
Year End Report for the 2024 Botanical Survey Season



Photo Caption: The first detection of *Calochortus uniflorus* on Green Diamond property.

April 2025

Year End Report for the 2024 Botanical Survey Season

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EXECUTIVE SUMMARY

Green Diamond Resource Company (GDRCo) botanical technicians surveyed a total of 40 timber harvest plans covering approximately 4,559 acres. A total of 34 plans were surveyed to completion; 5 plans were initiated in 2023 and completed in 2024; and 6 plans were initiated in 2024 and will be completed in 2025. The 2024 floristic survey season commenced on March 7th and concluded on September 12th with an estimated 108 field days. A total of 39 new California Rare Plant Rank (CRPR) 1 and 2 BotID#s were generated from THP and non-THP surveys, representing 8 taxa. A total of 73 new CRPR 3 and 4 BotID#s representing 13 taxa were generated from THP and non-THP surveys as a part of a continued commitment to collecting spatial data and habitat data for uncommon species. There was one new population of a state listed species, *Bensoniella oregana*, discovered late in the 2023 season during pond surveys for the Miller's Crossing THP. No federally listed plant species were found during survey efforts.

Within the Coastal Lagoons and Little River Botanical Management Area (CL/LR BMA), 8 harvest plans were reviewed and 3 received surveys in unique habitats. Running pine (*Lycopodium clavatum*) was the most prevalent uncommon plant encountered in the harvest plans, with a few occurrences of Oregon golden thread (*Coptis laciniata*), leafy-stemmed miterwort (*Mitellastrum caulescens*), heart leaved twayblade (*Listera cordata*), and nodding semaphore grass (*Pleuropogon refractus*).

2024 marks the first survey year since implementation of the County Line Botanical Management Area (CLBMA). Within the CLBMA, 7 harvest plans were reviewed and 3 received surveys in unique habitats. Seaside bittercress (*Cardamine angulata*) was the only special status plant present in the surveyed plans, although it was a preexisting population.

A summary data set for all occurrences has been prepared and will be submitted to the CNDDDB. This summary will include 112 field survey forms for all CRPR taxa discovered in 2024, 136 follow-up forms for 21 taxa, and the corresponding location data in ESRI File Based Geodatabase (FBGDB) format.

The Botany Department continues to work on and incorporate existing goals into a new goal set to start in 2024 following the creation of the County Line Botanical Management Area.

➤ BMA Expansion Project

- GDRCo introduced this project to CDFW in Q1 and subsequent meetings were held to discuss project background, scoping, and risk management.
- This project remains in development with the goal of completion in Q1 of 2025.

RESULTS OF SPECIAL STATUS PLANT POPULATION SURVEYS

Exhibited in the following tables are the records of new plant populations in 2024 for California Rare Plant Ranks 1-4. There are two main sections, separated by detections made within and outside of active THPs. For clarity, plant findings that are associated with THPs that are still in need of complete surveys are not recorded in the tallies for the year.

Rare and Uncommon Species Associated with THPs

Rare Species – CRPR 1 and 2 Detections

CRPR	Scientific Name	Common Name	Code	Number of Projects	Detections (BotID#s)
2B.2	<i>Astragalus umbraticus</i>	Bald Mountain milk-vetch	ASUM	1	2
1B.1	<i>Bensoniella oregana</i>	Bensoniella	BEOR	1	1
2B.2	<i>Erythronium revolutum</i>	coast fawn lily	ERRE	2	2
1B.2	<i>Gilia capitata ssp. pacifica</i>	Pacific gilia	GICAPA	3	6
2B.2	<i>Monotropa uniflora</i>	ghost pipe	MOUN	5	21
1B.2	<i>Piperia candida</i>	white flowered rein orchid	PICA	3	4
1B.2	<i>Sidalcea malviflora ssp. patula</i>	Siskiyou checkerbloom	SIMAPA	1	1
Total					37

Uncommon Species – CRPR 3 and 4 Detections

CRPR	Scientific Name	Common Name	Code	Number of Projects	Detections (BotID#s)
4.3	<i>Astragalus rattanii var. rattanii</i>	Rattan's milk-vetch	ASRARA	1	1
4.2	<i>Calochortus uniflorus</i>	pink star-tulip	CAUN	1	1
4.3	<i>Chrysosplenium glechomifolium</i>	golden saxifrage	CHGL	3	5
4.2	<i>Listera cordata</i>	heart-leaved twayblade	LICO	10	25
4.1	<i>Lycopodium clavatum</i>	running pine	LYCL	4	9
4.2	<i>Mitellastris caulescens</i>	leafy-stemmed miterwort	MICAU	4	13
4.2	<i>Pityopus californicus</i>	California pinefoot	PICAL	2	4
4.2	<i>Pleuropogon refractus</i>	nodding semaphore grass	PLRE	2	3
4.3	<i>Ribes laxiflorum</i>	trailing black currant	RILA	2	2
4.2	<i>Sidalcea malachroides</i>	maple-leaved checkerbloom	SIMA	1	1
3.2	<i>Tiarella trifoliata var. trifoliata</i>	trifoliolate laceflower	TITRTR	1	1
4.2	<i>Usnea longissima</i>	Methuselah's beard lichen	USLO	2	4
Total					69



Photo Caption: New finds for GDRCo! *Astragalus rattanii* var. *rattanii* – an important addition to our botanical records (left). *Calochortus uniflorus*, adding to the few occurrences known in Humboldt County (right).

Detections of Potentially Rare Species

The Botany Department seeks to survey THPs during the peak blooming window for species of special concern so there is a positive species ID with presented floral characteristics. There are a few reasons as to why plant populations are recorded as an unidentified species, such as herbivory or immaturity. It is common for populations of certain species to be detected in early spring and require a follow-up visit to determine if it is rare or not based on specific species level identifiers. Though the identification process may prove to be challenging as it may take years to complete because some plants require a few years to develop floral parts that are vital for identification.

Surveys completed in 2024 found 34 new potentially rare plant populations in 5 different THPs: Gibson Miller, Hunter Ranch, Miller’s Crossing, Fulton Ward, and John Hancorne. Ten of the plant populations were provided mitigations while the remaining were not. The majority of *Piperia* sp. populations started to produce an inflorescence late in summer, indicating that they were not *P. candida*, so they were not provided protection. Two *Piperia* populations in the John Hancorne THP were given programmatic protection measures. The remaining protection measures consisted of avoidance.

Scientific Name	Common Name	Code	Number of Projects	Detections (BotID#s)
<i>Gilia</i> sp.	gilia	GISP	1	1
<i>Piperia</i> sp.	rein orchid	PISP	5	32
<i>Sidalcea</i> sp.	checkerbloom	SISP	1	1

Non-Rare Species Detections

Erythronium californicum proved to be quite abundant in the Hunter Ranch and Miller’s Crossing THPs this year. Miller’s Crossing also had a copious amount of *Piperia transversa* detections from surveys with a total of 16 populations.

Scientific Name	Common Name	Code	Number of Projects	Detections (BotID#s)
<i>Erythronium californicum</i>	California fawn lily	ERCAL	2	16
<i>Piperia elongata</i>	dense-flower rein orchid	PIELO	1	3
<i>Piperia transversa</i>	green striped Piperia	PITR	3	18
<i>Piperia unalascensis</i>	Alaska rein orchid	PIUN	1	2
<i>Sidalcea asprella</i> ssp. <i>asprella</i>	Sierra foothills checkerbloom	SIASAS	2	3

Rare and Uncommon Species Not Associated with THPs (Incidental Detections)

There are several rare and uncommon plant populations that are detected every year on various parts of the property that are not associated with THPs. The Botany Department still records and submits data for these populations to the CNDDDB.

Rare Species and Uncommon Species – CRPR 1 - 4 Detections

CRPR	Scientific Name	Common Name	Code	Detections (BotID#s)
2B.2	<i>Erythronium revolutum</i>	coast fawn lily	ERRE	1
1B.2	<i>Iliamna latibracteata</i>	California globe mallow	ILLA	1
4.3	<i>Lilium washingtonianum</i> ssp. <i>purpurascens</i>	purple-flowered Washington lily	LIWA	1
4.2	<i>Listera cordata</i>	heart-leaved twayblade	LICO	1
4.3	<i>Ribes laxiflorum</i>	trailing black currant	RILA	2



Photo Caption: BotID#37734 was recorded as the second *Lilium washingtonianum* ssp. *purpurascens* population on GDRCo property (left). A tricky photo to decipher (right)! A young *Iliamna latibracteata* growing above a young *Rubus parviflorus*.

Detections of Potentially Rare Species

Scientific Name	Common Name	Code	Detections (BotID#s)
<i>Piperia</i> sp.	rein orchid	PISP	1

Non-Rare Species Detections

Scientific Name	Common Name	Code	Detections (BotID#s)
<i>Piperia transversa</i>	green striped piperia	PITR	1
<i>Piperia unalascensis</i>	Alaska rein orchid	PIUN	1

COASTAL LAGOONS AND LITTLE RIVER BOTANICAL MANAGEMENT AREA STATUS

GDRCo and CDFW agreed that the long-term survey protocol for THPs within the Coastal Lagoons and Little River BMA, effective 2009, is as follows:

1. *RPFs shall conduct focused surveys for all THPs within the Coastal Lagoons and Little River BMA. RPFs shall be responsible for reporting the presence of any unique, high quality, sensitive plant habitat within their project area, e.g. bogs, well developed lakes or ponds, coastal prairies, or large mossy boulders or rock outcrops. When Lycopodium clavatum is encountered within THP areas, voluntary, non-enforceable PPMs will be applied. These PPMs include establishing ELZs for select populations and retaining non-merchantable trees. If other sensitive species are observed, the RPF will consult with GDRCo botany staff.*
2. *Botanists shall survey unique, high quality sensitive plant habitats within THPs as identified by RPFs. If sensitive species are discovered appropriate PPMs shall be applied.*
3. *Botanists shall monitor a subset of L. clavatum populations on a yearly basis. Initially, monitoring activities will focus on pre- and post-harvest monitoring of populations protected with voluntary, internal PPMs that were implemented for plans submitted after July 8, 2008. Revisions to internal PPMs may be made based on monitoring results.*
4. *Botanists will survey unique or high-quality habitats outside of THPs when they are identified. The intent is to find and survey areas within the BMA that have the greatest likelihood of supporting sensitive species, regardless of whether the habitat would ever be impacted by timber harvest operations.*

Summary of THP activity and survey coverage in the CLLR BMA since adoption of the Botanical Management Plan (BMP) in 2008.

