, (Phyciodes pulchella*)
Flower moth, (*Landryia sp*.)
Gall midge, (*Blaesodiplosis* sp.)
Great basin bumble bee, (*Bombus centralis*)
Hercules carpenter ant, (*Camponotus herculeanus*)
Ichneumonid wasp, (Family *Ichneumonidae*)
Inland floodwater mosquito, (*Aedes vexans*)
Ichneumonid/braconid wasp, (Superfamily *Ichneumonoidea*)
Jewel beetle, (*Anthaxia prasina*)
Jewel beetle, (genus *Anthaxia,* subgenus *melanthaxia)*
Large daisy aphid, (*Uroleucon sp*.), "red aphid"
Leaf mining fly, (Complex *Phytomyza periclymeni* superspecies)
Leaf-miner fly, (*Aulagromyza sp*.)
Leaf-miner fly, (Subfamily *Phytomyzinae*)
Long-legged fly, (Family *Dolichopodidae*)
Lorquin's admiral, (*Himenitis lorquini*)
Many-spined rose gall wasp, (*Diplolepis spinosa*)
Morril lace bug, (*Corythucha morrilli*)
Moth fly, (Subfamily *Psychodinae*)
Mourning cloak butterfly, (*Nymphalis antiopa*)
Native dragonfly, (*Aeshna sp*.)
Nomad bee, (*Nomada sp*.)
None-biting midge, (Family *Chironomidae*)
None-biting midge, (Genus *Chironomus,* Subgenus *Chironomus*)
Northern crescent butterfly, (*Phyciodes cocyta*)
Northern checkerspot butterfly, (*Chlosyne palla*)

Pit-trapping antlion, (*Myrmeleon exitialis*)
Planthopper, (Infraorder *Fulgoromorpha*)
Plume moth, (Subfamily *Pterophorinae*)
Rabbitbrush stem gall moth, (*Gnorimoschema octomaculella*)
Rufous-backed cellophane bee, (*Colletes thoracicus*)
Salmonfly cicada, (*Platypedia areolata*)
Short-faced bee, (*Duporea sp.*)
Soldier beetle, (*Rhagonycha* sp.)
Spittlebug/froghopper, (Superfamily *Ceracopoidea*)
Spruce aphid, (*Adelges sp*.)
Square-headed wasp/sand wasp, (*Astata* sp.)
Two-tailed swallowtail, (*Papilio multicaudata*)
Typical bark beetle, (*Scolytus sp*.)
Ugly-nest caterpillar moth, (*Archips cerasivorana*)
Uhler's stink bug, (*Chlorochroa uhleri*)
Weevil wasp (*Cerceris* sp.)
Western black carpenter ant (*Camponotus modoc*)

Birds

American crow, (*Corvus brachyrhyncho*)
American kestrel, (*Falco sparverius*)
American robin, (*Turdus migratorius*)
American three-toed woodpecker, (*Picoides dorsalis*)
Bald eagle, (*Haliaeetus leucocephalus*)
Black-billed magpie, (*Pica hudsonia*)
Black-capped chickadee, (*Poecile atricapillus*)
Canada goose, (*Branta canadensis*)
Cassin's vireo, (*Vireo cassinii*)
Chipping sparrow (Spizella passerina)
Clark's nutcracker, (*Nucifraga columbiana*)
Common nighthawk, (*Chordeiles minor*)
Common raven, (*Corvus corax*)
Dark-eyed junco, (*Junco hyemalis*)
Dusky flycatcher, (*Empidonax oberhoiseri*)
Falcon, (*Falco* sp.)
Golden-crowned kinglet, (*Regulus satrapa*)
Hammond's flycatcher, (*Empidonax hammondii*)
Hummingbird, (*Selasphorus sp*.)
MacGillivray's warbler, (*Geothlypis tolmiei*)


Figure 38. Mountain chickadee, July 9, 2024.

Mountain chickadee, (*Poecile gambeli*)
Northern flicker, (*Colaptes auratus*)
Pileated woodpecker, (*Dryocopus pileatus*)
Pine siskin, (*Spinus pinus*)
Red-breasted nuthatch, (*Sitta canadensis*)
Red-naped sapsucker, (*Sphyrapicus nuchalis*)
Red-tailed hawk, (*Buteo jamaicensis*)
Ruby-crowned kinglet, (*Rugulus calendula*)
Ruffed grouse, (*Bonasa umbellus*)
Rufous hummingbird, (*Selasphorus rufus*)
Spotted towhee, (*Pipilo maculatus*)
Swainson's thrush, (*Catharus ustulatus*)
Townsend's solitaire, (*Myadestes townsendi*)
Turkey vulture, (*Cathartes aura*)
Violet-green swallow, (*Tachycineta thalassina*)
Warbling vireo, (*Vireo gilvus*)
Western tanager, (*Piranga ludoviciana*)
Yellow-rumped warbler, (*Setophaga coronata*)

Mammals

American black bear, (*Ursus americanus*)
American red squirrel, (*Tamiasciurus hudsonicus*)
Bighorn sheep, (*Ovis canadensis*)
Bushy-tailed woodrat, (*Neotoma cinerea)*
Least chipmunk, (*Neotamias minimus*)
Red fox, (*Vulpes vulpes*)
Rocky Mountain elk, (*Cervus canadensis* ssp. *canadensis*)
Rocky Mountain mule deer, (*Odocoileus hemionus* ssp. *hemionus*)
Snowshoe hare, (*Lepus americanus*)
Western chipmunk, (*Neotamias sp*.)
White-tailed deer, (*Odocoileus virginianus*)
Yellow-pine chipmunk, (*Neotamias amoenus*)

Figure 39. Bighorn ram, July 9, 2024.

Fungi

Fungi and Rusts

Broom rust fungus, (*Calyptospora ornamentalis*)
Cedar-apple rust, (*Gymnosporangium juniper-virginianae*)

Common gilled mushroom, (Family *Omphalotaceae*)
Common gilled mushroom, (*Clitocybe albirhiza*)
Corky bark disease, (*Diplodia tumefaciens*)
Felted twiglet, (*Tubaria conspersa*)
Hoof fungus, (*Fomes fomentarius*)
Juniper broom rust, (*Gymnosporangium nidus-avis*)
Juniper-hawthorn rust, (*Gymnosporangium globosum*)
Leaf curl fungi, (*Taphrina sp.*)
Lilac bonnet, (*Mycena pura*)
Map fungus, (*Coccomyces dentatus*)
Multiflora rose rust, (*Phragmidium rosae-multiflorae*)
Pinelitter gingertail, (*Xeromphalina cauticinalis*)
Rounded earth star, (*Geastrum saccatum*)
Rust fungi, (Order *Pucciniales*)
Rust fungi, (*Puccinia caricis-shepherdiae*)
Rust fungi, (*Phragmidium sp.*)
Spruce witch's broom rust, (*Chrysomyxa arctostaphyli*)
Stocked hairy fairy cup, (*Lachnum birgineum*)
Tarspot fungus, (*Rhytisma arbuti*)
Veiled polypore, (*Cryptoporus volvatus*)


