Rare Plants Annual Report

Humboldt Redwood Company LLC.

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Cover Photo: seacoast ragwort (*Packera bolanderi* var. *bolanderi*) in the Van Duzen Watershed

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EXECUTIVE SUMMARY

Humboldt Redwood Company, LLC (HRC) botanists, foresters, and consultants assessed and/or surveyed 22 projects in 2018 looking for the 28 species of rare or uncommon "sensitive" plants on our Special Status Plant List. These projects consisted primarily of Timber Harvesting Plan (THP) units covering approximately 5,841.6 acres. Botanical survey coverage during the 2018 survey season was approximately 3,914.5 acres with 108 miles of surveyed roads (includes 9 miles of road surveyed for Howell's montia), altogether totaling 4,417 acres. This year on HRC property we found 19 new occurrences of four of our Special Status plant species, which represent six new populations, bringing the total number of rare plant populations detected on HRC land to 171. We reduced impacts to these occurrences to less than significant levels by implementing a variety of mitigation methods, in consultation with the California Department of Fish and Wildlife (CDFW), and established buffers around sensitive plant occurrences as needed in conjunction with the use of herbicides in regeneration forestry. We documented 93 occurrences of eleven species that are on our Watch List (not rare but of limited distribution in California), which were found incidental to surveys for Special Status plants. Research projects, post-mitigation monitoring, and wetlands determinations for THP preparation made up the remainder of our activities.

Maps of the individual species are provided in Appendix 5. Accompanying this report is a Rare Plant Detections Map showing all active plant occurrences on HRC land, and a Rare Plant Road Surveys Map which shows total road survey coverage (cut bank and fill slope surveys) from 2010 to 2018 and *Montia howellii* road surveys (MOHO Research) from 2005 to 2018. California Natural Diversity Data Base (CNDDB) forms for the Special Status and Watch List species occurrences will be provided on CD to CNDDB and are available to the HCP Wildlife Agencies on request.

We surveyed 9 miles of roads for *Montia howellii* in 2018. We documented plant locations and numbers for known sites, and discovered several newly occupied road segments adjacent to these existing seed sources. We also documented two new sites on roads that had not been previously occupied. Five roads containing *Montia howellii* populations are exempt from the property-wide

winter use restrictions which currently mitigate other known populations. Three of these "open" sites were visited in 2018 (Wrigley Rd., Cummings Creek Road, and Riverside Park). The results of monitoring efforts are presented in the summary tables below and are included in tables found in Appendix 7.

Proposed Changes for 2019

HRC does not propose any significant changes to the Rare Plant Program for the 2019 survey season.

Through consultation with CDFW in 2018 HRC agreed to add *Cardamine angulata* (seaside bittercress) and *Viola palustris* (alpine marsh violet) to our Special Status Plant List. These CRPR 2B plants have historically been found in the Freshwater watershed (no extant sites known on HRC property). Both species have been added to HRC's plant lists and training manuals.

INTRODUCTION

HRC employees, foresters, and consultants conducted plant habitat assessments and seasonally appropriate floristic plant surveys in 2018 on timberlands owned by Humboldt Redwood Company, LLC. We conducted the surveys and habitat assessments to comply with the California Environmental Quality Act (CEQA) and HRC's Habitat Conservation Plan (HCP) "Conservation Plan for Sensitive Plants" (§6.12.1). This section requires that the presence of rare plant species be determined through field surveys conducted during planning of covered activities including, but not limited to, development of THPs, planning for new road construction, and development of quarries or borrow pits. Company employees and forestry contractors delineated potential rare plant habitat, and a qualified botanist verified the habitat determinations and performed a seasonally appropriate survey if potential habitat was present.

The procedures that we follow provide a high probability that rare plants are discovered during planning. When plants are found, mitigation measures are applied to reduce impacts to a level that is less than significant; these measures are reviewed by CDFW and include avoidance of herbicide application to these plants.

This report summarizes the results of surveys, mitigations, research, and monitoring conducted in the year 2018 and fulfills HRC's HCP reporting requirements for rare plants (section 6.12.1, Item 5).