Year	THP acres in BMA	BMA acres surveyed	BMA acres exempt from survey
2008	3,029	1,219	1,810
2009	670	76	594
2010	3,813	109	3,704
2011	1,975	52	1,923
2012	893	1	892
2013	1,811	52	1,759
2014	2,185	137	1,620
2015	2,625	148	2,374
2016	1,594	109	1,485
2017	1,857	204	1,654
2018	2,344	807	1,537
2019	1,138	273	865
2020	1,262	60	1,202
2021	762	60	702
2022	905	14	891
2023	797	88	709
2024	709	32	677
Totals	28,369	3,441	24,398

There were three THPs that were partially surveyed within the Coastal Lagoons and Little River BMA during the 2024 survey season. Unique forest interior habitat was pointed out by the RPF of the KnK Tops THP. Botanists surveyed the area but there were no relevant discoveries. Focused creek surveys were conducted in the Little Labyrinth THP. No new findings were recorded, although a population of *Pleuropogon refractus* was found to have expanded.

COUNTY LINE BOTANICAL MANAGEMENT AREA STATUS

GDRCo and CDFW agreed that the long-term survey protocol for THPs within the County Line BMA, effective 2023, is as follows:

1. *Botanists will use extensive botanical database and Geographic Information System (GIS) of each THP in the BMA, in collaboration with forestry staff, to determine the potential presence of suitable sensitive plant habitat, e.g., Monotropa uniflora survey area, Piperia candida survey area, rock outcrops, and forest composition. Effectively, THP level surveys are limited to areas of high potential for target species and potential adverse effects.*
2. *Focused surveys in the County Line BMA will be conducted in habitats that are outlined below:*
 - a. *Stands with a significant component of Picea sitchensis (≥50%) will be surveyed for Moneses uniflora. In which, all portions of the THP area that meet this threshold will be surveyed.*
 - b. *Any THP unit situated along the ridgeline between Tectah/Johnsons Creeks and Mettah Creek, located on the southeastern boundary of the BMA, will be surveyed for Piperia candida.*
 - c. *Any THP unit located within the area surrounding the pocket of Monotropa uniflora populations in the northern part of the BMA, bounded by Omagar Creek to the east, North Fork Ah-Pah Creek to the south, and Tarup Creek to the west and north, will be surveyed for Monotropa uniflora.*
 - d. *Rock outcrops to be utilized as a rock source that have not received botanical surveys in the past.*
3. *In-lieu of full THP level surveys, botanists will focus survey efforts within the BMA in two key areas (discussed here and continued in #4). The first focus area will involve conducting surveys in high quality habitats outside of previously assessed areas. The time dedicated to these survey efforts will be determined by the number of THPs in the BMA in any given year, with a commitment of one person-day per THP. Sensitive plants and associated habitat that may be among those surveyed outside of the THP process are outlined below:*
 - a. *Class I and large Class II watercourses may be surveyed for Cardamine angulata, Erythronium revolutum, and Packera bolanderi var. bolanderi.*
 - b. *Wet areas (e.g., swamps, bogs, ponds, etc.) may be surveyed for a suite of wetland associates.*
 - c. *Rock outcrops that may be utilized as a rock source and cutbanks associated with riparian areas may be surveyed for Erythronium revolutum and Packera bolanderi var. bolanderi.*
4. *The second focus area will involve monitoring of known populations. Follow-up visits will monitor the effectiveness of GDRCo's PPMs, as well as indicating species well-being throughout the area. Efforts will be made to revisit at least one Erythronium revolutum population per year, at least two Cardamine angulata populations per year, and at least three Monotropa uniflora populations per year.*

Summary of THP activity and survey coverage in the CL BMA since adoption of the Botanical Management Plan (BMP) in 2023.

Year	THP acres in CL BMA	CL BMA acres surveyed	CL BMA acres exempt from survey
2024	925	35	890
Totals	925	35	890

There were two new plans that were partially surveyed within the County Line BMA during the 2024 survey season. One unit in The Slab THP was within the *Piperia* study area and received a full botany survey, although there were no new sensitive plants observed. The RPF for the Surpur Fly THP noted a unique rock outcrop present in the plan to be surveyed. No new plant findings came from the survey.

YEAR END MITIGATION SUMMARY

Survey efforts in 2024 yielded 39 new BotID#s for confirmed CRPR List 1 and 2 species. There were five populations of *Erythronium revolutum* present in THPs and four were provided with programmatic protection. The remaining population was an incidental detection found along a bog margin and therefore protected by default measures in the Riparian Management Zone.

There was an abundance of *Piperia sp.* populations detected this year, with a total of 33 new populations. Most of the populations had no inflorescences during initial detection in April and May but had an inflorescence starting to develop that were a month away from flowering during follow-ups in June. Many were not able to receive an identification to species due to the inflorescences being damaged or eaten before they could bloom. Given their late phenology, they were believed not to be *Piperia candida* and therefore were not provided with protection measures. A few populations were within RMZs and received avoidance.

Two populations of *Astragalus umbraticus* were detected in the Tully Tubby THP. Neither population received any protection measures due to the lifecycle of the plant and the mature stage of the plants. Given that the plants were large and had been reproductively active for some years, allowing disturbance to the populations instead of providing protection measures would benefit the populations. This disturbance will allow for scarification of the newly set seeds, promoting germination of a new cohort of plants. The Botany Department will continue to monitor these sites and observe the overall health and success of these populations with the protection measures, or lack of, provided.

Table: Summary of Plant Protection Measures for 2024 Season

Code	Species	Common Name	Mitigation Used	Total Populations	Mitigated Populations
ASUM	<i>Astragalus umbraticus</i>	Bald Mountain milk-vetch	None	2	0
BEOR	<i>Bensoniella oregana</i>	bensoniella	Avoidance	1	1

CAAN	<i>Cardamine angulata</i>	seaside bittercress	Programmatic	1	1
EROR	<i>Erythronium oregonum</i>	Oregon fawn lily	Avoidance	1	1
ERRE	<i>Erythronium revolutum</i>	coast fawn lily	Programmatic, Avoidance	5	4
GICAPA	<i>Gilia capitata</i> var. <i>pacifica</i>	pacific gilia	Avoidance, Other	6	6
GISP	<i>Gilia</i> sp.	gilia	Avoidance	1	1
LYCL	<i>Lycopodium clavatum</i>	running pine	Programmatic	10	3
MOUN	<i>Monotropa uniflora</i>	ghost pipe	Programmatic, Avoidance	24	14
MOHO	<i>Montia howellii</i>	Howell's montia	Other, Programmatic	13	13
PICA	<i>Piperia candida</i>	white-flowered rein orchid	Programmatic	4	4
PISP	<i>Piperia</i> sp.	rein orchid	Programmatic, Avoidance	33	8
SIMAPA	<i>Sidalcea malviflora</i> ssp. <i>patula</i>	Siskiyou checkerbloom	50-foot buffer	1	1

PIPERIA LEAF MORPHOLOGY STUDY

Leaf Morphology Comparison between Four Species of *Piperia* to Aide in the Early Identification of *Piperia candida*

Budesilich, M., G. Cashman, D. Lamphear, and A. Shedlock

Introduction

Piperia is a genus of ephemeral plants within the *Orchidaceae* family. There are ten lower taxa and two subspecies in the *Piperia* genus that occur within North America, all of which also occur in California. The plants produce 2-6 oblong to lanceolate leaves during the spring, only lasting a few months before dying back. A many-flowered raceme is produced between May to September (FNA, 2020). *Piperia* has presented a challenge to botanists as the leaves are superficially identical across species, with no obvious distinction of species identity

until an inflorescence is produced and blooms. It can take several years for a single plant to store enough energy for it to produce an inflorescence, prolonging the identification process.

There are five species of *Piperia* that are known to occur across Green Diamond Resource Company's (GDRCo) private timberlands, covering Del Norte, Humboldt, and Mendocino Counties. The species include *P. candida*, *P. elegans*, *P. elongata*, *P. transversa*, and *P. unalascensis*. The only species of concern is *P. candida*. This species ranges from Alaska, British Columbia, Washington, Oregon, and Northern California. It is regarded as a special status plant in California under the California Native Plant Society (CNPS) and the California Natural Diversity Database (CNDDB) as a California Rare Plant Rank (CRPR) 1B.2. Plants with this ranking are considered rare throughout their range in California. It is ranked in the state as S3 and G3 globally, deeming it a vulnerable taxon. It is not a State or Federally listed species (CNPS Rare Plant Inventory, 2022).

When *Piperia* populations detected in spring surveys don't flower, or the inflorescence is impacted, it extends the amount of time the population goes unidentified. On an active landscape such as GDRCo's, identifying the specific species of *Piperia* detected during floristic surveys for a Timber Harvest Plan (THP) is a time-sensitive task. Per GDRCo's Property-Wide Consultation for *P. candida*, made in collaboration with the California Department of Fish and Wildlife (CDFW), all populations of *P. candida* and unidentified populations of *Piperia* within a THP shall be protected with a 50-foot No-Harvest buffer. Complications arise from the uncertainty of identifying *Piperia* populations without an inflorescence, as these populations are afforded protection measures but have the possibility of being one of the four non-special status species. To avoid providing protection measures to non-special status *Piperia* populations, timber harvest operations often get delayed due to the need for botanists to return to the population in the summer when there is an inflorescence to examine for species identification.

The ability to make clear distinctions earlier in the season between *P. candida* and other species in the genus would optimize botanists' time and prevent unnecessary timber retention. The goal of this study was to examine the morphological differences in the leaves of *P. candida* compared to the three other species that occur on GDRCo's landscape - *P. transversa*, *P. unalascensis*, and *P. elongata* – so that a specific species may be determined before blooming occurs.

Study Area

The study was conducted on private timberlands owned by GDRCo. in Humboldt County, California. Six specific locations were surveyed: Sproul Creek (southwest of Garberville), Cal Barrel (near Bald Mountain Road), Williams Ridge (near Bald Hills Road), Johnson Ridge (near Johnson Road), Wiggins (near Maple Creek Road), and Snow Camp. A total of 76 mature plant specimens from 28 distinct populations were sampled for analysis. These populations were previously identified from floristic surveys conducted for THPs. The general forest type across populations were *Pseudotsuga menziesii* var. *menziesii* and *Notholithocarpus densiflorus* var. *densiflorus* dominant stands with open understories and dry, sometimes rocky, soil. The elevation of the populations ranged from 800 to 4,700 feet.