Figure 40. Veiled polypore, Aug. 29, 2024

Lichens

Beard lichen, (*Usnea* sp.)
Black-eye lichen (*Tephromela atra*)
Blue-gray rosette lichen, (*Physcia caesia*)
Bristly beard lichen, (*Usnea hirta*)
Blushing scale lichen, (*Psora decipiens*)
Bottlebrush frost lichen, (*Physconia detersa*)
Burred horsehair lichen, (*Bryoria furcellata*)
Elegant sunburst lichen, (*Rusavskia elegans*)
Gold cobblestone lichen, (*Pleopsidium flavum*)
Lapland beard lichen, (*Usnea perplexans*)
Leather lichen, (*Dermatocarpon miniatum*)
Lung lichens, (*Lobaria sp.*)
Mealy pixie cup, (*Cladonia chlorophaea*)
Mountain wolf lichen, (*Letharia lupina*)
Pebbled pixie cup, (*Cladonia pyxidata*)
Pelt lichen, (*Peltigera sp.*)


Figure 41. Trumpet lichen, Aug. 29, 2024.

Peppered rock tripe, (*Umbilicaria deusta*)
Pitted beard lichen, (*Usnea cavernosa*)
Pixie cup reindeer lichen, (*Cladonia sp*.)
Powder-headed tube lichen, (*Hypogymnia tubulosa)*
Powder-tipped rosette lichen, (*Physeia dubia*)
Powdered funnel lichen, (*Cladonia cenotea*)
Powdery goldspeck, (*Candelariella efflorescens*)
Powdery sunburst lichen, (*Xanthomendoza ulophyllodes*)
Shield lichen, (*Parmelia sulcata*)
Smooth-footed powderhorn, (*Cladonia ochrochlora*)
Split-leg lichen, (*Cladonia cariosa*)
Sugared sunburst lichen, (*Rusavskia sorediata*)
Trumpet lichen, (*Cladonia fimbriata*)
Veinless pelt lichen, (*Peltigera malacea*)
Witch's hair, (*Alectoria sarmentosa*)
Wolf lichen, (*Letharia vulpina*)
Yellow map lichen, (*Rhizocarpon geographicum*)

Non-vascular Plants

Bryophytes

Acrocarpous mosses, (Family *Bryaceae*)
Brachythecium moss, (*Brachythecium sp*.)
Broom forkmoss, (*Dicranum scoparium*)
Bud-headed groove-moss, (*Aulacomnium androgynum*)
Capillary wing-moss, (*Pterigynandrum filiforme*)
Feather mosses, (Family *Hypnaceae*, Order *Hypnales*)
Feather moss, (*Hygrohypnum sp.*)
Feather moss, (*Scorpidium sp*.)
Fern-leaved hook-moss, (*Cratoneuron filicinum*)
Fir tamarisk-moss, (*Abietinella abietina*)
Fragile fork-moss, (*Dicranum tauricum*)
Golden feather-moss, (Campliadelphus chrysophyllus)
Golden glade-moss, (*Rhytidum rugosum*)
Grimmia dry rock moss, (*Grimmia laevigata*)
Homalothecium moss, (*Homalothecium sp*.)
Joint-toothed moss (Family *Pottiaceae*)
Lyell's bristle-moss, (*Pulvigera lyellii*)
Red-stemmed feather moss, (*Pleurozium schreberi*)

Figure 42. Fragile fork-moss, Aug. 29, 2024.

Rhizomnium moss, (*Rhizomnium glabrescens*)
Rock moss (*Schistionium sp.*)
Sessile grimmia moss, (*Schistidium apocarpum*)
Sickle-leaved hook-moss, (*Sanionia uncinata*)
Square gooseneck moss, (*Rhytidiadelphus squarrosus*)
Stairstep moss, (*Hylocomium splendens*)
Star moss, (*Syntrichia ruralis*)
Thyme moss, (*Plagiomnium sp.*)
Woodsy thyme-moss, (*Plagiomnium cuspidatum*)

Vascular Plants

Ferns and Fern Allies

Fee's lip fern, (*Myriopteris gracilis*)
Field horsetail, (*Equisetum arvense*)
Fragile fern, (*Cystopteris fragilis*)
Gastony's Cliffbrake (*Pellaea gastonyi*)
Oregon woodsia, (*Woodsia oregana*)
Rocky Mountain woodsia (*Woodsia scopulina*)
Simple cliffbrake, (*Pellaea glabella simplex*)
Smooth cliffbrake, (*Pellaea glabella*)

Figure 43. Gastony's cliffbrake, June 25, 2024 (listed as a vulnerable species by NatureServe).

Gymnosperms, Conifers

Common Douglas-fir, (*Pseudotsuga menziesii*)
Common juniper, (*Juniperus communis*)
Creeping juniper, (*Juniperus horizontalis*)
Englemann spruce, (*Picea englemannii*)
Limber pine, (*Pinus flexilis*)
Lodgepole pine, (*Pinus contorta*)
Western ponderosa pine, (*Pinus ponderosa*)
Rocky Mountain juniper (*Juniperus scopulorum*)
Rocky Mountains Douglas-fir, (*Pseudotsuga menziesii glauca*)
White spruce, (*Picea glauca*)

Figure 44. Western ponderosa pine, June 25, 2024.

Angiosperms, Flowering Plants

Alfalfa, (*Medicago sativa*)*
Alpine sorrel, (*Oxyria digyna*)
Alaskan bellflower, (*Campanula alaskana*)

Figure 45. Alfalfa, one of the invasive alien species encroaching from the access road near the ER, on July 19, 2024.