SPECIAL STATUS PLANTS

We conducted floristic surveys to look for the plants on HRC's current Special Status Plant List (Table 1). This list includes vascular plants which are of limited abundance in California, and are known or believed to occur in Humboldt County. We report the results of our surveys to CNDDB annually (both new occurrences and updates to previously reported occurrences). The list was derived from the following sources in consultation with CDFW and the United States Fish and Wildlife Service (USFWS):

- Federally listed or proposed threatened or endangered plants
- California state listed or proposed rare, threatened or endangered plants
- CDFG Natural Diversity Database, Special Vascular Plants, Bryophytes, and Lichens

- California Native Plant Society (CNPS) species with California Rare Plant Rank (CRPR) 1A, 1B, 2A, and 2B.[1]

Table 1. HRC's Special Status Plant List for the 2018/19 field season.

Scientific Name/Common Name	Status	Presence on Ownership
***Astragalus agnicidus* Humboldt milk-vetch**	**G2, S2, CE, CRPR 1B.1**	**Yes**
Astragalus umbraticus Bald mountain milk-vetch	G4, S2, CRPR 2B.3	Unknown
Bensoniella oregona bensoniella	G3, S2, CR, CRPR 1B.1	Unknown
Cardamine angulata seaside bittercress	G4G5, S3, CRPR 2B.2	Unknown
***Carex arcta* northern clustered sedge**	**G5, S1, CRPR 2B.2**	**Yes**
Carex leptalea flaccid sedge	G5, S1, CRPR 2B.2	Unknown
Carex praticola meadow sedge	G5, S2, CRPR 2B.2	Unknown
Cornus Canadensis bunchberry	G5, S2, CRPR 2B.2	Unknown
Epilobium oreganum Oregon fireweed	G2, S2, CRPR 1B.2	Unknown
***Erythronium oregonum* giant fawn lily**	**G4G5, S2, CRPR 2B.2**	**Presumed**
***Erythronium revolutum* coast fawn lily**	**G4G5, S3, CRPR 2B.2**	**Yes**
***Gilia capitata* ssp. *pacifica* Pacific gilia**	**G5T3, S2, CRPR 1B.2**	**Yes**
Glyceria grandis American manna grass	G5, S3, CRPR 2B.3	Unknown
Iliamna latibracteata California globe mallow	G2G3, S2, CRPR 1B.2	Unknown
Juncus supiniformis hair-leaved rush	G5, S1, CRPR 2B.2	Unknown
Kopsiopsis hookeri small ground cone	G4?, S1S2, CRPR 2B.3	Unknown
Lilium occidentale western lily	G1, S1, FE, CE, CRPR 1B.1	Unknown
Moneses uniflora woodnymph	G5, S2, CRPR 2B.2	Unknown
***Montia howellii* Howell's montia**	**G3G4, S2, CRPR 2B.2**	**Yes**
Noccaea fendleri ssp. *californicum* Kneeland Prairie pennycress	G5?T1, S1, FE, CRPR 1B.1	Adjacent
***Packera bolanderi* var. *bolanderi* seacoast ragwort**	**G4T4, S2S3, CRPR 2B.2**	**Yes**
***Piperia candida* white-flowered rein orchid**	**G3, S3, CRPR 1B.2**	**Yes**
Polemonium carneum royal sky pilot	G3G4, S2, CRPR 2B.2	Unknown
Sanguisorba officinalis great burnet	G5?, S2, CRPR 2B.2	Unknown
***Sidalcea malvaeflora* ssp. *patula* Siskiyou checkerbloom**	**G5T2, S2, CRPR 1B.2**	**Yes**
Sidalcea oregana ssp. *eximia* coast checkerbloom	G5T1, S1, CRPR 1B.2	Unknown
Sisyrinchium hitchcockii Hitchcock's blue-eyed grass	G2, S1, CRPR 1B.1	Unknown
Viola palustris alpine marsh violet	G5, S1S2, CRPR 2B.2	Unknown

Abbreviations: FE, federally listed Endangered; SE, California state listed Endangered; SR, California state listed Rare; CRPR, California Rare Plant Rank; G, global rank; S, state or provincial rank.