Area	Sproul Creek	Cal Barrel	Williams Ridge	Johnson Ridge	Wiggins	Snow Camp
Area code	SPR	CAL	WIL	JOH	WIG	SNO
Elevation (feet)	800-1400'	2300-2600'	1700-2800'	1700-2500'	2300-3200'	3600-4700'

Table 1. A breakdown of each area on GDRCo' property where *Piperia* populations were visited for this study, including the three-letter area code and the elevation ranges the populations occurred at within each

Methods and Materials

Data collection focused on leaf dimensions, leaf color, and inflorescence height. Leaf measurements were taken for the primary and secondary leaf (labeled Lf1 and Lf2) and included length, maximum width, the distance from the leaf base to its widest point, and midrib thickness (measured at the widest point). Measurements were recorded in millimeters using digital calipers. Leaves were gently pressed flat between two pieces of plexiglass for accuracy while taking measurements. If an inflorescence was present, it would be measured for height starting at the base of the primary leaf to the tip of the inflorescence. The number of inflorescence bracts was recorded, along with the number of flower buds when sufficiently developed to be measurable. The mobile application of the Munsell Color Chart was used to determine the color of each leaf by lining the mobile device, a 2021 iPhone, up to the center of the leaf, left of the midrib, and pairing it with the closest color match. One plant from each population with a developing inflorescence, or one that appeared mature enough to produce an inflorescence, was caged with chicken wire to protect the inflorescence from ungulate herbivory or damage. The caging effort aimed to ensure that an inflorescence would be seen for each population to reconfirm the identity and to monitor the timing of inflorescence development. Each plant that was measured was marked with a pin flag and given a unique identification number, which included a three-letter area code, an incremental population number, and a letter. For example, the first plant of the first population visited in the study in Sproul Creek was labeled "SPR 1 A". The letter A was always used for the caged plant. Letters B, C, and so forth were the uncaged plants.

The first visits were scheduled in late spring to early summer when both leaves of the plants would be fully emerged and an inflorescence starting to develop. The sites were revisited during the summer to measure the floral features, with blooming times determined from previous follow-up visits to the populations. Measurements recorded during the second visits included inflorescence height (mm), number of inflorescence bracts, total number of flower buds, number of open flower buds, number of fruiting buds, and the petal color. Open flower buds were characterized by the opening of the petals. Fruiting buds were defined as those with petals that had turned brown and dried, and with an ovary that had begun to enlarge.

Results

The results show slight separation of *P. candida* from *P. transversa* and *P. elongata* when comparing the distance from the leaf base to the widest point against the length ratio (Figure 1). This ratio provides insight into the shape of the leaf, reflecting the characteristic linear form. Results show that *P. candida* had a ratio higher

than 0.55 for both the primary and secondary leaves, while *P. transversa* had ratios below 0.77 and *P. elongata* below 0.68. There is greater separation between values in the secondary leaves in comparison to the primary leaves, with *P. candida* ratios above 0.55, *P. elongata* with ratios below 0.53, and *P. transversa* ratios below 0.71. *P. unalascensis* was close in range to *P. candida*, with ratios between 0.60 and 0.81.

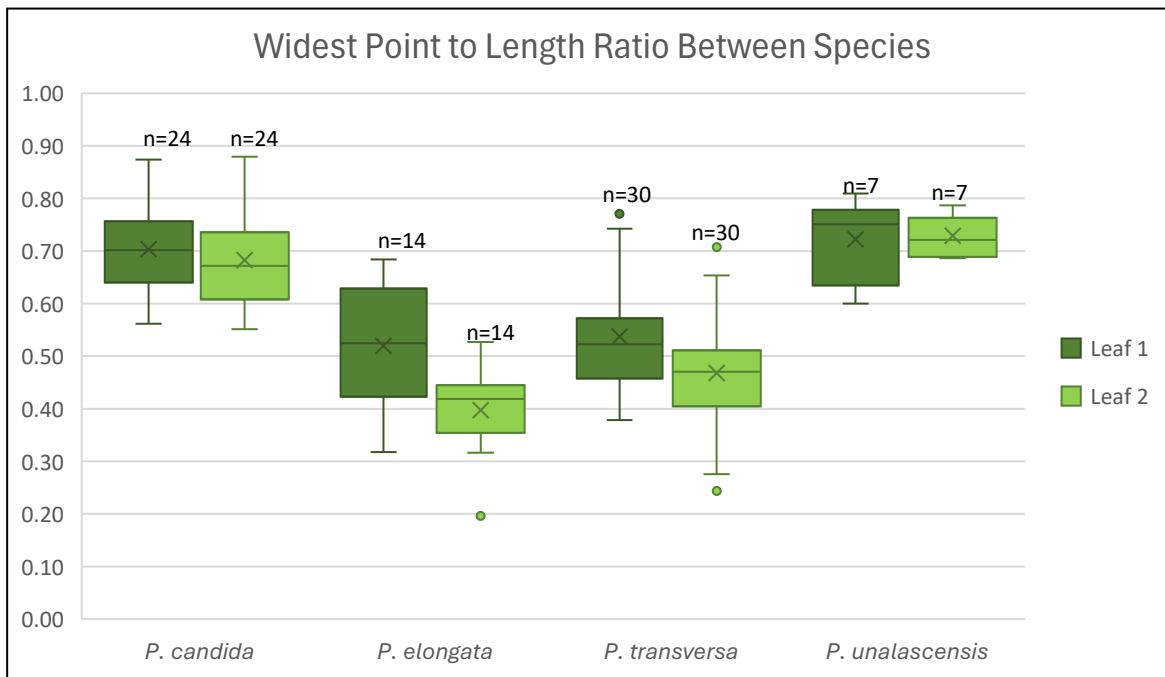


Figure 1. The distance from the leaf base to the widest point on the leaf occurs is divided by the total leaf length. Lf1 represents the primary leaf of the plant, while Lf2 represents the secondary leaf. Box boundaries are at the 25th and 75th percentiles, the whiskers extend from the 5th to the 25th and the 75th to the 95th percentiles, and the outliers (dots) are represented beyond the whiskers. The x in the boxes represents the mean value. N = number of plants.

There is considerable overlap when comparing leaf length between species (Figure 2). However, when comparing the leaf widths, *P. candida* tends to have smaller leaf widths while *P. elongata* and *P. transversa* have larger leaf widths (Figure 3). *P. unalascensis* leaves were slightly wider than *P. candida*.

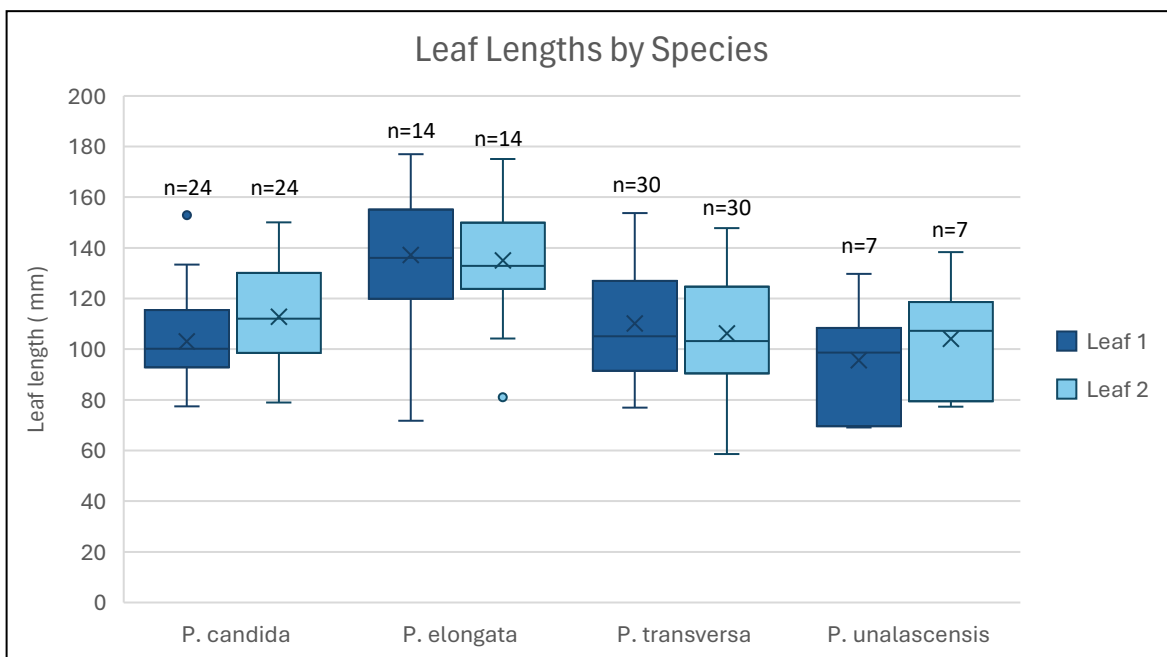


Figure 2. Comparison of leaf lengths by species. Box boundaries are at the 25th and 75th percentiles, the whiskers extend from the 5th to the 25th and the 75th to the 95th percentiles, and the outliers (dots) are represented beyond the whiskers. The x in the boxes represents the mean value. N = number