American dwarf mistletoe, (*Arceuthobium americanum*)
American groundsel/ragwort, (*Packera* sp.)
Arrowleaf balsamroot, (*Balsamorhiza sagittata*)
Aspen fleabane, (*Erigeron speciosus*)
Aster, (Subfamily *Asteroideae*)
Balsam ragwort, (*Packera paupercula*)
Bastard toadflax, (*Comandra umbellata*)
Bearberry, (*Arctostaphylos uva-ursi*)
Beardtongue, (*Penstemon sp*.)
Beautiful sedge, (*Carex concinna*)
Bicolor sedge, (*Carex* Sect. *bicolores*)
Bigseed biscuitroot, (*Lomatium macrocarpum*)
Black cottonwood, (*Populus trichocarpa*)
Bluebunch wheatgrass, (*Pseudoroegneria spicata*)
Blazingstar, (*Mentzelia sp*.)
Blue-eyed grass, (*Sisyrinchium* sp.)
Bog orchid, (*Platanthera sp*.)
Bulrush sedge, (*Carex scirpoidea*)
Bunchflower, (*Anticlea sp*.)
Bush penstemon, (*Penstemon fruticosus*)
Caespitose fleabane, (*Erigeron caespitosus*)
Canada hawkweed, (*Hieracium umbellatum*)
Canadian bluejoint, (*Calamagrostis canadensis*)
Canadian buffalo-berry, (*Sheperdia canadensis*)
Canadian gooseberry, (*Ribes oxyacanthoides*)
Carrotleaf biscuitroot, (*Lomatium multifidum*)
Cheatgrass, (*Bromus tectorum*)*
Choke cherry, (*Prunus virginiana*)
Common blue lettuce, (*Lactuca pulchella*)
Common butterwort, (*Pinguicula vulgaris*)
Common dandelion, (*Taraxacum officinale*)*
Common gaillardia, (*Gaillardia aristata*)
Common harebell, (*Campanula rotundifolia*)
Common lambsquarters, (*Chenopodium album*)*
Common mullein, (*Verbascum thapsus*)*
Common snowberry, (*Symphoricarpos albus*)
Common yarrow, (*Achillea millefolium*)
Creeping snowberry, (*Symphoricarpos mollis*)

Figure 46. Canada hawkweed, July 19, 2024.

Figure 47. Glaucous honeysuckle flower buds, June 25, 2024.

Creeping mahonia, (*Berber repens*)
Crested-tongue beardtongue, (*Penstemon eriantherus*)
Cushion buckwheat, (*Eriogonum ovalifolium*)
Cutleaf anemone, (*Anemone multifida*)
Cut-leaf fleabane, (*Erigeron compositus*)
Dark-throated shooting star, (*Primula pauciflora*)
Douglas' bladderpod, (*Physaria douglasii*)
Elegant goldenrod, (*Solidago lepida*)
Englemann's aster, (*Dogllingeria englemannii*)
False goldenaster, (*Heterotheca* sp.)
Fescues, (*Festuca sp*.)
Field locoweed, (*Poxytropis campestris*)
Field sagewort, (*Artemisia campestris*)
Fremont's goosefoot, (*Chenopodium fremontii*)*
Fringed sagebrush (*Artemisia frigida*)
Giant red Indian paintbrush, (*Castilleja miniata*)
Glaucous honeysuckle, (*Lonicera dioica*)
Golden corydalis, (*Corydalis aurea*)
Golden sedge, (*Carex aurea*)
Gordon's bladderpod, (*Thysaria gordonii*)
Grayleaf willow, (*Salix glauca*)
Great Basin wildrye, (*Leymus cinereus*)
Green alder, (*Alnus alnobetula*)
Green bog orchid (*Platanthera huronensis*)
Green-flowered wintergreen, (*Pyrola chlorantha*)
Greene's mountain ash, (*Sorbus scopulina*)
Groundsels, (*Senecio sp*.)
Grey goldenrod, (*Solidago nemoralis*)
Heartleaf arnica, (*Arnica cordifolia*)
Hair-like sedge, (*Carex capillaris*)
Hairy butterwort (*Pinguicula villosa*)
Hairy false goldenaster, (*Heteroheca villosa*)
Hemp dogbane, (*Apocynum cannabinum*)
Hillside arnica, (*Arnica fulgens*)
Hooker's thistle, (*Cirsium hookerianum*)
Hookspur violet, (*Viola adunca*)
Horned butterwort, (*Pinguicula macroceras*)
Inland sedge, (*Carex interior*)

Labrador Indian paintbrush, (*Castilleja septentrionalis*)
Lanceleaf stonecrop, (*Sedum lanceolatum*)
Leafy aster, (*Symphyotrichum foliaceum*)
Lemon sagewort, (Artemisia michauxiana)
Lewis flax, (*Linum lewisii*)
Lindley's aster, (*Symphyotrichum ciliolatum*)
Linearleaf phacelia, (*Phacelia linearis*)
Locoweed, (*Oxytrotis sp*.)
Low milkvetch, (*Astragalus lotiflorus*)
Kalm's lobelia, (*Lobelia kalmii*)
Knapweed, (*Centaurea sp*.)*
Maryland sanicle, (*Sanicula marilandica*)
Matte saxifrage, (Saxifraga bronchialis)
Meadow deathcamas, (*Toxicoscordion venenosum*)
Meadow-rue, (*Thalictrum sp*.)
Menzies' catchfly, (*Silene menziesii*)
Missouri goldenrod, (*Solidago missouriensis*)
Mountain ash, (*Sorbus sp*.)
Mountain deathcamas (*Anticlea elegans*)
Narrow-leaved wirelettuce, (*Stephanomeria tenuifolia*)
Nodding onion, (*Allium cernuum)*
North American harebell, (*Campanula alaskana*)
North wind bog orchid, (*Platanthera aquilonis*)
Northern bedstraw, (*Galium boreale*)
Northern bog sedge, (*Carex alascana*)
Northern bog violet, (*Viola nephrophylla*)
Northern comandra, (*Geocaulon lividum*)
Northern goldenrod, (*Solidago multiradiata*)
Northern sweetgrass, (*Anthoxanthum hirtum*)
Northwestern wild rye, (*Leymus innovates*)
Oregon grape, (*Berberis aquifolium*)
Oxeye daisy, (*Leucanthemun vulgare*)*
Paintbrush, (*Castilleja sp*.)
Paper birch, (*Betula papyrifera*)
Perennial sow thistle (*Sonchus arvensis*)*
Pine reed grass, (*Calamagrostis rubescens*)
Pipsissewa, (*Chimaphila umbellate*)
Plum thistle, (*Cirsium sp*.)

Figure 48. Narrow-leaved wirelettuce blooming on a steep dry talus slope July 19, 2024.

Figure 49. Northern sweetgrass, June 19, 2024.