[1] California Native Plant Society (CNPS 2014) CRPR 1A: Plants presumed extirpated in California and rare or extinct elsewhere; CRPR 1B: rare, threatened, or endangered in California and elsewhere; CRPR 2A: Plants presumed extirpated in California, but more common elsewhere; CRPR 2B: rare, threatened, or endangered in California, but more common elsewhere.

WATCH LIST PLANTS

In 2006 we developed our Watch List (CRPR 3 and 4[2]) and began recording occurrences of these plants which we encountered while conducting our operational surveys.

Table 2. HRC's Watch List Plants for the 2018/19 field season.

Scientific Name/Common Name	Status	On HRC
***Astragalus rattanii* var. *rattanii* Rattan's milk-vetch**	**G4T3, S4, CRPR 4.3**	**Yes**
Calamagrostis bolanderi Bolander's reed grass	G4, S4, CRPR 4.2	
Calamagrostis foliosa leafy reed grass	G3, S3, CRPR 4.2	
Carex buxbaumii Buxbaum's sedge	G5, S3, CRPR 4.2	
Castilleja ambigua ssp. *ambigua* Johnny nip	G4T5, S4, CRPR 4.2	
***Chrysosplenium glechomifolium* Pacific golden saxifrage**	**G5, S3, CRPR 4.3**	**Yes**
Collomia tracyi Tracy's collomia	G4, S4, CRPR 4.3	
***Coptis laciniata* Oregon goldthread**	**G4?, S3?, CRPR 4.2**	**Yes**
Epilobium septentrionale Humboldt County fuchsia	G4, S4, CRPR 4.3	
Erigeron biolettii streamside daisy	G3?, S3?, CRPR 3	
Erigeron robustior robust daisy	G3, S3, CRPR 4.3	
Fritillaria purdyi Purdy's fritillary	G4, S4, CRPR 4.3	
***Hemizonia congesta* ssp. *tracyi* Tracy's tarplant**	**G5T4, S4, CRPR 4.3**	**Yes**
***Hosackia gracilis (Lotus formosissimus)* harlequin lotus**	**G3G4, S3, CRPR 4.2**	**Yes**
Iris longipetala coast iris	G3, S3, CRPR 4.2	
***Lathyrus glandulosus* sticky pea**	**G3, S3, CRPR 4.3**	**Yes**
Leptosiphon (Linanthus) acicularis bristly leptosiphon	G4?, S4?, CRPR 4.2	
***Lilium kelloggii* Kellogg's lily**	**G3, S3, CRPR 4.3**	**Yes**
***Lilium rubescens* redwood lily**	**G3, S3, CRPR 4.2**	**Yes**
Lilium washingtonianum ssp. *purpurascens* purple-flowered Washington lily	G4T4, S3S4, CRPR 4.3	
***Listera cordata* heart-leaved twayblade**	**G5, S4, CRPR 4.2**	**Yes**
***Lycopodium clavatum* running-pine**	**G5, S3, CRPR 4.1**	**Yes**
Lycopus uniflorus northern bugleweed	G5, S4, CRPR 4.3	
***Mitellastra caulescens (Mitella caulescens)* leafy-stemmed mitrewort**	**G5, S4, CRPR 4.2**	**Yes**
Navarretia linearifolia ssp. pinnatisecta pinnate-leaved navarretia	G4G5T4, S4, CRPR 4.3	
Piperia michaelii Michael's rein orchid	G3, S3, CRPR 4.2	
***Pityopus californicus* California pinefoot**	**G4G5, S4, CRPR 4.2**	**Yes**
Platanthera stricta slender bog-orchid	G5, S3, CRPR 4.2	
***Pleuropogon refractus* nodding semaphore grass**	**G4, S4, CRPR 4.2**	**Yes**
***Ribes laxiflorum* trailing black currant**	**G5?, S3, CRPR 4.3**	**Yes**
***Ribes roezlii* var.*amictum* hoary gooseberry**	**G5T4, S4, CRPR 4.3**	**Yes**
***Sidalcea malachroides* maple-leaved checkerbloom**	**G3, S3, CRPR 4.2**	**Yes**
***Usnea longissima* Long- beard lichen**	**G4, S4, CRPR 4.2**	**Yes**
Wyethia longicaulis Humboldt County wyethia	G3, S3.3, CRPR 4.3	

[2] CRPR 3: Review list, plants with uncertain taxonomy, more information needed. CRPR 4: Plants of limited distribution, a watch list.