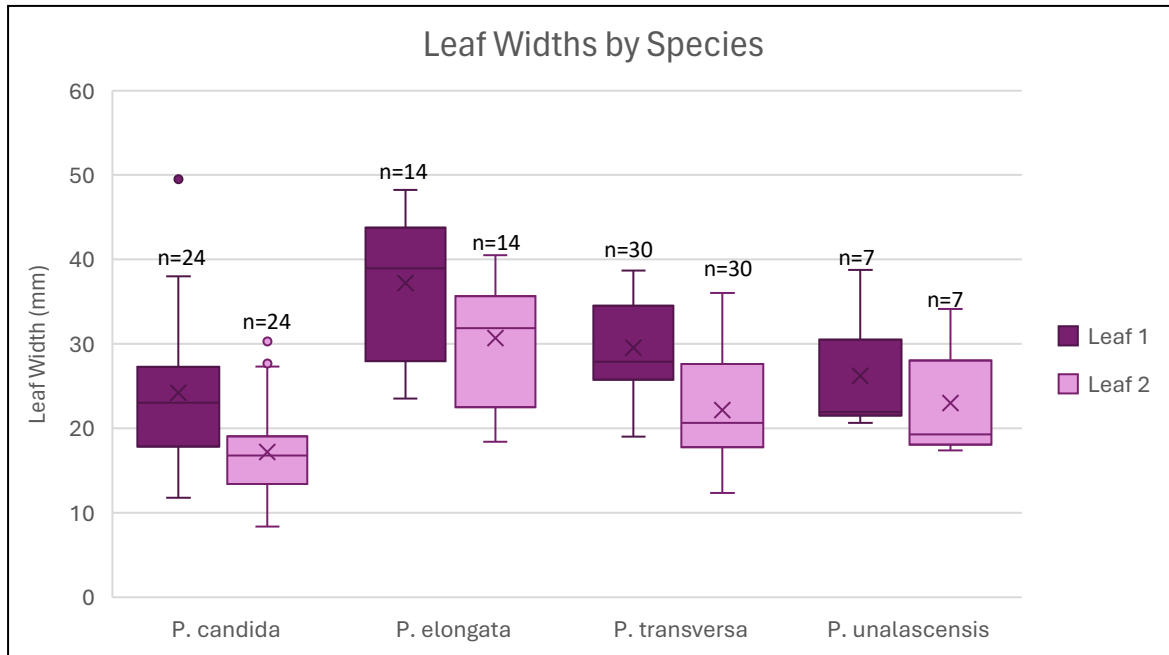


Figure 3. Comparison of leaf widths by species. Box boundaries are at the 25th and 75th percentiles, the whiskers extend from the 5th to the 25th and the 75th to the 95th percentiles, and the outliers (dots) are represented beyond the whiskers. The x in the boxes represents the mean value. N = number

The color results of the plants were in the 5.0 GY and 7.5 GY Hues. The Value/Chroma for each Hue occupied a wide range, with a total of 20 unique colors observed across the 68 plants that were sampled in the study. The pie charts in (Figure 4) represent the color range per species. *P. candida* had leaves that were predominantly 7.5 GY, with one outlier. The dominant color recorded was 7.5 GY 4/4, seen in 28% of the plants.

P. transversa had the largest range of colors, with 12 colors across 30 plants. A total of 55% were in the 5.0 GY Hue and 45% in the 7.5 GY Hue. Unlike *P. candida*, only 5% of *P. transversa* plants were 7.5 GY 4/4. The most dominant color for *P. transversa* was 7.5 GY 5/4, seen in 20% of the plants. About 42% of *P. transversa* plants share the same color with 92% of *P. candida* plants, highlighting the distinct color difference between the two species.

P. elongata leaves tended to be on the yellow side of green, with 79% of plants in the 5.0 GY Hue. The dominant color observed across 36% of *P. elongata* plants was 5.0 GY 4/4.

P. unalascensis tended to have darker leaves, some rich green. 5.0 GY 4/6 was observed in 36% of plants.

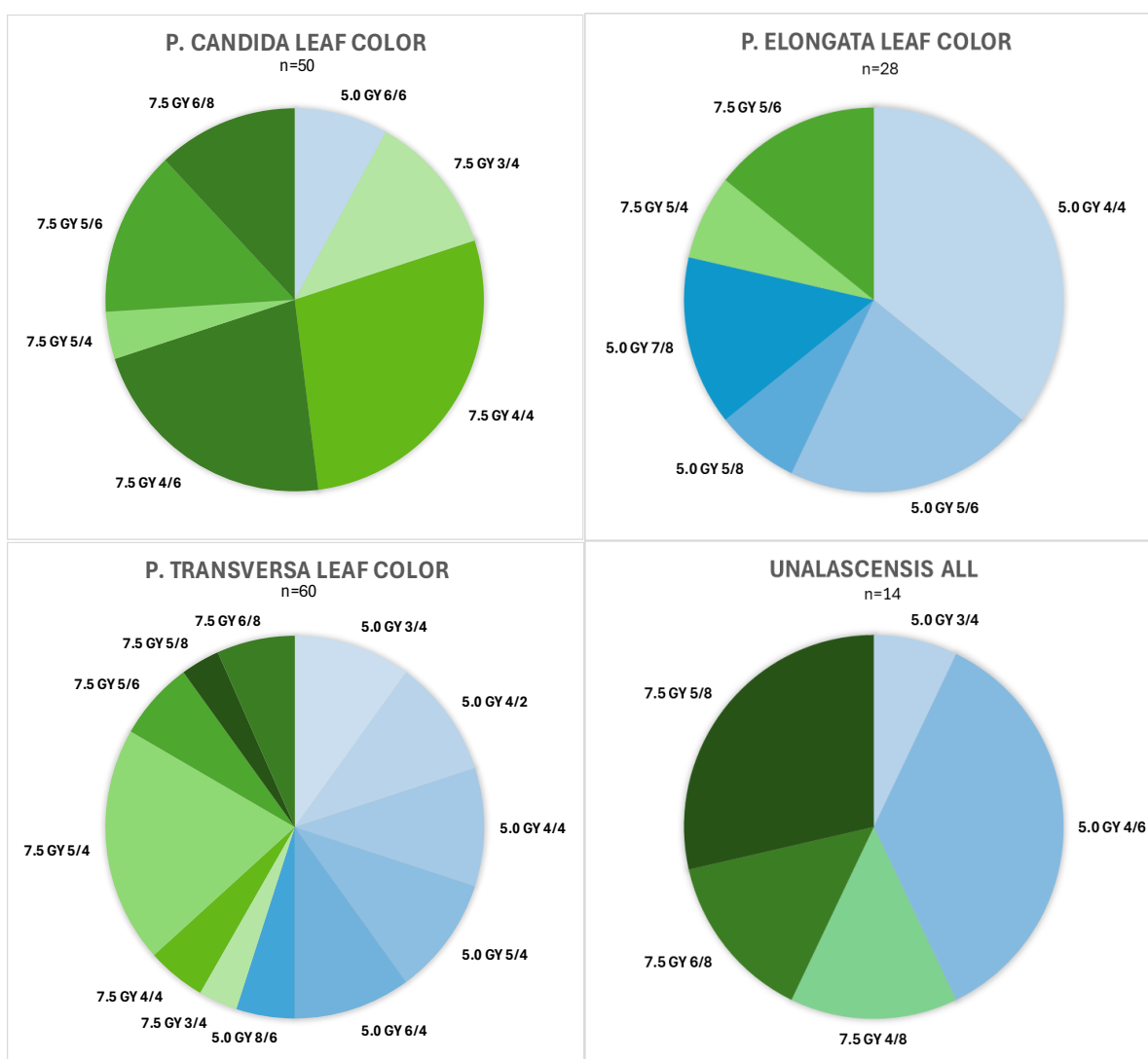


Figure 4. Color demographic of each species. Colors are listed as "Hue Value/Chroma". N= number of leaves.

During the first visit to each population, inflorescence heights were recorded to monitor the phenology of each species. When paired with the day of the year the height was observed, a general rate of development can be seen across each species (Figure 5). The rate of inflorescence development varies by taxa and location. Inflorescence development can be influenced by elevation, weather, slope, aspect, and more. See Table 1 for more information about each location. In Figure 5, *P. candida* is represented in bright green and had recorded inflorescence height between 15 mm and 118 mm on day 115 in Sproul Creek (SPR), while *P. transversa* and *P. elongata* had no development on the same day. On day 136, *P. elongata* and *P. transversa* began to develop inflorescences that were less than 50 mm in height in Cal Barrel (CAL), while *P. candida* had inflorescence heights greater than 50 mm. *P. unalascensis* has representation only in Snow Camp due to limited known occurrences on GDRCo's property, so a rate of inflorescence development was not recorded.

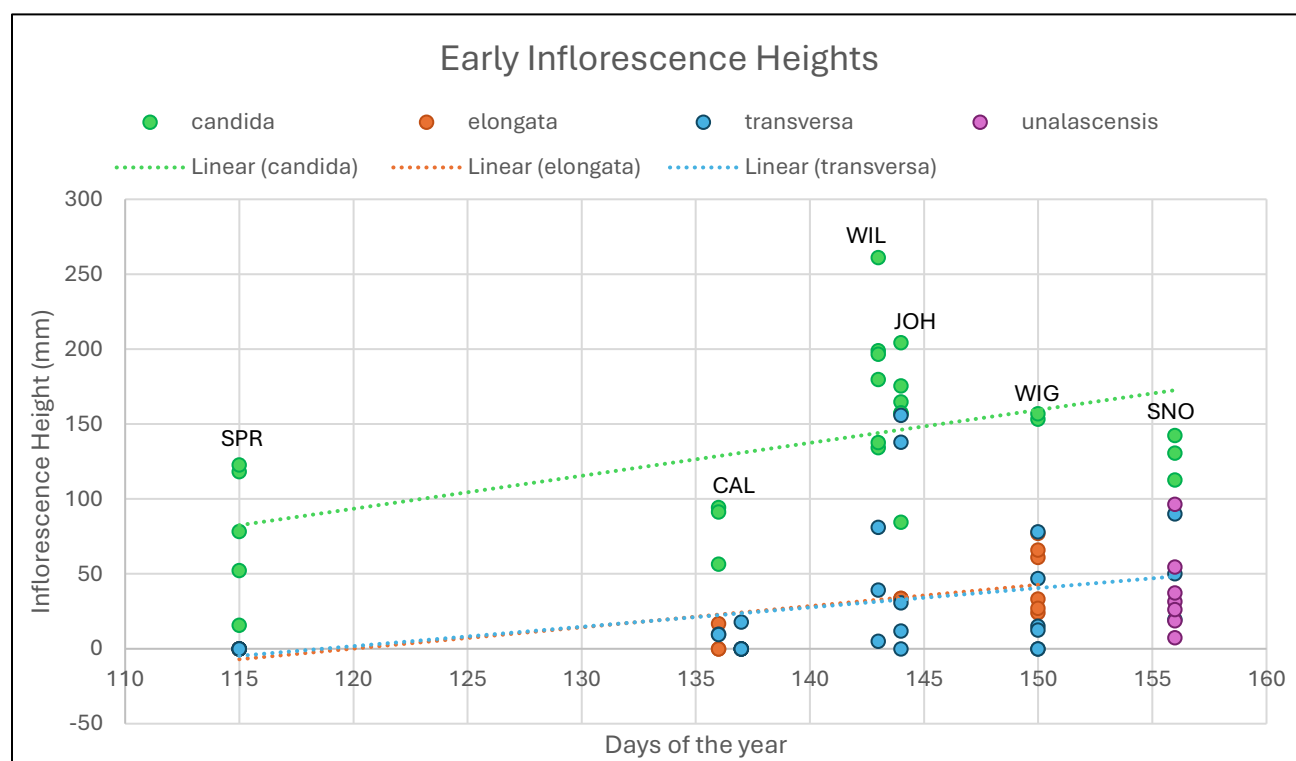


Figure 5. Inflorescence heights from the initial visit date of each population spanning 40 days from April 24th (day 115) to June 4th (day 156) in 2024. Each column is labeled with the three-letter area code representing where the populations occurred.