Prairie cinquefoil, (*Potentilla pensylvanica*)
Prairie junegrass, (*Koeleria macrantha*)
Prairie pasqueflower, (*Pulsatilla nuttalliana*)
Prairie smoke, (*Geum triflorum*)
Prickly wild rose, (*Rosa acicularis*)
Purple clematis, (*Clematis occidentalis*)
Red baneberry, (*Actaea rubra*)
Red osier dogwood, (*Cornus sericea*)
Reflexed rockcress, (*Boechera retrofracta*)
Rhexia-leaf Indian paintbrush, (*Castilleja rhexiifolia*)
Rocky Mountain groundsel, (*Packera streptanthifolia*)
Rocky Mountain maple, (*Acer glabrum*)
Rosy pussytoes, (*Antennaria rosea*)
Rough-fruited fairybells, (*Prosartes trachycarpa*)
Roundleaf alumroot, (*Heuchera cylindrica*)
Rubber rabbitbrush, (*Ericameria nauseosa*)
Sagebrush mariposa lily, (*Calochortus macrocarpus*)
Sand ricegrass, (*Eriocoma hymenoides*)
Saskatoon, (*Amelanchier alnifolia*)
Shaggy fleabane, (*Erigeron pumilus*)
Sheathed sedge, (*Carex vaginata*)
Shinyleaf meadowsweet, (*Spirea lucida*)
Shooting star, (*Primula sp.*)
Short-fruit willow, (*Salix brachycarpa*)
Showy aster, (*Eurybia conspicua*)
Shrubby cinquefoil, (*Dasiphora fruticosa*)
Sickletop lousewort, (*Pedicularis racemosa*)
Silver wormwood, (*Artemisia ludoviciana*)
Silverleaf phacelia (*Phacelia hastata*)
Slender bog orchid, (*Platanthera stricta*)
Slender hawksbeard, (*Crepis atribarba*)
Small-leaf pussytoes, (*Antennaria parvifolia*)
Small round-leaved orchid, (*Galearis rotundifolia*)
Smooth blue aster, (*Symphyotrichum laeve*)
Smooth fleabane, (*Erigeron glabellus*)
Sow thistle, (*Sonchus sp.*)
Spreading dogbane, (*Apocynum androsaemifolium*)
Spreading fleabane, (*Erigeron divergens*)

Figure 50. Prairie pasqueflower, April 18, 2024.

Figure 51. Shaggy fleabane, June 25, 2024.

Spike trisetum, (*Koeleria spicata*)
Starry false Solomon's-seal, (*Maianthernum stellatum*)
Sticky goldenrod, (*Solidago simplex*)
Stiff Yellow Indian Paintbrush (*Castilleja lutescens*)
Stream orchid, (*Epipactis gigantea*)
Strict blue-eyed grass, (*Sisyrinchium montanum*)
Striped coralroot, (*Corallorhiza striata*)
Subalpine fleabane (*Erigeron glacialis*)
Sutherland's larkspur, (*Delphinium southerlandii*)
Swamp meadow-grass, (*Poa palustris)*
Tall goldenrod, (*Solidago altissima*)
Tall ragwort, (*Senecio serra*)
Tansymustard, (*Defcurainia sp*.)
Ternate desert-parsley, (*Lomatium triternatum*)
Thread-leaf fleabane, (*Erigeron filifolius*)
Timber milkvetch, (*Astragalus miser*)
Timothy grass, (*Phleum pretense*)*
Trembling aspen, (*Populus tremuloides*)
True sedge, (*Carex sp*.)
Tufted hair grass, (*Deschampsia cespitosa*)
Twinberry honeysuckle, *(Lonicera involucrata*)
Twinflower, (*Linnaea borealis*)
Umber pussytoes, (*Antennaria umbrinella*)
Veiny meadow-rue, (*Thalictrum venulosum*)
Virginia strawberry, (*Fragaria virginiana*)
Water birch, (*Betula occidentalis*)
Wavyleaf thistle, (*Cirsium undulatum*)
Western fescue, (*Festuca occidentalis*)
Western Indian paintbrush, (*Castilleja oxidentalis*)
Western meadow aster, (*Symphyotrichum campestre*)
Western meadow-rue, (*Thalictrum occidentale*)
Western poison ivy, (*Toxicodendron rydbergii*)
Western rattlesnake plantain, (*Goodyera oblongifolia*)
Western snowberry, (*Symphoricarpos occidentalis*)
Western sticky goldenrod, (*Solidago spathulata* ssp. *glutinosa*)
Western stoneseed, (*Lithospermum ruderale*)
Western white clematis, (*Clematis ligusticifolia*)
White-grained mountain ricegrass, (*Oryzopsis asperifolia*)

Figure 52. Western meadow aster still blooming on Aug. 29, 2024.

Figure 53. Western sticky goldenrod, Aug. 29, 2024.

White prairie aster, (*Symphyotiachum falcatum*)
White sweet clover, (*Meliotus alba*)*
Wild blue flax (*Linum lewisii*)*
Wild buckwheat, (*Eriogonum sp*.)
Wild lettuces, (*Lactuca sp*.)
Wild sarsaparilla, (*Aralia nudicaulis*)
Wood lily, (*Lilium philadelphicum*)
Woods' rose, (*Rosa woodsii*)
Woolly groundsel, (*Packera cana*)
Yellow beardtongue, (*Penstemon confertus)*
Yellow lady's slipper (*Cyparipedium parviflorum*)
Yellow salsify, (*Tragopogon dubius*)*
Yellow-spot saxifrage, (*Saxifraga bronchialis austromontana*)
Yoho paintbrush, (*Castilleja purpurascens*)

Figure 54: Two of the new species added to the list in 2024 - Hairy butterwort (left) and Stiff Yellow Indian Paintbrush (right), May 17, 2024 (Photos by Gail Berg)

Appendix B: Species List for Columbia Lake Ecological Reserve with Scientific Name First, then Common Name

This list includes both the scientific and common names for species observed during site visits in 2022, 2023, and 2024. Names **in bold** refer to species first identified in 2024. Naming protocols follow iNaturalist and eBird. Names are listed in alphabetical order according to scientific name. Alien species are marked with an asterisk*.

Kingdom Animalia (Animals)

Phylum Arthropoda (Arthropods)

Diplopoda

Superorder *Juliformia* (Round-backed millipede)

Arachnida

***Aceria calaceris* Rocky Mountain maple felt mite**
***Dermacentor andersoni* Rocky Mountain wood tick**
***Dictynidae* (Family), Mesh weaver spider**
***Entelegynae* (Infra-order), Entelegyne spider**
***Eriophyes sp,* Gull and rust mite**
***Eriophyes emarginatae* Plum finger gall mite**
***Erythraeidae* (Family), Velvet mite**
***Evarcha sp*., Jumping spider**
Frontinella pyramitela, Bowl-and-doily spider
***Gnaphosa sp*, Stealthy ground spider**
Misumena vatia, Goldenrod crab spider
Neriene radiata, Filmy dome spider
***Philodromus sp.,* Running crab spider**
***Pityohyphantes sp.* Sheet-weaver spider**

Figure 55: Evidence of *Eriophyes emarginatae* (Plum finger gall mite) on Saskatoon leaves, July 19, 2024.

Figure 56. *Bombus centralis* (Great Basin bumblebee) on sagebrush mariposa lily, July 19, 2024.