We report these occurrences to CNDDB at the end of each year along with the new and updated occurrences of our Special Status plants. Our purpose in reporting CRPR 3 or 4 plants is to further the knowledge of California flora and provide accurate records for future decisions relating to rare plant listings and habitat protections.

SETTING

The HRC ownership is located in Humboldt County, California. The ownership totals approximately 209,300 acres and is managed primarily for timber production. The soils are largely derived from sedimentary rocks (such as claystone, mudstone, siltstone and sandstone) with scattered intrusions of metamorphosed sedimentary and ultramafic rocks. The ownership is situated in the following geographic subdivisions of the California Floristic Province: the North Coast and North Coast Ranges sub-regions of the Northwestern California region (Hickman 1993, Baldwin 2012). The primary vegetation types on the ownership, called "series" in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), and later called "Vegetation Alliances" in the Manual of California Vegetation 2nd edition (Sawyer J.O., Keeler-Wolfe T. and Evans J.M. 2009) include Redwood, Douglas-fir, Douglas-fir/Tan oak, Tan oak, Mixed oak, and Mixed conifer forests as well as smaller areas of several different grassland, scrub, riparian, and wetland vegetation alliances.

METHODS

SURVEY METHODS

HRC botanists and consultants use survey methods based on the CDFW recommended protocol for rare plant surveys, "Protocol for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities" (CDFG 2009). All surveys are floristic in nature and seasonally appropriate for the species considered, focusing not only on the predicted Special Status plants but also identifying and recording all vascular plant taxa encountered to the lowest taxonomic level (i.e. genus or species) necessary for identification of our focus species. When we conduct field-based habitat assessments at times of the year which were not seasonally

appropriate, we return to areas identified as suitable habitat for the surveyed species during the next appropriate floristic season.

MITIGATION METHODS

When we locate Special Status plants which have the potential to be adversely affected by land management activities, we adopt one or more of the following measures to avoid, minimize, and/or mitigate adverse impacts to the species to less than significant levels. These same measures are listed in CEQA, Section 15370.

- Avoid the impact altogether by not taking a certain action
- Minimize impacts by limiting the degree or magnitude of the action
- Rectify the impact by repairing, rehabilitating, or restoring the impacted environment
- Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the project
- Compensate for the impact by replacing or providing substitute resources or environments

The measures we propose take into consideration the population size, viability, and habitat needs of the Special Status plant in relation to the proposed project activities, constraints, and scope. We achieve avoidance and minimization of impacts by several means, alone or in combination, and depending on the species may include:

- Establishing no-cut retention areas (for canopy dependent species) or equipment and site preparation limitation areas (for non-canopy dependent species) that incorporate the population.
- Designating an appropriate buffer zone according to the habitat requirements of the species and the specifics of the population at the site.
- Designating species-specific overstory canopy retention in the buffer and core areas.
- Establishing an equipment exclusion zone within the buffer and core areas.
- Directional falling of timber away from the areas.

CDFW reviews and approves all proposed mitigation measures. The measures used in 2018 at any particular site are noted on the sensitive species detections table in Appendix 2 and in the site revisit table in Appendix 7.

DEFINITION OF OCCURRENCE

Because of database limitations, HRC uses the term "occurrence" to refer to a group of plants of the same species which were discovered during a specific survey event. These may be groups of plants close together and representing a single population or part of a larger population previously discovered, or they can be widely scattered groups representing several populations. Based on this definition, an occurrence as we use it has no relationship to a "biological population," or to the CNDDB meaning of "occurrence."