Discussion

There was overlap in the leaf dimensions and leaf colors between all four *Piperia* species, which was expected given the superficial similarities of their foliage. Analysis of the widest point to length ratio reveals some separation of *P. candida* from *P. elongata* and *P. transversa*. The widest point to length ratio can be used to determine the leaf shape. With the knowledge that *Piperia* leaves are unbranching and linear, the potential leaf shapes can be narrowed to lanceolate, oblong, or oblanceolate. Leaves with ratios greater than 0.61 are oblanceolate, meaning the widest point on the leaf occurs in the outer third of the leaf. Leaves with ratios between 0.40 and 0.60 are oblong in shape, meaning they are widest in the central third of the leaf. Leaves with ratios below 0.39 are lanceolate in shape, meaning they are widest near the base of the leaf. The widest point to

length ratio outlines that *P. candida* and *P. unalascensis* were oblanceolate in shape, while *P. transversa* and *P. elongata* were oblong, sometimes lanceolate.

While *P. candida* had distinct colors that were unique from the other three species, the colors were assessed through ocular examination rather than with a more accurate method, such as a digital field spectrometer. Consequently, the results may lack complete accuracy. There were many environmental variables that influenced the way color was observed in the field, including cloud cover, time of day, aspect, and canopy cover. Leaf colors can also vary depending on a range of factors including soil type, soil nutrients, elevation, rain year, weather, stand types, and genetics. The data reveals a distinction of leaf colors between the species, specifically for *P. candida*, which was hypothesized to exhibit a richer green compared to the other species. *P. candida* leaves were dominantly in the 7.5 GY Hue, with one outlier in the sample that had a 5.0 GY Hue. This unique population was found growing atop a rock outcrop with limited soil. This shift in color may be influenced by these harsh site conditions. The results suggest that *P. candida* predominately exhibits a 7.0 GY Hue, distinguishing it from *P. transversa* and *P. elongata*, where over 55% of individuals fall outside this Hue range.

Since the floral features of *Piperia* are the definitive way to determine the species, these traits were incorporated into the study by assessing the phenology of each species. This was achieved by measuring inflorescence heights at various stages of development throughout the study period. Pairing the inflorescence height with the day of the year the measurement was taken reveals that *P. candida* was consistently taller than the other species by 20-50 mm, if not more. This trend was seen consistently in each study area. It was typical in April and early May to not observe any sign of inflorescence development in *P. transversa* and *P. elongata* during this study. The two species are known to bloom in July and August, and this was confirmed through the study. In June, the inflorescences of *P. transversa* and *P. elongata* were about halfway developed, with dense inflorescence heads reaching about 150 mm in height, while *P. candida* was already starting to flower.

There were major overlaps between the data of *P. candida* and *P. unalascensis*. With only seven specimens of *P. unalascensis* from a single area, the reliability is limited, leading to low confidence in the data set. Given the history of *P. unalascensis* and *P. candida*, it is understandable as to why their results from the sampling overlaps. *P. candida* was recently separated from *P. unalascensis* in the 1990's by Ackerman and Morgan when the flowers were observed to have minute differences in floral morphology, bract number, scent, scape base and raceme conformation (Ackerman and Morgan, 1990). Further testing and data collection with a larger sample of *P. unalascensis* will provide more definitive conclusions.

Without examining the inflorescence of a *Piperia* plant, it is possible to assess key values with leaf dimensions and early inflorescence measurements to make an informed hypothesis of the species. To aid in this process, a dichotomous key has been developed. Though the key cannot identify an unknown *Piperia* to species with complete confidence, it can provide the surveyor valuable guidance in narrowing down the possibilities. This will help in reducing the percentage of non-special status species, like *P. transversa*, from receiving protection measures and reduce the time spent revisiting *Piperia* populations waiting for them to bloom to confirm the species identity.

Implications for Further Research

Utilizing the dichotomous key on newly detected *Piperia* populations and documenting its success will help to improve the key and evaluate its accuracy. All populations identified in the first trial year should be caged and monitored in summer to confirm the identity.

Additional years of data collection will bolster the existing dataset, improving accuracy and confidence in the dichotomous key steps. Utilizing a digital spectrometer would benefit the study by minimizing human bias. Sampling all mature, two leaved specimens across populations would provide insights into inter-population variation. Expanding the study area beyond GDRCo's property could introduce greater genetic diversity across geographically separated populations, though logistical challenges, such as accessibility, may arise.

Leaf-Based Dichotomous Key for *Piperia*

This key does not provide complete confidence in species determination and should be used with caution. Populations keyed to *P. candida* or *P. unalascensis* should be followed-up when in flower and keyed with the Jepson Manual for accurate species determination.

1. Unopened inflorescence present (April 1st – June 1st)
 2. Inflorescence >50 mm in height* (25-250 mm), *P. candida*
 - 2' Inflorescence <50 mm in height* (0-150 mm), *P. transversa*
- 1' Unopened inflorescence not present for examination
 3. Leaf(s) oblanceolate, widest point to length ratio** > 0.60. Leaves erect, upright, or spreading
 4. leaf color in 7.5 GY range *P. candida* or *P. unalascensis*
 - 4' leaf color in the 5.0 GY range *P. unalascensis*
 - 3' Leaf(s) oblong, widest point to length ratio** < 0.60. Leaves oppressed or prostrate
 5. widest point to length ratio 0.40-0.54, leaves robust..... *P. elongata* or *P. transversa*
 - 5' widest point to length ratio <0.40..... *P. transversa*

* Inflorescence height measured from the base, where the base of the leaves meets the scape, to the tip of the inflorescence.

**Widest point to length ratio: measure the length of the leaf. Then find the widest point on the leaf and measure from the base of the leaf to the widest point. Divide the widest point length by the total leaf length to calculate the widest point to length ratio.

MONITORING AGREEMENTS

THP Monitoring Agreements

The summaries below pertain specifically to binding monitoring agreements established with CDFW during consultations on proposed mitigations at the THP level. Voluntary monitoring efforts are described in detail in this report, as well (see Follow-up Visits section of report).

Ghost pipe (*Monotropa uniflora*)

The monitoring study for the population of ghost pipe, BotID#37136, in the Winchuck 2022 THP (CDF# 1-22-00145-DEL) continues into its second year. This was the first monitoring year post-thinning operations, which was completed in early 2024.

The stand was well spaced, and the species composition appeared to have remained the same. Skid roads stretched through the stand, leaving pockets of untouched ground where few *Vaccinium ovatum* and *Polystichum munitum* remained. Relocating several of the plot center trees was difficult, as they had been harvested then run over by machinery. Using the GPS location and plot notes, we were able to locate the stumps that were the plot center and remark them with ample flagging. The 2-acre area that was provided with the 66' No-Harvest buffer remained intact, with the habitat appearing unchanged.

There were considerably less ghost pipe clumps seen in the treated area of the population during this year's monitoring, especially in the areas that received direct disturbance. The amount of debris covering the ground seemed to be most impactful to the plants, second to the tracking of the machines through the stand. The reduction of clumps may also be a result of host trees being cut, increased sunlight, or changes in soil moisture. The botany crew looks forward to future monitoring as the stand begins to respond to the thinning.



Photo Caption: A before (left, 2023) and after (right, 2024) photo of plot T1 (treatment plot 1) looking south.

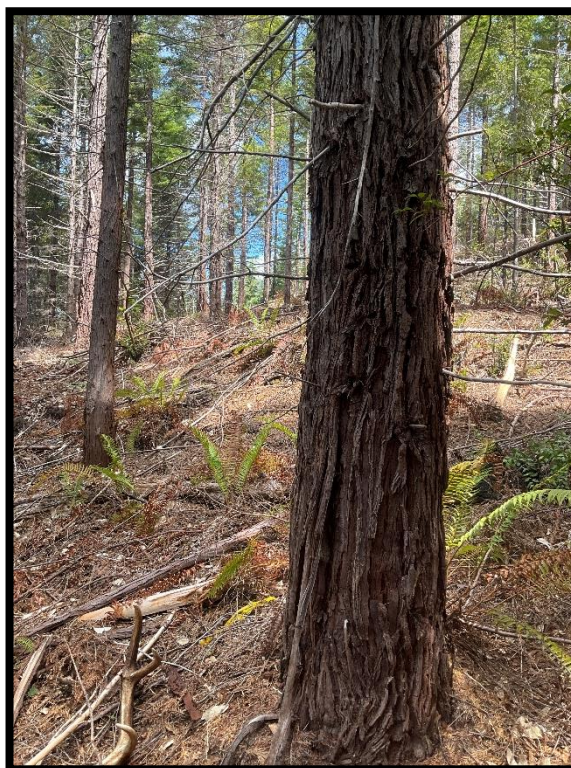


Photo Caption: A before (left, 2023) and after (right, 2024) photo of plot T5 (treatment plot 5) looking north.

Siskiyou checkerbloom (*Sidalcea malviflora* subsp. *patula*)

Goodman Prairie THP (CDF# 1-18-00176-HUM): BotID#35799, 35801, 35802, 35815, & 35816

The 2024 season marks the final year of monitoring for the five populations of *Sidalcea malviflora* ssp. *patula* identified during the 2019 botanical surveys for the Goodman Prairie THP. Plant protection measures were implemented for four of the five populations; however, one population was not protected due to its location on a proposed road. Protection measures included establishing a 50-foot Equipment Limitation Zone (ELZ) around each population. True oaks (*Quercus* sp.) were to be retained within the 50-foot ELZ, and all conifers were available for harvest within the outer 25-foot ELZ. Additionally, the inner 25-foot ELZ was to retain an overstory of greater than 50%.

BotID#35799 was documented along the road margin on the eastern border of a unit. The plants occupied space on both sides of the road and extended into the unit. This population exhibited strong health, with a robust 150 individuals. Mitigations for this population, in addition to the measures already mentioned, stated that road maintenance would be limited and there shall be no side casting on the segment. During a visit the following year, 85 plants were observed, with flowering plants noted and habitat conditions unaffected. By the next monitoring year in 2022, the population had grown to 150 individuals and the habitat continued to provide an undisturbed setting. Observations indicated another increase in flowering individuals. In the final monitoring year, 2024, the population increased to 190 individuals, demonstrating the effectiveness of the mitigation measures.