Insects

***Aedes vexans*, Inland floodwater mosquito**
***Adelges cooleyi,* Douglas fir adelgid**
***Adelges sp*., Spruce aphid**
Aeshna sp., Native dragonfly
***Anthaxia,* subgenus *melanthaxia*, Jewel beetle**
Anthaxia prasina, Jewel beetle
Archips cerasivorana, Ugly-nest caterpillar moth
***Astata* sp., Square-headed wasp/sand wasp**
***Anthophila (*Epifamily), Bee**
***Aphididae* (Family), "green aphid"**
***Aphidinae* (Subfamily) "red aphid"**
***Aphidini* (Tribe), *"*black aphid"**
***Aulagromyza sp*., Leaf-miner fly**
***Blaesodiplosis* sp., Gall midge**
***Bombus centralis,* Great basin bumble bee**
***Camponotus herculeanus,* Hercules carpenter ant**
***Camponotus modoc,* Western black carpenter ant**
Superfamily *Ceracopoidea,* Spittlebug/froghopper
***Cerceris sp*., Weevil wasp**
Family *Chironomidae,* None-biting midge
***Chironomus,* Subgenus *Chironomus*, None-biting midge**
Chlorochroa uhleri, Uhler's stink bug
Chlosyne palla Northern checkerspot butterfly
Colletes thoracicus, Rufous-backed cellophane bee

***Corythucha distincta*, Distinct lace bug**
Corythucha morrilli, Morril lace bug
***Cyclorrhapha* (Infraorder), Cyclorrhaphan fly**
***Cycnia tenera,* Delicate cycnia moth**
Diplolepis spinose, Many-spined rose gall wasp
***Dolichopodidae* (Family), Long-legged fly**
Duporea sp., Short-faced bee
Formica subpolita, Ant
***Fulgoromorpha* (Infraorder), Planthopper**
***Gnorimoschema octomaculella*, Rabbitbrush stem gall moth**
Himenitis lorquini, Lorquin's admiral
Hyphantria cunea, Fall webworm moth
***Ichneumonidae* (Family), Ichneumonid wasp**
***Ichneumonoidea* (Superfamily), Ichneumonid/braconid wasp**
***Landryia sp*., Flower moth**
***Macrosiphoniella* sp., Anthemid aphid**
***Myrmeleon exitialis,* Pit-trapping antlion**
***Nomada sp*., Nomad bee**
Nymphalis antiopa, Mourning cloak butterfly
***Okanagana sp.*, Cicada**
Papilio multicaudata, Two-tailed swallowtail
Phyciodes cocyta, Northern crescent butterfly
***Phyciodes pulchella,* Field crescent butterfly**
***Phytomyza periclymeni* (Complex superspecies), Leaf mining fly**
***Phytomyzinae* (Subfamily), Leaf-miner fly**
Platypedia areolate, Salmonfly cicada
***Prosternon bombycinum*, Click beetle**
***Psychodinae* (Subfamily), Moth fly**
***Pterophorinae* (Subfamily) Plume moth**
***Rhagonycha* sp., Soldier beetle**
***Scolytus sp*., Typical bark beetle**
***Tibicininae* (Subfamily), Cicada**
***Tibicinina* (Subtribe), Cicada**
***Trichiotinus assimilis*, Bee-mimic beetle**
***Trimerotoropis verruculata,* Crackling forest grasshopper**
***Uroleucon sp*., Large daisy aphid, "red aphid"**

Figure 57. Turkey vulture soaring above the cliffs in Columbia Lake ER, July 19, 2024.

Phylum Chordata, Class Aves (Birds)

Bonasa umbellus, Ruffed grouse
***Branta canadensis*, Canada goose**
***Buteo jamaicensis*, Red-tailed hawk**
Cathartes aura, Turkey vulture
Catharus ustulatus, Swainson's thrush
Chordeiles minor, Common nighthawk
Colaptes auratus, Northern flicker
Corvus brachyrhyncho, American crow
Corvus corax, Common raven
Dryocopus pileatus, Pileated woodpecker
***Empidonax hammondii*, Hammond's flycatcher**
Empidonax oberhoiseri, Dusky flycatcher
Falco sp., Falcon
***Falco sparverius*, American kestrel**
Geothlypis tolmiei, MacGillivray's warbler
Haliaeetus leucocephalus, Bald eagle
Junco hyemalis, Dark-eyed junco
Myadestes townsendi, Townsend's solitaire
***Nucifraga columbiana*, Clark's nutcracker**
Picoides dorsalis, American three-toed woodpecker
***Pica hudsonia,* Black-billed magpie**
Pipilo maculatus, Spotted towhee
Piranga ludoviciana, Western tanager
Poecile atricapillus, Black-capped chickadee
Poecile gambeli, Mountain chickadee
Regulus satrapa, Golden-crowned kinglet
***Rugulus calendula,* Ruby-crowned kinglet**
Selasphorus sp., Hummingbird

***Selasphorus rufus,* Rufous hummingbird**
***Setophaga coronate*, Yellow-rumped warbler**
Sitta canadensis, Red-breasted nuthatch
***Sphyrapicus nuchalis*, Red-naped sapsucker**
Spinus pinus, Pine siskin
Spizella passerine, Chipping sparrow
***Tachycineta thalassina*, Violet-green swallow**
Turdus migratorius, American robin
Vireo cassinii, Cassin's vireo
Vireo gilvus, Warbling vireo

Figure 58. Mule deer jawbones below the limestone cliffs, Aug. 29, 2024.

Phylum Chordata, Class Mammalia (Mammals)

Lepus americanus, Snowshoe hare
Cervus canadensis ssp. canadensis, Rocky Mountain elk
Neotoma cinerea, Bushy-tailed woodrat
Neotamias amoenus, Yellow-pine chipmunk
***Neotamias sp*., Western chipmunk**
Neotamias minimus, Least chipmunk
Odocoileus hemionus ssp. *hemionus*, Rocky Mountain mule deer
Odocoileus virginianus, White-tailed deer
Ovis canadensis, Bighorn sheep
Tamiasciurus hudsonicus, American red squirrel
Ursus americanus, American black bear
Vulpes vulpes, Red fox

Kingdom Fungi

Figure 59. Cedar apple rust on Saskatoon leaves, Aug. 29, 2024. l

Division Basidiomycota, Fungi and Rusts

***Calyptospora ornamentalis*, Broom rust fungus**
***Chrysomyxa arctostaphyli*, Spruce witch's broom rust**
***Clitocybe albirhiza*, Common gilled mushroom**
***Coccomyces dentatus*, Map fungus**
***Cryptoporus volvatus*, Veiled polypore**
***Diplodia tumefaciens*, Corky bark disease**
Fomes fomentarius, Hoof fungus
***Geastrum saccatum*, Rounded earth star**
Gymnosporangium globosum, Juniper-hawthorn rust
***Gymnosporangium juniper-virginianae*, Cedar-apple rust**
***Gymnosporangium nidus-avis*, Juniper broom rust**
***Lachnum birgineum*, Stocked hairy fairy cup**
***Mycena pura*, Lilac bonnet**
Family *Omphalotaceae*, Common gilled mushroom
***Phragmidium rosae-multiflorae*, Multiflora rose rust**
***Phragmidium sp.*, Rust fungi**
***Pucciniales* (Order), Rust fungi**
Rhytisma arbuti, Tarspot fungus
***Taphrina sp.*, Leaf curl fungi**
***Tubaria conspersa*, Felted twiglet**
***Xeromphalina cauticinalis*, Pinelitter gingertail**

Figure 60. Mountain wolf lichen, Aug. 29, 2024.