RESULTS

SURVEY RESULTS

We assessed and/or surveyed 22 projects for Special Status plants in 2018, covering a total of approximately 4,417 acres; including 108 miles of roads (this includes 9 miles of survey for *Montia howellii*). Most of the assessment and survey acres were associated with THP preparation or operational needs such as THP completions and were inspected between March and August (Table 3). We also located several Special Status plants during non-THP related projects such as trail maintenance, hydrology, forestry, or wildlife monitoring activities. Habitat assessment visits may occur during the typical floristic period or may occur outside of those documented blooming periods. If potential sensitive plant habitat is located outside of the floristic period those areas are re-visited during the next appropriate time frame for floristic survey.

Table 3. 2018 Assessed/surveyed acres by month.

Year	Month	Unit Survey/Assessment Acres*
2017	December	107.1
2018	January	82.3
2018	February	0
2018	March	224.6
2018	April	600.30
2018	May	831.60
2018	June	741.3
2018	July	326.6
2018	August	198.1
2018	September	160.3
2018	October	615.2
2018	November	27.1
Total 2018 Unit Survey/Assessment Acres		**3,914.5**
2018	Road Survey/Assessment Acres	480.7
2018	Howell's montia Surveys	21.8
Total 2018 Survey/Assessment Acres		**4,417.0**

*This value is generated in ArcGIS by creating polygons from survey route data. Total 2018 project acres from database records are approximately 5,841.6. Some portions of projects were surveyed in previous years or have future surveys planned. December totals for previous years are included in current year survey statistics.

Table 4 includes a summary of the totals for new occurrences and populations found in 2018. These data are also included in tables in Appendix 2: 2018 Plant Detections, Appendix 5: Rare Plant Detections and Rare Plant Road Surveys maps.

Table 4. Summary of 2018 Special Status Plant detections and property-wide totals.

Species	2018 occurrences	New populations	Total populations[3]	# new plants*	Total plants**
Astragalus agnicidus	0	0	1	0	8,510
Carex arcta	0	0	3	0	55
Erythronium revolutum/oregonum	7	1	29	691	7,454
Gilia capitata ssp. *pacifica*	4	3	25	2,785	13,941
Montia howellii	3	2	45	280	39,644
Packera bolanderi var. *bolanderi*	5	0	37	58	11,148
Piperia candida	0	0	22	0	2,010
Sidalcea malvaeflora ssp. *patula*	0	0	9	0	2,808
Totals	**19**	**6**	**171**	**3,814**	**85,570**

*Totals of new occurrences only, does not include changes in known sites
**Total plant count is tally of original occurrence data and subsequent revisit counts, from Microsoft Access Database.

[3] Populations are defined as groups of the species separated by at least a quarter-mile from other such known groups, equivalent to CNDDB definition of "occurrence".

The CNDDB Rare Plant Report forms corresponding to the new occurrences of Special Status plants on HRC property are provided as a CD and will be sent to the Sacramento CNDDB office no later than the last week of December 2018.

In 2018 we also revisited known Special Status plant locations either for monitoring, or for new THP layout. These revisits are documented in Appendix 7 at the end of this report. All revisited sites have been documented on a CNDDB report form and will be sent along with the new occurrence reports by the end of December 2018.

EFFECTIVENESS MONITORING

HRC conducts post-impact effectiveness monitoring of some Special Status plant sites. The purpose of effectiveness monitoring is to determine if the mitigations applied to plants at a specific site are effective at minimizing impacts on the population from covered timberland management activities (e.g. timber harvest, road building, reforestation). We also conduct post-impact monitoring where impacts may have been significant but unavoidable and the population is being monitored for the level of response. Effectiveness monitoring usually consists of one follow-up visit or, rarely, revisits over several years, conducted by a qualified botanist or plant ecologist. Appendix 3 provides a summary of the events which trigger THP-specific monitoring visits.

Four projects were visited this season for mitigation effectiveness monitoring (including yearly monitoring for Howell's montia). Results of the monitoring efforts are detailed below and included in plant detection tables and re-visit tables in Appendices 2 and 7.