Photo Caption: A bold blooming inflorescence captured from

BotID#35801 was initially observed with twelve healthy plants growing at the bottom of a unit. The next two monitoring years, 2020 and 2022, the population size rose and held steady at fifteen individuals. The habitat was noted to not have changed drastically and not many conifers were harvested from the outer ELZ. Shading and herbaceous encroachment were mentioned as this population's largest threats. In 2024, the population count was consistent with the prior visits at fifteen plants. The protection measures have been successful in providing a space for the plants to persist.

The largest population found in this plan was BotID#35802 with an astounding 500 individuals. A visit in 2020 found the population size to be unchanged. Botanists mentioned the positive response observed in the population from mechanical conifer removal, which was exhibited by copious flowering plants across the extent of the population. The following monitoring year, 2022, recorded 650 thriving plants and unaffected habitat. In 2024, the population count was estimated to have 500 plants, many in full flower and some in earlier stages. Observations stated there was some extension of the population further beyond previous mapped occupancy. Mitigations have successfully safeguarded the population and its required habitat from any adverse impacts.

BotID#358015 was another modest sized population with fifteen plants. There were concerns about the amount of shade that the plants were receiving, but those threats were extinguished after harvest operations. During the following year, in 2020, the population had tripled in size and was counted to have fifty individuals, and this

count had remained consistent with the 2022 monitoring visits. The habitat and population have remained unchanged as observed in 2024 visits. Fifty individuals were recorded and nearly half of those were blooming. Added ground level light promoted the right conditions for the plants to thrive.

The one population that did not receive mitigations, BotID#35816, consisted of ten plants growing on a proposed seasonal road. The road was constructed and during visits the following year, botanists were able to find three plants directly in machine tracks. Despite direct impacts, the plants did not completely perish. In 2022, there were just two individuals, noticeably struggling with spittle bug infestation and no indication of reproduction. The final year of monitoring saw a change in its downward trajectory as six plants were present in the population, all in full bloom. The plants exist in an entirely open area, only bordered by tall grass, perhaps granting more space and sun to rebound from impacts.

Spotted Knapweed Monitoring at Sweet Flat, Mad River

In 2013 the GDRCo botany department began collaborating with the Humboldt County Department of Agriculture to monitor and remove spotted knapweed (*Centaurea stoebe*) from the gravel bars along the Mad River near the City of Blue Lake. Spotted knapweed was initially detected in 2013 along the Mad River at three locations south of the Mad River Hatchery. One of these locations is at “Sweet Flat” which is best accessed from private GDRCo roads.

The botany crew has visited and removed plants from the site since 2014. Thirty plants were removed in 2017, fifty in 2018, four in 2019, six in 2020, thirty-four in 2021, twenty-nine in 2022, thirty-three in 2023, and twelve were pulled and removed in 2024. In January of this year, a large rain event dropping approximately three inches of rain within 24 hours occurred and caused major flooding and flash water deliveries to mainstem rivers. This event created a significant change in the gravel bed at Sweet Flat and may have contributed to lower numbers of spotted knapweed plants. Additionally, there is an infestation of yellow star thistle (*Centaurea solstitialis*) at this site that was first detected in 2016 and was widespread in the eastern half of the site. There are several known infestations of yellow star thistle throughout the watershed. Due to the riparian nature of the habitat, there is no plan to use herbicides in treating this site.

The new site that was detected in 2022 in the historic log decking site off of the BL-1000 was treated with herbicide in 2023. A follow-up to the site was not conducted this year, but the site is continuing to be monitored by the IFM department.

Figure 1. Location of *Centaurea stoebe* removal efforts at Sweet Flat, Mad River

FOLLOW UP VISITS

The follow-up section of this report has been expanded upon to describe in more detail some of the specific responses we have observed in a variety of species over the years. The following populations revisited are not included in formal monitoring agreements per consultation with CDFW.

Bald Mountain milk vetch (*Astragalus umbraticus*)

The three populations revisited in the 2024 season were previously a part of a monitoring agreement with CDFW, monitoring the response of the populations to timber harvest operations, road use, and road maintenance. BotID#36348 was a measly population of 15 plants detected in 2020. Road work commenced later that year and in 2021 the population was booming with an estimated 150 plants seen. The population is now starting to see a slow decline, with 115 plants observed in 2022 and 75 in 2024. The plants are large and flowering, producing lots of seeds to replenish the seed bank. BotID#31584 saw a different fate. Starting with 40 plants in 2015, road work to the site was permitted and commenced in 2020. Later that year, no plants were seen. 2022 yielded no signs of plants either, likely due to the adjacent unit being harvested and allowing more sunlight to the site. But in 2024, 28 plants were found 50 feet east from the original point. The plants were occupying a recently opened seasonal road spur that led to a landing. Most were large and flowering.

BotID#36338 on the other hand had an extremely positive response to the thinning operations. In 2020, 150 plants were found extending from the roadside of an old skid road and into a small area within the timber harvest stand. No protection measures were given to the population and thinning operations commenced later

that year. In 2021, 410 plants were seen at the site, many being young seedlings. In 2022, an estimated 1,400 plants were seen starting to expand and occupying a greater area within the stand. In 2024, the population has doubled, if not more, to an estimated 3,000 plants. Plants have spread into the northern part of the unit as well, taking up most openings and skid roads. Easily classified as the most dominant species in the understory within the unit.



Photo Caption: BotID#36338 nearly covering the entire understory of the thinning unit (left). A friendly visitor hanging out on a flowering *Astragalus umbraticus* plant (above).

Total Known ASUM Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
272	3	3

Benson's saxifrage (*Bensoniella oregana*)

BotID#37301 was detected in 2023 during surveys for the Wiggins North II THP, GDRCo#172202. 35 plants were seen growing on the west and east edges of a seepy wet meadow. In 2024, approximately 100 plants were seen. An accurate count couldn't be determined given the rhizomatous nature of the species, but the previous population size was well-underestimated potentially due to the time of year it was found. The plants were healthy and flowering.

Total Known BEOR Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
19	1	1

Coast fawn lily (*Erythronium revolutum*)

During the 2024 season, fourteen populations of *Erythronium revolutum* received follow-ups. Eleven of the fourteen populations were extant. The year was kicked off the with a visit to see the epic Hunter Creek population, BotID#30991. The population was detected in 2014 occupying a steep, mossy, creek side rock face.

Since the population is mostly inaccessible, the population size is an estimated 500 plants given the density of flowers and leaves that can be seen from the other side of the creek. The population continues to thrive in this unique location.

BotID#30454 continues to expand on the rock face it calls home. It has gone from approximately 100 plants in 2012 to 600 plants in 2024, creeping onto the sides of the road prism and boulders below the rock wall.

BotID#35810 detected in 2019 had a population estimate of 2300 plants. This population spanned 300 feet down the creek and received programmatic protection measures and was located within a Riparian Management Zone. This year, ten surveyors walked the population side by side and counted a total of 6,835 plants spread throughout the protection area. Many were starting to flower or had developing buds.

Meanwhile, BotID#30036 was not so fortunate. This population was first detected back in 2011 and had approximately 350 plants present within the Riparian Management Zone. It received a 50' No-Harvest Buffer. In 2024, the buffer flagging was found at the GPS location of the population but there were no plants in sight, not a trace. The habitat was in excellent condition, so it is unclear what caused 350 plants to vanish.

One population of unidentified *Erythronium* was revisited, BotID#30648. The population was found in 2009, a single leaf nestled within a population of *Coptis laciniata*. The population was well within a Riparian Management Zone, so it wasn't afforded any formal protection measures. In 2024, no plants or old fruit capsules were seen despite the area looking untouched.



Photo Caption: A snippet of the magnificent mossy rock wall that BotID#30991 inhabits (left). The stunning mahogany *Erythronium revolutum* lit up by the morning rays (right).

Total Known ERRE Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
385	14	11

Total Known ERSF Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)	Identified to <i>Erythronium revolutum</i>	Identified to <i>Erythronium oregonum</i>	Identified to <i>Erythronium californicum</i>
68	1	0	0	0	0

California globe mallow (*Iliamna latibracteata*)

BotID#35582 was discovered in 2018 with mostly small immature plants. The population arose out of burn pile sites that were a result of a clear cut. The habitat provided the ideal conditions for the population to grow and thrive. Observations from a 2024 visit noted the stand is starting to regenerate and fill in with other species, although the *Iliamna latibracteata* plants were still present. There were 10 different large plants which were successfully forming buds for the season.

Total Known ILLA Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
4	1	1

Running pine (*Lycopodium clavatum*)

A total of five populations of *Lycopodium clavatum* were revisited this season. Four of the five populations had positive detections. BotID#29838 received a 25' Equipment Limitation Zone (ELZ) in 2010 when it was first detected but was not seen during follow-ups in 2018 or in 2024, likely due to being outcompeted by tree saplings in the regenerating stand. BotID#36352 and BotID#29877 were both present and in good health despite not receiving protection measures.

A first-time follow-up was conducted for BotID#1266, 18 years since it was detected in 2006. The population was an estimated 25 plants and was provided a 25' ELZ. In 2024, the population was deemed as 1 plant due to its rhizomatous nature, but was described as a large, healthy, sprawling mat of plants occupying the road edge, injecting itself between the *Gaultheria shallon* and *Vaccinium ovatum* stems that also occupy the road edge.

BotID#31785 is a unique one as it is one of the very few, if not only, populations of *Lycopodium clavatum* in the Wilson Creek Drainage. When first detected in 2016, it was estimated at 15 plants that covered a 300 square foot area on an old skid road. It was provided a 25' ELZ. In 2024, two mats were seen. A large one in the center of the protection area and another smaller one next to the protection buffer flag line. Overall, the population had responded well to the thinning operations surrounding the plant buffer.

Total Known LYCL Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
1022	5	4

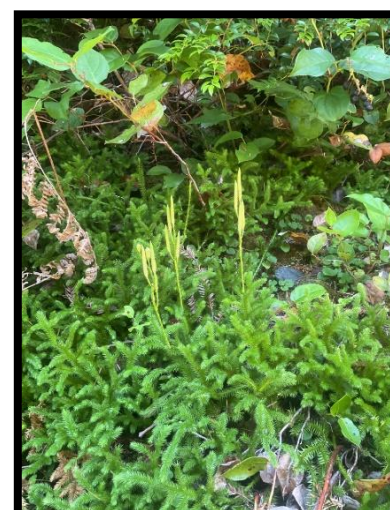


Photo Caption: A closeup of BotID#1266 with a few strobili nearing maturity.