Division Ascomycota (Lichens)

Alectoria sarmentosa, Witch's hair
Bryoria furcellata, Burred horsehair lichen
Candelariella efflorescens, Powdery goldspeck
***Cladonia cariosa*, Split-leg lichen**
***Cladonia cenotea*, Powdered funnel lichen**
***Cladonia chlorophaea*, Mealy pixie cup**
***Cladonia fimbriata*, Trumpet lichen**
Cladonia ochrochlora, Smooth-footed powderhorn
Cladonia pyxidata, Pebbled pixie cup
***Cladonia sp*., Pixie cup reindeer lichen**
Dermatocarpon miniatum, Leather lichen
Hypogymnia tubulosa, Powder-headed tube lichen
***Letharia lupina*, Mountain wolf lichen**
Letharia vulpina, Wolf lichen
Lobaria sp., Lung lichens
Parmelia sulcata, Shield lichen
Peltigera malacea, Veinless pelt lichen
***Peltigera sp*., Pelt lichen**
Physcia caesia, Blue-gray rosette lichen
***Physconia detersa*, Bottlebrush frost lichen**
Physeia dubia, Powder-tipped rosette lichen
Pleopsidium flavum, Gold cobblestone lichen
***Psora decipiens*, Blushing scale lichen**
Rhizocarpon geographicum, Yellow map lichen
Rusavskia elegans, Elegant sunburst lichen

***Rusavskia sorediata*, Sugared sunburst lichen**
***Tephromela atra*, Black-eye lichen**
Umbilicaria deusta, Peppered rock tripe
Usnea cavernosa, Pitted beard lichen
Usnea hirta, Bristly beard lichen
***Usnea perplexans*, Lapland beard lichen**
***Usnea* sp., Beard lichen**
Xanthomendoza ulophyllodes, Powdery sunburst lichen

Kingdom Plantae

Division Bryophyta (Bryophytes)

Figure 61. Woodsy thyme-moss on July 9, 2024.

Class Bryopsida (Mosses)

Aulacomnium androgynum, Bud-headed groove-moss
Abietinella abietina, Fir tamarisk-moss
Brachythecium sp., Brachythecium moss
Bryaceae (Family), Acrocarpous mosses
Campliadelphus chrysophyllus, Golden feather-moss
Cratoneuron filicinum, Fern-leaved hook-moss
Dicranum scoparium, Broom forkmoss
***Dicranum tauricum*, Fragile fork-moss**
Grimmia laevigata, Grimmia dry rock moss
***Homalothecium sp*., Homalothecium moss**
Hygrohypnum sp., Feather moss
Hylocomium splendens, Stairstep moss
Hypnaceae (Family), Order *Hypnales*, Feather mosses
Plagiomnium cuspidatum, Woodsy thyme-moss
***Plagiomnium sp.*, Thyme moss**
Pleurozium schreberi, Red-stemmed feather moss
***Pterigynandrum filiforme*, Capillary wing-moss**

Pulvigera lyellii, Lyell's bristle-moss
***Rhizomnium glabrescens*, Rhizomnium moss**
Rhytidiadelphus squarrosus, Square gooseneck moss
Rhytidum rugosum, Golden glade-moss
Sanionia uncinata, Sickle-leaved hook-moss
***Schistidium apocarpum*, Sessile grimmia moss**
Scorpidium sp., Feather moss
Syntrichia ruralis, Star moss

Clade Tracheophyta (Vascular Plants – Ferns, Gymnosperms, Angiosperms)

Figure 62. Oregon woodsia growing among cracks in the limestone cliffs, Aug. 29, 2024.

Division Pteridophyta, Class Pteridophyta (Ferns)

Cystopteris fragilis, Fragile fern
Myriopteris gracilis, Fee's lip fern
Pellaea gastonyi, Gastony's cliffbrake
Pellaea glabella, Smooth cliffbrake
***Pellaea glabella simplex*, Simple cliffbrake**
Woodsia oregana, Oregon woodsia
Woodsia scopulina, Rocky Mountain woodsia

Subclass Equisetidae, Order Equisetales, Family Equisetaceae

Equisetum arvense, Field horsetail

Figure 63. Creeping juniper near the cold springs, July 19, 2024.

Sub-kingdom Embryophyta, Clade Gymnospermae (Gymnosperms), Division Pinophyta or Coniferae, Class Pinopsida or Conifera (Conifers)

Juniperus communis, common juniper
Juniperus horizontalis, creeping juniper
Juniperus scopulorum, Rocky Mountain juniper
***Picea englemannii*, Englemann spruce**
Picea glauca, white spruce
Pinus contorta, lodgepole pine
Pinus flexilis, limber pine
Pinus ponderosa, ponderosa pine
Pseudotsuga menziesii, common Douglas-fir
***Pseudotsuga menziesii glauca*, Rocky Mountains Douglas-fir**

Clade Angiospermae, Division Anthophyta (Flowering Plants)

Figure 64. Angiosperms can be further divided into monocots such as the wood lily (left), and dicots like the timber milkvetch, a legume (right), both in bloom on June 25, 2023.

Acer glabrum , Rocky Mountain maple
Achillea millefolium, Common yarrow
***Actaea rubra,* Red baneberry**
Allium cernuum, Nodding onion
***Alnus alnobetula*, Green alder**
Amelanchier alnifolia, Saskatoon
***Anemone multifida*, Cutleaf anemone**
***Antennaria parvifolia*, Small-leaf pussytoes**
Antennaria rosea, Rosy pussytoes
Antennaria umbrinella, Umber pussytoes
***Anthoxanthum hirtum,* Northern sweetgrass**

Anticlea elegans, Mountain deathcamas
***Anticlea sp.*, Bunchflower**
Apocynum androsaemifolium, Spreading dogbane
***Apocynum cannabinum*, Hemp dogbane**
Aralia nudicaulis, Wild sarsaparilla
Arceuthobium americanum , American dwarf mistletoe
Arctostaphylos uva-ursi, Bearberry
Arnica cordifolia, Heartleaf arnica
Arnica fulgens, Hillside arnica
***Artemisia campestris*, Field sagewort**
Artemisia frigida, fringed sagebrush
Artemisia ludoviciana, silver wormwood
Artemisia michauxiana, lemon sagewort
***Asteroideae* (Subfamily), Aster**
***Astragalus lotiflorus*, Low milkvetch**
Astragalus miser, Timber milkvetch
Balsamorhiza sagittata, Arrowleaf balsamroot
***Berber repens,* Creeping mahonia**
Berberis aquifolium, Oregon grape
Betula occidentalis, Water birch
Betula papyrifera, Paper birch
Boechera retrofracta, Reflexed rockcress
Bromus tectorum, Cheatgrass*
Calamagrostis canadensis, Canadian bluejoint
Calamagrostis rubescens, Pine reed grass
***Campanula alaskana*, Alaskan bellflower**
Campanula rotundifolia, Common harebell
***Carex alascana,* Northern bog sedge**
***Carex aurea,* Golden sedge**
***Carex bicolores* (Sect.), Bicolor sedge**
***Carex capillaris*, Hair-like sedge**
***Carex concinna,* Beautiful sedge**
***Carex interior*, Inland sedge**
***Carex scirpoidea*, Bulrush sedge**
***Carex vaginata,* Sheathed sedge**
Carex sp., True sedges
***Castilleja lutescens*, Stiff Yellow Indian paintbrush**
Castilleja miniata, Giant red Indian paintbrush