PROPERTY-WIDE CONSULTATIONS

HRC has assumed implementation of four property-wide species-specific management agreements that were originally developed through consultation with CDFG by The Pacific Lumber Company (PALCO), the previous landowner. These species are *Astragalus agnicidus, Erythronium revolutum, Montia howellii,* and *Packera bolanderi* var. *bolanderi.* Copies of the consultation letters are in Appendix 4. The mitigation measures provided in these agreements will likely reduce impacts for these species to a less than significant level. We will request site-

specific consultations from CDFW only if we propose mitigations that deviate from these agreements at specific locations.

CHANGES TO HRC'S SPECIAL STATUS PLANT AND WATCH LISTS

HRC does not propose any changes to either the special status plant list or watch list for the 2019 survey season.

CALIFORNIA NATIVE PLANT SOCIETY (CNPS) WATCH LIST PLANTS

INTRODUCTION AND SUMMARY

In 2006 HRC botanists began to voluntarily document plants ranked as CRPR 4: "plants of limited distribution, a watch list", and CRPR 3: "plants of problematic taxonomy and about which we need more information" (CNPS 2016). There are approximately 34 species on these CRPR lists that are known or are likely to occur on HRC ownership (see Introduction, Table 2). HRC botanists have located populations of 16 of these species during surveys.

Appendices 2 and 7 contain details on newly detected occurrences as well as data for site re-visits. We record these as we would plants on our Special Status Plant List and maintain them in our database (see Data Management and Analysis Methods). We also report these plants annually to CNDDB.

METHODS

Survey Methods

These species are found incidentally during the course of our normal operational surveys.

This season HRC botany staff recorded two new watch list species on the property. Occurrences of both *Hosackia gracilis* (harlequin lotus) and *Hemizonia congesta* ssp. *tracyi* (Tracy's tarplant) were found in open prairie/managed grassland habitat just west of Scotia in the Monument Ridge area. It is likely more occurrences of these species exist in similar habitat elsewhere on HRC lands.

Mitigation Methods

CRPR 3 and 4 plants are generally not considered sufficiently rare to qualify for mitigation and protection under CEQA.

Voluntary Management Plan for Lycopodium clavatum

In July 2008, *Lycopodium clavatum* was moved from CRPR 2 to CRPR 4. HRC has voluntarily implemented the following management plan for this species:

1. Humboldt Redwood Company, LLC (HRC), will report to CDFW and CNDDB all occurrences of *Lycopodium clavatum* discovered during forestry operations once a year.

2. HRC will no longer include enforceable language for the protection of this species in new THPs.

3. Where *Lycopodium clavatum* is found within a THP unit, HRC will make efforts during planning to conserve mats through silvicultural practices, such as placing retained tree clusters at the plant locations, but will harvest any marketable tree that is not otherwise retained.

RESULTS

Watch list plant detections are included in Appendix 2: Plant Detections.

DISCUSSION

Our goal in surveying and reporting these occurrences is to further the knowledge of California flora and provide accurate records for future decisions concerning plant and habitat protections. Prior to 2006, watch list plants were mentioned in THP and habitat surveys but the data was not reported to CNDDB nor retained in HRC's data base. There are likely additional occurrences of these species on the property.

Maps of the watch list species on HRC property are included in Appendix 5.

EFFECTIVENESS MONITORING RESULTS

Appendix 3 contains a spreadsheet with the current monitoring schedule for sensitive plant sites.

This year several projects were scheduled for effectiveness monitoring visits including:

- Mountain View THP 1-13-035HUM
- Redwood House Selection THP 1-16-004HUM
- PBL THP 1-14-149HUM
- Yearly Howell's montia monitoring

Results for monitoring visits are described below.