Howell's montia (*Montia howellii*)

Four populations of *Montia howellii* were revisited during the 2024 field season. All four populations were found to be extant. Two recent discoveries (BotID#36770 and BotID#36771) were granted programmatic plant protections, although both populations exist on pullouts along a public road that is exposed to daily traffic. Frequent disturbance in the respective pullouts may explain the decrease in population size since their discovery in 2021. Despite the impact observed during the 2024 visits, plants were persisting in both areas.

BotID#1094 was recorded in 2001 with 730 individuals growing along the SA-2000 road and was programmatically mitigated. Some past follow-ups have mentioned slight impacts to available habitat from permitted road work that was conducted after the plants have set seed. Regardless of the development, the population has retained its numbers. During a revisit in 2024, botanists recorded 1,000 individuals in the population.

BotID#1145 is comprised of various occurrences that extend along the SA-2500 mainline. The collective population was first recorded in 2004 and granted programmatic plant protection measures that reduced impact to the 435 plants during their growing and seeding cycle. Such protections have successfully sustained the population over the past twenty years. In 2024, botanists inspected the SA-2560, a newly opened seasonal road which splits off from the SA-2500, to find whether the plants from BotID#1145 have taken advantage of the newly opened habitat. At least 70 new plants were discovered growing on the opened road. Due to time constraints, the entirety of the road was not able to be surveyed but it is evident that the plants are benefiting and expanding further.



Total Known MOHO Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
97	4	4

Photo Caption: Small but unstoppable *Montia howellii* plants (BotID#1094) seen growing in the mucky roadside.

Ghost pipe (*Monotropa uniflora*)

Thirty-four populations of *Monotropa uniflora* were revisited with twenty-six that were positively observed in 2024. Sixteen of the populations had not been revisited since their original detection. These populations received programmatic protection measures and were within recently harvested units. Of the sixteen populations that hadn't been revisited since their detection, twelve had positive findings. BotID#35985 was a large population spanning several acres, with half of the population receiving programmatic protection. The protection area hugged the edge of the RMZ, creating a large cohesive habitat for the numerous clumps of plants to thrive.

Of the eight populations that were not positively observed, five consisted of only a single plant. Two of those five did not receive protection measures. BotID#35704 did receive programmatic protection measures but was negatively impacted by bear damaged trees that had become rotten and fell across the population center. BotID# 31013 and BotID#35981 were small populations with 3-10 clumps that received programmatic protection but were not found this year. The habitat looked excellent in both cases, so it's uncertain why the plants were not present. In the case of BotID#35433, it was the only population detected within the Savoy Split THP (GDRCo#931703). Per the property-wide programmatic agreement the population received protection measures although it was not a robust population, consisting of just a single clump of 25 stems.

On the positive side of things, twelve populations had an increase in population size since their original detection. BotID#37063 consisted of 8 clumps in 2022 when it was detected and has now expanded to 24 clumps. BotID#36674 has consistently been increasing in size from 13 clumps in 2020 to now 15 clumps. Certainly, it is exciting to see small populations that were not seen in the last follow-up return like BotID#34950. The population was detected in 2017 with a single clump and received programmatic protection. In 2021 there were no plants found, but in 2024, 3 clumps were seen and were in good health.



Photo Caption: A snapshot of all three clumps within BotID#34950 seen tucked amongst the *Polystichum munitum*.

Total Known MOUN Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
1126	34	26

White flowered rein orchid (*Piperia candida*)

Sixteen populations of *Piperia candida* and two populations of unconfirmed *Piperia candida* populations were revisited this year. Sixteen of the eighteen total populations were found. BotID#30124 was the only population that did not receive formal protection measures out of the eighteen revisited this year due to its location in the center of an old road prism to be used for timber harvest operations. It consisted of just a single flowering plant at the time of detection in 2012.

Eleven of the populations received a 50' No-Harvest Equipment Limitation Zone (ELZ). BotID#36720 showed an increase in population size and population health. 15 plants were first detected in 2020 on a steep creek slope

and have now expanded to an estimated 50 plants with approximately 30-40% in flower. Most of the other populations saw a decline in population size, likely due to increased sun exposure within the protection zone post-timber harvest. BotID#36423 consisted of 45 plants in 2020 with four producing an inflorescence. It now consists of 13 plants with one producing an inflorescence.

Five of the populations received avoidance due to their location within the riparian management zone or within a Habitat Retention Area. One population of unconfirmed *Piperia candida*, BotID#30506, received a 25' No-Harvest ELZ when it was detected in 2013 with 20 individuals. No inflorescence was produced to confirm the identity, but it was thought to be *P. candida* due to leaf characteristics. In 2023, 7 plants were seen but no inflorescences had developed. In 2024, 6 plants were seen in May with a single inflorescence just starting to develop. In August the inflorescence was seen in full flower and the species was confirmed to be *P. elongata* with its long, downward curving petal spurs.



Photo Caption: *P. candida* flowering in full force in the Bald Hills late-June (left). BotID#30506, now identified is *P. elongata*, in early bloom during early August (right).

Total Known PICA Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
101	16	14

Total Known PICAu Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)	Identified to <i>P. elongata</i>
6	2	2	1

Rein orchid (*Piperia* sp.)

There is a plethora of unidentified *Piperia* species across the landscape. Visiting plants while they are flowering is a tricky venture, as some years the plants do not produce an inflorescence at all and some years the plants die before the inflorescence is mature enough for a positive identification to species. Five out of the 221 unidentified populations were visited this year with the hopes of resolving their unknown nature. However, botanists did not observe any plants at the five populations that varied from 1-7 individuals.

BotID#30512 was made up of one plant, initially found in the RMZ during surveys from 2013. Revisits have never been successful in relocating the plant. One botanist speculated the initial observation was a misidentified young *Scolioopus bigelovii*. BotID#30639 was also just one plant that was identified during 2013 surveys. No plant protection was provided to the population and the habitat quality was markedly poor.

BotID#30056, BotID#30053, and BotID#37008 had population sizes that ranged from 2-7 plants. None of the three populations had plant protection measures and two populations were noted to be in poor quality habitat. Harvest operations were likely the reason for the absence of plants in these populations as they were either in a clear cut or on an appurtenant road.

Total Known PISP Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
221	5	0

Siskiyou checkerbloom (*Sidalcea malviflora ssp. patula*)

Botanists revisited nine different *Sidalcea malviflora ssp. patula* populations which were all found to be extant. Five of the populations were discussed in the monitoring section. Two populations (BotID#37208 and BotID#30635) have remained at a consistent size since their initial discoveries. BotID#37208 was initially recorded in 2022 and revisited in 2024 with a total of 3 plants during each visit, although the visit during 2024 observed two flowering individuals. The population was not provided with any protection measures as it was an incidental detection outside of a harvest plan. BotID#30635 was observed in 2013 with 50 plants. The area was managed for an elk habitat improvement project and the population received a 50' No-Harvest buffer from selective removal of young conifers. During the 2024 season, the population count was consistent with 50 individuals after almost 10 years. Plant protections successfully conserved the habitat for the plants to persist.

Another two populations (BotID#30636 and BotID#30633) were observed during 2024 with notable population growth. BotID#30636 was initially observed to have two plants in 2013. During visits in 2024, the population was up to 16 individuals. BotID#30633 was found during the same 2013 surveys for the elk project, although the population was given a 50' No-Harvest buffer. The population was initially recorded with 10 plants and increased to 50 plants in 2024.

Total Known SIMAPA Populations on GDRCo	Populations Revisited (2024)	Populations Found to be Extant (2024)
17	9	9



Photo Caption: Riley taking a break from botanical surveys while botanists write up a new *Sidalcea malviflora ssp. patula* population, BotID#37600.

HABITAT IMPROVEMENT PROJECTS

Scotch Broom (*Cytisus scoparius*) Removal

The preservation of the botanically unique Christmas Prairie Lake continues for the sixth year in a row working on the removal of Scotch broom (*Cytisus scoparius*) from the margins of the lake. The botany crew spent one day removing the invasive weed through hand pulling and the use of weed wrenches. There were many small plants present this year as well as a few medium sized plants that required some wrenching to remove. With several more years of physical removal, the population may begin to deplete as the seed bank is being exhausted.

A few of the *Astragalus umbraticus* populations on Williams Ridge that were cleared of Scotch broom in 2022 were revisited this year to continue the removal of the infestation. There were no large Scotch broom plants seen among the populations, only young sprouts in some of the areas where Scotch broom had been the thickest. The crew spent one day removing the small plants from the population sites. The *A. umbraticus* populations seemed to be benefiting from the lack of competition and increased light from removal of the invasive species.

The botany crew will continue to remove Scotch broom from the property in areas of high ecological importance such as Christmas Prairie Lake and around known sensitive plant occurrences.



Photo caption: Alex using the weed wrench to pull up young *Cytisus scoparius* plants.