Castilleja oxidentalis, Western Indian paintbrush
***Castilleja purpurascens*, Yoho paintbrush**
***Castilleja rhexiifolia* , Rhexia-leaf Indian paintbrush**
***Castilleja septentrionalis,* Labrador Indian paintbrush**
***Castilleja sp*., Paintbrush**
Centaurea sp*., Knapweed
Chenopodium album, Common lambsquarters*
Chenopodium fremontii*, Fremont's goosefoot
***Chimaphila umbellate*, Pipsissewa**
Cirsium hookerianum, Hooker's thistle
Cirsium undulatum, Wavyleaf thistle
***Cirsium sp*., Plum thistle**
Clematis ligusticifolia, Western white clematis
Clematis occidentalis, Purple clematis
Comandra umbellate, Bastard toadflax
Corallorhiza striata, Striped coralroot
Cornus sericea, Red osier dogwood
Corydalis aurea, Golden corydalis
Crepis atribarba, slender hawksbeard
Cyparipedium parviflorum, Yellow lady's slipper
Dasiphora fruticosa, Shrubby cinquefoil
***Defcurainia sp.*, Tansymustard**
Delphinium southerlandii, Sutherland's larkspur
***Deschampsia cespitosa*, Tufted hair grass**
***Dogllingeria englemannii* , Englemann's aster**
Epipactis gigantea, Stream orchid (giant helleborine)
Ericameria nauseosa, Rubber rabbitbrush
***Erigeron caespitosus*, Caespitose fleabane**
***Erigeron compositus* , Cut-leaf fleabane**
Erigeron divergens, spreading fleabane
Erigeron filifolius, thread-leaf fleabane
***Erigeron glabellus*, Smooth fleabane**
***Erigeron glacialis,* Subalpine fleabane**
***Erigeron pumilus*, Shaggy fleabane**
***Erigeron speciosus*, Aspen fleabane**
Eriocoma hymenoides, Sand ricegrass
Eriogonum ovalifolium , Cushion buckwheat
***Eriogonum sp.,* Wild buckwheat**

Eurybia conspicua, Showy aster
***Festuca occidentalis*, Western fescue**
Festuca sp., Fescues
Fragaria virginiana, Virginia strawberry
Gaillardia aristata, Common gaillardia
***Galearis rotundifolia,* Small round-leaved orchid**
Galium boreale, Northern bedstraw
Geocaulon lividum, Northern comandra
Geum triflorum , Prairie smoke
Goodyera oblongifolia, Western rattlesnake plantain
Heteroheca villosa, Hairy false goldenaster
***Heterotheca sp*., False goldenaster**
Heuchera cylindrical, Roundleaf alumroot
***Hieracium umbellatum*, Canada hawkweed**
Koeleria macrantha, Prairie Junegrass
***Koeleria spicata*, Spike trisetum**
***Lactuca pulchella,* Common blue lettuce**
Lactuca sp., Wild lettuces
Leucanthemun vulgare*, Oxeye daisy
Leymus cinereus, Great Basin wildrye
Leymus innovates, Northwestern wild rye
Lilium philadelphicum, Wood lily
Linnaea borealis, Twinflower
Linum lewisii, Lewis flax*
Lithospermum ruderale, Western stoneseed
Lobelia kalmii, Kalm's lobelia
Lomatium macrocarpum, Bigseed biscuitroot
Lomatium multifidum, Carrotleaf biscuitroot
Lomatium triternatum, Ternate desert-parsley
Lonicera dioica, Glaucous honeysuckle
***Lonicera involucrata* , Twinberry honeysuckle**
Maianthernum stellatum, Starry false Solomon's-seal
Medicago sativa*, Alfalfa
Meliotus alba, White sweet clover*
***Mentzelia sp*., Blazingstar**
***Oryzopsis asperifolia* , White-grained mountain ricegrass**
Oxyria digyna, Alpine sorrel
Oxytropis campestris, Field locoweed

***Oxytropis sp.*, Locoweed**
Packera cana, woolly groundsel
Packera paupercula, Balsam ragwort
Packera streptanthifolia, Rocky Mountain groundsel
***Packera* sp., American groundsel/ragwort**
Pedicularis racemosa, Sickletop lousewort
Penstemon confertus, Yellow beardtongue
Penstemon eriantherus, Crested-tongue beardtongue
Penstemon fruticosus, Bush penstemon
***Penstemon sp*., Beardtongue**
Phacelia hastata, Silverleaf phacelia
Phacelia linearis, Linearleaf phacelia
Phleum pretense*, Timothy grass
***Physaria douglasii,* Douglas' bladderpod**
Pinguicula macroceras, Horned butterwort
***Pinguicula villosa*, Hairy butterwort**
***Pinguicula vulgaris*, Common butterwort**
Platanthera aquilonis, North wind bog orchid
Platanthera huronensis, Green bog orchid
Platanthera stricta, Slender bog orchid
***Platanthera sp.*, Bog orchid**
Poa palustris, Swamp meadow-grass
Populus tremuloides, Trembling aspen
***Populus trichocarpa*, Black cottonwood**
Potentilla pensylvanica, Prairie cinquefoil
Primula pauciflora, Dark-throated shootingstar
***Primula sp.,* Shooting star**
Prosartes trachycarpa, Rough-fruited fairybells
Prunus virginiana , Choke cherry
Pseudoroegneria spicata, Bluebunch wheatgrass
***Pulsatilla nuttalliana*, Prairie pasqueflower**
***Pyrola chlorantha,* Green-flowered wintergreen**
Ribes oxyacanthoides, Canadian gooseberry
Rosa acicularis , Prickly wild rose
Rosa woodsia, Woods' rose
***Salix brachycarpa* , Short-fruit willow**
***Salix glauca*, Grayleaf willow**
Sanicula marilandica, Maryland sanicle