MOUNTAIN VIEW THP 1-13-035HUM

This project was originally surveyed in 2013. During surveys an occurrence of *Piperia candida* (white-flowered rein orchid, PICA 1660) was discovered situated on the running surface and cut-bank of the graveled access road. The occurrence was buffered with a 50 foot zone in which selective tree removal was allowed but road use and maintenance were limited to attempt to retain site character and plant viability while allowing timber harvest to continue. During the summer of 2014 roadwork adjacent to the site was completed and equipment and dump trucks passed through the occurrence during work. In 2015 the site was visited and site condition was good, no observable disturbance had occurred within the protected area and plant numbers were higher than in 2013. Timber harvest on the plan began late in 2017. A visit to the site before the start of operations in 2017 was conducted and while the site seems un-changed the plant numbers were lower than the previous year. Timber harvest lasted until July of 2018. The 2018 monitoring visit was conducted just at the cessation of timber harvest and the road segment containing *Piperia candida* was graded prior to the monitoring visit. The grading was light, and all spoils were kept on the road prism. The flagging and wooden barrier were in place and undisturbed by timber harvest or road maintenance activity. The plant count for 2018 was rather low and most plants were either fully blooming or had senesced for the year. The wooden barrier was removed, and a small amount of woody debris was cleared from the occupied road

segment. Additional monitoring visits are planned for post-harvest results. The monitoring schedule for this project calls for visits in year one and three after harvest and roadwork. Harvest was complete in 2018. The next visit will occur in 2019 then again in 2021. HRC shall conduct these visits earlier in the season in order to catch all possible *Piperia* plants. Populations often have a portion that does not bloom and come up as single leaves that will have withered by late summer, monitoring visits conducted earlier in the year are more likely to capture the entire plant population for that season. Table 5 contains plant numbers and a simple trends analysis.

Table 5. Monitoring Results – Plant Counts for PICA 1660

Species Code	Occurrence ID	2013	2015	2017	2018
PICA	1660	82	137	46	15
	Change in number		55	-91	-31
	% Change		+67.1	-66.4(-43.9 from baseline)	-67.4(-81.7 from baseline)

It is unclear what has caused the plant numbers to drop. Numbers came up significantly after the road use in 2014 but have dwindled to less than 20% of the original numbers since then.

REDWOOD HOUSE SELECTION THP 1-16-004HUM

The Redwood House Selection THP was surveyed in 2016 and numerous known and newly detected occurrences of *Packera bolanderi* var. *bolanderi* (seacoast ragwort, PABOBO) were included therein. Post-harvest monitoring visits are planned on a number of sites that required site-specific mitigation buffers to allow timber harvest activities to proceed. The THP was harvested late in 2017 and the monitoring visits are planned for two years after the completion of harvest. The first monitoring visit was conducted in 2018. At each of the monitored sites the total number of plants were tallied and compared to pre-harvest numbers. The site-specific buffers installed prior to operations were meant to protect the plants by providing a core area directly around the plants in which no timber operations were allowed. This included any tree harvest, road or skid trail construction, and installation of cable yarding corridors. Several of the sites were also given a 50-foot buffer, measured from the edge of the occupied core, in which cable corridors could be established and used but no other trees marked or taken for harvest were

allowed. Results of the monitoring effort were encouraging. In general, the buffers were intact and had been properly treated during timber harvest. In some cases, no yarding corridors were established within the buffers, the operators were able to yard around the sites entirely, and minimal impacts from cable yarding were noted (true for buffers around occurrence 716). Other outer buffers were crossed by corridors and the sites showed some impacts in the form of tree removal, canopy reduction, and some ground disturbance where logs were yarded through the site (especially occurrences 4307, 4308, and 4309). In several locations the plants had spread from the previously occupied core areas and now occupy portions of the outer buffer. A few plants were found outside of buffered areas entirely, in yarding corridors and along tractor skid trails in areas that were thought to be unoccupied prior to harvest (occurrence 4815). Table 6 contains results of the 2018 monitoring visit. Please note that Occurrence 716 is a large, widely spread occurrence; not all points were re-visited and not all re-visited points are included in this monitoring exercise so there will be discrepancies between this table and the re-visit table presented in Appendix 7.