PROPERTY-WIDE SUMMARY TABLE FOR 2024 FLORISTIC SURVEYS

THP Name	GDRCO THP #	CalFire THP #	IN A BMA?	Quad	Elevation (ft)	Survey Acres	Field Work Date(s)	Field Survey Hours	Survey Rate (ac/hr)	CRPR 1-2 Rare/Sensitive Sp. (mitigated)	CRPR 3-4 Uncommon Species
Gibson Miller	012301	1-24-00019-HUM	No	Briceland	880-1760	145.6	4/2, 4/3, 6/4	26.5	5.49	PICA, PISP	Negative
Kelly Ranch	032201	-	No	Board Camp Mountain & Mad River Buttes	2000-3820	174	5/20, 5/21, 5/22, 5/24, 8/8	20	8.7	PISP	LICO
Hunter Ranch	032202	1-23-00189-HUM	No	Mad River Buttes	2520-3200	103.5	2023: 6/22, 6/23, 7/10, 9/6. 2024: 5/1	26.75	3.87	GICAPA, PISP, SISP	ASRARA, LICO
Mid Salmon Combo	142301	1-24-00027-HUM	No	Fields Landing & McWhinney Creek	600-1000	130	4/5, 4/9	14.75	8.81	MOHO	LICO, RILA
Tom McCloud (Pond survey)	142401	1-24-00168-HUM	No	Fields Landing & McWhinney Creek	600-1300	0.7	9/12	0.5	1.4	MOHO	CHGL
Miller's Crossing	172301	1-24-00001-HUM	No	Mad River Buttes	3000-4000	251.3	2023: 9/13. 2024: 4/17, 4/22, 4/23, 4/29, 4/30, 5/28, 6/6, 6/21, 7/12, 9/5	63.25	3.97	BEOR, ERRE, GICAPA, MOHO, PISP	CAUN
Cold Boulder (Pond survey)	172402	1-25-00012-HUM	No	Mad River Buttes	2000-3000	3.4	9/5	1.5	2.27	BEOR	Negative
Mad Sweasey	242301	1-24-00145-HUM	No	Korbel	100-700	148.45	4/10, 4/11, 6/7, 6/24	15.75	9.43	Negative	CHGL, LICO, MICAU
Bosque Frio	262301	1-24-00010-HUM	No	Blue Lake	600-2200	140.3	4/8, 4/9	19.5	7.19	Negative	CHGL, LICO, MICAU, TITRTR
Fulton Ward	262303	1-24-00035-HUM	No	Maple Creek	1280-2560	155	3/7, 3/8, 3/22, 4/15, 4/16, 4/17, 6/5, 6/11	55.5	2.79	PISP, SIMAPA	MICAU, SIMA, USLO
Cummings 1 st Gen (Pond survey)	262402	1-24-00203-HUM	No	Maple Creek	1600-2600	2.2	9/12	2.5	0.88	Negative	Negative
Mickey Mini	342301	1-23-00170-HUM	No	Arcata North	240-520	62.55	5/13	8	7.82	Negative	Negative
K&K 150	402401	1-24-00088-HUM	No	Blue Lake	1000-1880	117.32	3/28, 3/29, 4/4	11.75	9.98	Negative	LICO

K&W 700	422301	1-24-00114-HUM	Y&N CLLR	Blue Lake & Panther Creek	1710-3210	77.6	3/26, 4/4	6	12.93	Negative	COLA, MICAU, LICO, LYCL
Upper Basin	422401	1-24-00104-HUM	No	Blue Lake	840-1440	134.55	5/30, 5/31	12.25	10.98	Negative	LICO, PLRE
Little Labyrinth	432401	1-24-00193-HUM	CLLR	Crannell & Panther Creek	300-1900	15	5/10	2.75	5.45	Negative	PLRE, LYCL
Mule Prairie	442301	1-24-00024-HUM	No	Blue Lake	1800-2920	187.45	3/27, 3/28, 3/29, 6/7, 6/24	16.25	11.52	PICA	LICO
Maple Pollnow	452301	1-23-00146-HUM	CLLR	Panther Creek	1040-1880	-	-	-	-	Negative	Negative
Stone Soup Thin	452304	1-24-00026-HUM	CLLR	Crannell & Panther Creek	600-1000	-	-	-	-	Negative	Negative
Pitcher 1000	472305	1-23-00181-HUM	CLLR	Rodgers Creek	680-1920	-	-	-	-	Negative	LYCL
Big 4	472307	1-24-00065-HUM	CLLR	Rodgers Peak	266-1030	-	-	-	-	Negative	Negative
K&K Scatter	482301	1-23-00147-HUM	No	Panther Creek	1680-2520	250	3/19, 3/20, 3/21, 3/25, 3/26	33.25	7.52	Negative	LICO, LYCL
Peter Panther	482302	1-24-00073-HUM	No	Panther Creek	740-2120	188	5/10, 5/14, 5/16, 5/29	14	13.43	Negative	LYCL
KnK Tops	482401	1-24-00110-HUM	Y&N CLLR	Panther Creek	1140-2360	131.4	5/10, 6/3, 7/29, 8/5	13.75	9.56	MOHO	LYCL
Old K&K North	482402	1-24-00121-HUM	No	Panther Creek & Hupa Mountain	520-2060	157.5	6/12, 6/13	12.5	12.6	Negative	PICAL
John Hancorne	512201	1-23-00182-HUM	No	Bald Hills	1300-2540	187.5	2023: 6/21. 2024: 4/24, 4/25, 4/26	21.5	8.72	ERRE, PISP	LICO
Tully Tubby	512301	1-24-00132-HUM	No	French Camp Ridge	1600-2700	181	5/6, 5/7, 5/8, 6/10	19	9.53	ASUM, GICAPA	LICO
Johnson 5	512401	1-24-00163-HUM	Y&N CL	Holter Ridge	900-1800	111.5	5/9, 5/23	13.75	8.11	Negative	Negative
The Slab	562304	1-23-00185-HUM	CL	Holter Ridge	640-1800	30	4/19	4.25	7.06	Negative	Negative
Surp of the Day	562305	1-24-00086-HUM	CL	Ah Pah Ridge & Holter Ridge	200-1560	-	-	-	-	Negative	Negative
The Rock Johnson	562401	1-24-00081-HUM	CL	Bald Hills	2000-2500	-	-	-	-	Negative	Negative
Surpur Fly	562402	1-24-00156-HUM	CL	Smith River	200-1500	5	6/12	1	5	CAAN	Negative
Westside McGarvey	662401	1-24-00198-HUM	CL	Requa & Fern Canyon	640-1800	-	-	-	-	Negative	RILA

Biscuits and McGarvey	662402	1-24-00082-HUM	CL	Fern Canyon, Ah Pah Ridge	120-1000	-	-	-	-	Negative	Negative
H-510 (Added acreage)	712202	1-24-00072-DEL	No	Childs Hill	500-1800	10	4/1, 7/5	4	2.5	MOUN	LICO
W-110	712302	1-24-00045-DEL	No	Requa	40-840	80	2023: 8/17, 2024: 6/17, 6/26, 7/3, 8/19	12.25	6.53	Negative	CHGL
Wilson Thicket	712401	1-24-00160-DEL	No	Childs Hill & Requa	80-1160	199.5	6/18, 6/19, 6/26, 7/3	23.5	8.49	Negative	CHGL, PLRE
Hunters Hills	712402	1-24-00108-DEL	No	Childs Hill & Requa	800-1600	163	4/1, 7/30, 8/1	20.75	7.86	MOUN	PICAL
Good Wil Hunter	712403	1-24-00201-DEL	No	Childs Hill	720-1700	108.5	8/13, 8/14	12.75	8.51	MOUN	LYCL
Turwar 2023	732301	1-24-00030-DEL	No	Klamath Glen & Requa	280-2360	159	7/8, 7/10, 7/18, 7/22	16	9.94	MOUN	Negative
Hoppaw Ridge	732401	1-24-00118-DEL	No	Klamath Glen & Requa	80-1600	169.5	8/6, 8/7	21.25	7.98	MOUN	Negative
Seaview	732402	1-25-00017-DEL	No	Requa	400-900	64.5	8/12	5.5	11.73	Negative	Negative
Archery Range Exemption	902301	1-24EX-00047-DEL	No	Smith River	80	-	-	-	-	Negative	Negative
Some Mor THP	902401	1-24-00066-DEL	No	Smith River	440-1600	34.5	7/15/2024	3.25	10.62	Negative	Negative
Mor Rock	902402	1-24-00120-DEL	No	High Divide & Smith River	240-1400	136	7/15, 7/16	8.25	16.48	Negative	Negative
Bear Crik	932302	1-23-00180-DEL	No	High Divide	0-1700	86	6/25, 6/27	12.25	7.02	PICA	Negative
Lower Divider	932401	1-24-00189-DEL	No	High Divide & Hiouchi	600-2000	266	7/23, 7/24, 7/25, 10/2	26.25	10.13	Negative	CHGL, USLO, OXSU
Peacock (Added road work)	942301	1-23-00082-DEL	No	Hiouchi	0-100	2	5/1	3	0.67	GICAPA, MOUN	USLO
Deadwood	942302	1-24-00078-DEL	No	Hiouchi	400-1600	72.5	5/15, 7/11	19.25	3.77	MOUN	Negative
AWP 2024	-	-	-	-	-	-	4/12, 7/3, 8/20	3	-	Negative	RILA

Light green highlight: surveys initiated in 2023 and completed in 2024. Light grey highlight: surveys initiated in 2024 and status pending results of 2025 surveys.

Key to species abbreviations and CRPR Status

ASRARA: <i>Astragalus rattanii</i> var. <i>rattanii</i> (CRPR 4.3)	GICAPA: <i>Gilia capitata</i> ssp. <i>pacifica</i> (CRPR 1B.2)	PISP: <i>Piperia</i> species
ASUM: <i>Astragalus umbraticus</i> (CRPR 2B.2)	LICO: <i>Listera cordata</i> (CRPR 4.2)	PLRE: <i>Pleuropogon refractus</i> (CRPR 4.2)
BEOR: <i>Bensoniella oregona</i> (CRPR 1B.1)	LYCL: <i>Lycopodium clavatum</i> (CRPR 4.1)	RILA: <i>Ribes laxiflorum</i> (CRPR 4.3)
CAAN: <i>Cardamine angulata</i> (CRPR 2B.1)	MICAU: <i>Mitellastra caulescens</i> (CRPR 4.2)	SIMA: <i>Sidalcea malachroides</i> (CRPR 4.2)
CAUN: <i>Calochortus uniflorus</i> (CRPR 4.2)	MOHO: <i>Montia howellii</i> (CRPR 2B.2)	SIMAPA: <i>Sidalcea malviflora</i> ssp. <i>patula</i> (CRPR 1B.2)
CHGL: <i>Chrysosplenium glechomifolium</i> (CRPR 4.3)	MOUN: <i>Monotropa uniflora</i> (CRPR 2B.2)	SISP: <i>Sidalcea</i> species
COLA: <i>Coptis laciniata</i> (CRPR 4.2)	OXSU: <i>Oxalis suksdorfii</i> (CRPR 4.3)	TITRTR: <i>Tiarella trifoliata</i> var. <i>trifoliata</i> (CRPR 3.2)
ERRE: <i>Erythronium revolutum</i> (CRPR 2B.2)	PICA: <i>Piperia candida</i> (CRPR 1B.2)	USLO: <i>Usnea longissima</i> (CRPR 4.2)
	PICAL: <i>Pityopus californicus</i> (CRPR 4.2)	

PROGRAM GOALS FOR 2025

- BMA Expansion Project
 - Continue working with CDFW on this project in early 2025 with the goal of completion by the end of the first quarter.
 - Begin implementation of some, if not all, measures for the 2025 survey season for survey relief.

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Additional Resources

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