Saxifraga bronchialis austromontana, Yellow-spot saxifrage
Saxifraga bronchialis, Matte saxifrage
Sedum lanceolatum, Lanceleaf stonecrop
***Senecio serra*, Tall ragwort**
Senecio sp., Groundsels
Sheperdia canadensis, Canadian buffaloberry
***Silene menziesii*, Menzies' catchfly**
***Sisyrinchium montanum,* Strict blue-eyed grass**
***Sisyrinchium* sp., Blue-eyed grass**
Solidago altissima, Tall goldenrod
Solidago lepida, Elegant goldenrod
Solidago missouriensis, Missouri goldenrod
Solidago multiradiata, Northern goldenrod
Solidago nemoralis, Grey goldenrod
Solidago simplex, Sticky goldenrod
***Solidago spathulata* ssp. *glutinosa*, Western sticky goldenrod**
Sonchus arvensis, Perennial sow thistle*
***Sonchus sp.,* Sow thistle**
***Sorbus scopulina*, Greene's mountain ash**
***Sorbus sp.,* Mountain ash**
Spirea lucida, Shinyleaf meadowsweet
***Stephanomeria tenuifolia*, Narrow-leaved wirelettuce**
Symphoricarpos albus, Common snowberry
Symphoricarpos mollis, Creeping snowberry
Symphoricarpos occidentalis, Western snowberry
***Symphyotrichum campestre*, Western meadow aster**
Symphyotiachum falcatum, White prairie aster
Symphyotrichum ciliolatum, Lindley's aster
Symphyotrichum foliaceum, Leafy aster
Symphyotrichum laeve, Smooth blue aster
Taraxacum officinale, Common dandelion,*
Thalictrum occidentale, Western meadow-rue
***Thalictrum sp*., Meadow-rue**
Thalictrum venulosum, Veiny meadow-rue
Thysaria gordonii, Gordon's bladderpod
***Toxicodendron rydbergii* , Western poison ivy**
Toxicoscordion venenosum, Meadow deathcamas
Tragopogon dubius, Yellow salsify*

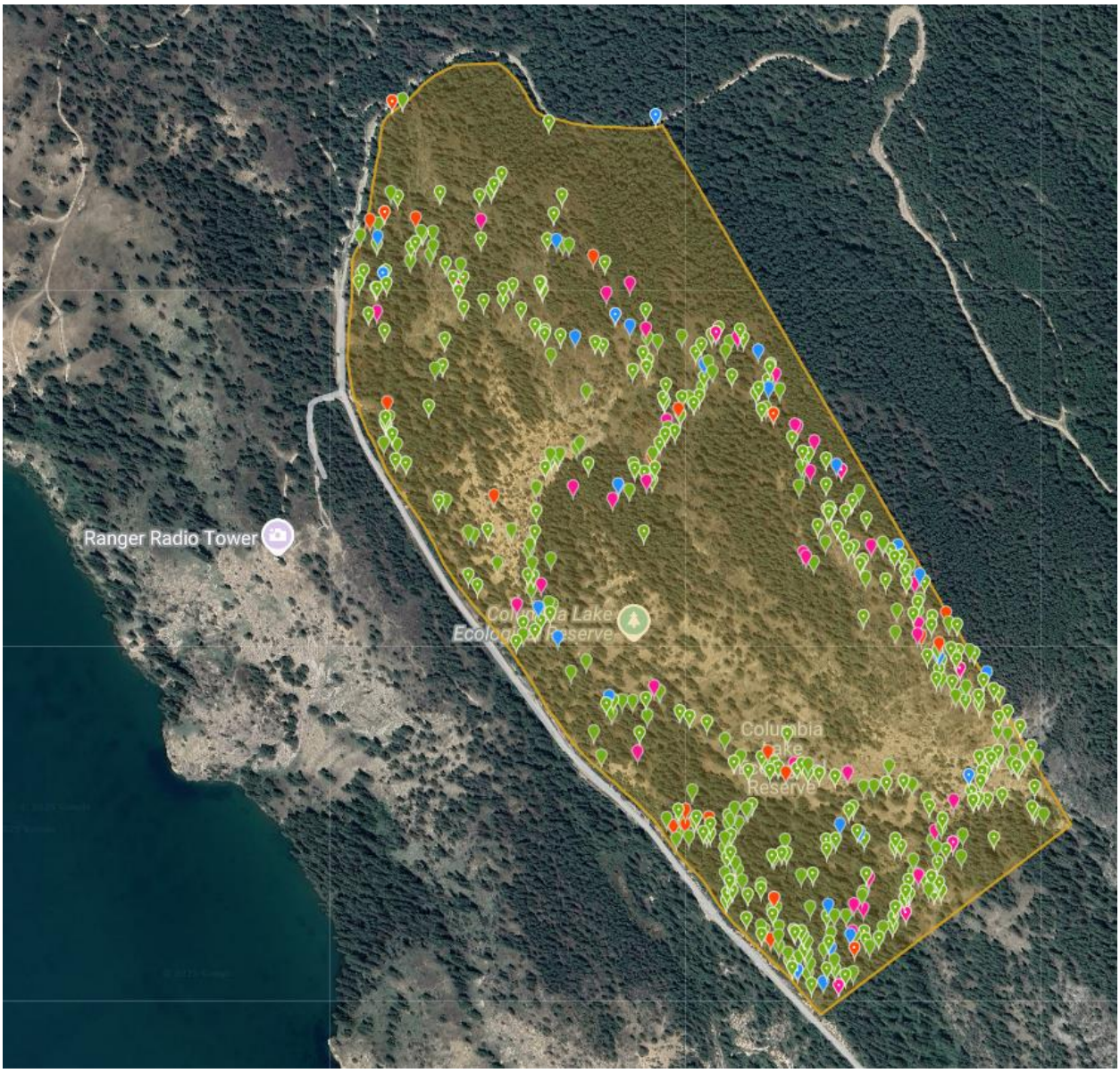
Verbascum thapsus, Common mullein*
Viola adunca, Hookspur violet
***Viola nephrophylla*, Northern bog violet**

Figure 65: *Castilleja rhexifolia* (Rhexia-leaved paintbrush), one of the many species of this genus found in the Columbia Lake ER, July 9, 2024.

Appendix C. Animal, Fungi, and Plant Observation Locations in the Columbia Lake Ecological Reserve.

Map 8: Map of iNaturalist observations as of March 15, 2025.

Key: Green refers to plants, blue to mammals or birds, red to insects or arachnids, and purple to lichens or fungi.



Map 9: Google Earth map of iNaturalist observations as of March 15, 2025.

Key: Green refers to plants, blue to mammals or birds, red to insects or arachnids, and purple to lichens or fungi.

Link to iNaturalist observations – https://inaturalist.ca/observations?project_id=columbia-lake-ecological-reserve&verifiable=any

Stats as of March 15, 2025: 1,657 observations, 342 species, 180 identifiers, 13 observers.

Link to Ian Hatter's eBird checklists (2023 and 2024) for CLER - https://ebird.org/canada/checklist/S149595696