Table 6. Monitoring Results – Plant Counts for PABOBO at Redwood House Selection

Species Code	Occurrence ID	2016	2018	Notes
PABOBO	716	137	436	Site 1: Programmatic Buffer
PABOBO	716	50	162	Site 2: Site Specific - Minimal Corridor in Buffer
PABOBO	716	175	243	Site 3: Site Specific - Minimal Corridor in Buffer
PABOBO	716	105	242	Site 4: Programmatic Buffer
PABOBO	4292	20	18	Roadside, semi-circle buffer - not included in calculation
PABOBO	4307	72	49	Site 5: Site Specific - Corridors in buffer
PABOBO	4308	39	20	Site 5: Site Specific - Corridors in buffer
PABOBO	4309	17	30	Site 5: Site Specific - Corridors in buffer
PABOBO	4815		3	New detection outside of buffers - not included in calculation

Plant Totals	**595**	**1182**
Percent Change		**98.7**

PBL THP 1-14-149HUM

The PBL THP 1-14-149HUM located in the Larabee watershed contains a host of historic and contemporary occurrences of *Astragalus agnicidus* (Humboldt milk-vetch, ASAG). This species

appears to be closely linked with disturbance and has been known to flourish in disturbed areas after timber harvest on HRC property. Surveys for this THP were done in 2014. Additional surveys and some monitoring visits were conducted in 2015 and 2016. HRC botany staff will be continuing to revisit several occurrences while monitoring the PBL THP during the next several years. The mitigation plan calls for effectiveness monitoring visits for at least three years after completion of harvest or roadwork. HRC had plans to conduct timber harvest operations within this THP in 2017 and did complete some of the planned roadwork in 2015 and 2016 but timber harvest operations had not yet begun in earnest. The 2017 monitoring efforts focused on sections of road with recent roadwork or newly constructed road sections. Harvest activities within the THP were completed late in 2018. The results of the 2017 monitoring were included in the 2017 HRC Annual Report and included re-visits to known sites as well as documentation of newly detected sites in areas of recent roadwork where plants were not previously located. No monitoring visit was conducted in 2018, timber harvest was active at the best time for survey and HRC will wait for 2019 to re-visit for post impact monitoring.

MONTIA HOWELLII (HOWELL'S MONTIA, MOHO) YEARLY MONITORING

All Howell's montia sites are monitored on a five year rotation (all known sites are visited and counted once every five years). Sites that have had roadwork or timber harvest in the previous year are generally included in the following year's monitoring to document the species response to the operational activity. General mitigation for the species includes seasonal road use and maintenance restrictions, although a sub-set of occurrences are located on the "Open Roads" which are described further below.

Winter Road Use (Open Roads)

Five roads that would ordinarily be blocked from heavy equipment traffic according to the property-wide mitigation agreement were left open during the 2004-2018 winter seasons. These roads are ones with deeded in-holding owner rights-of-way, or are in areas where we are not able to restrict public access. We recorded plant numbers and mapped the locations of *Montia howellii* on three of these roads in 2018. We will continue to examine these occupied road areas to follow trends in population numbers related to impacts of un-mitigated winter road use.

Population numbers at the "Open Road" sites have fluctuated, sometimes greatly, from year to year (Table 7, Figure 1).

The numbers at Wrigley Road had declined after the dramatic increase following some light grading and road maintenance that was conducted there in 2011. Numbers appear to have dropped again in 2018. Habitat at this site is gradually shrinking as the roadsides and landings fill in with grasses and shrubs, remaining plants are found on the edges of tire ruts from light seasonal use.

Riverside has rebounded from a low several years ago, but continued impacts to that population are likely due to unrestricted and abundant use of the area by motor vehicle recreationists. Portions of the nearby (unoccupied) road system were used as a helicopter service landing, log decking, and loading area during THP operations in 2017. No new plants appear to have come up in the recently used areas, but the traditional site is still extant and shows an increase from previous monitoring visits.

Cummings Creek Road has historically contained a large population but due to current dis-use and ingrowth from grasses and shrubs the site and the potential habitat contained therein has dwindled in recent years. The once robust population is now relegated to a small road section kept open by some light activities including trespass dumping and shooting taking place on site.

In all, the combined change in plant numbers between "open road" sites show a decrease of 1,014 plants (76%) when comparing 2018 with the most recent count at each site visited.

By comparison, total plants at the mitigated sites (Table 8) revisited this year have increased by more than 1,830 plants (34.6% increase) since the last count.

Table 7. *Montia howellii* plant numbers (Open Roads).

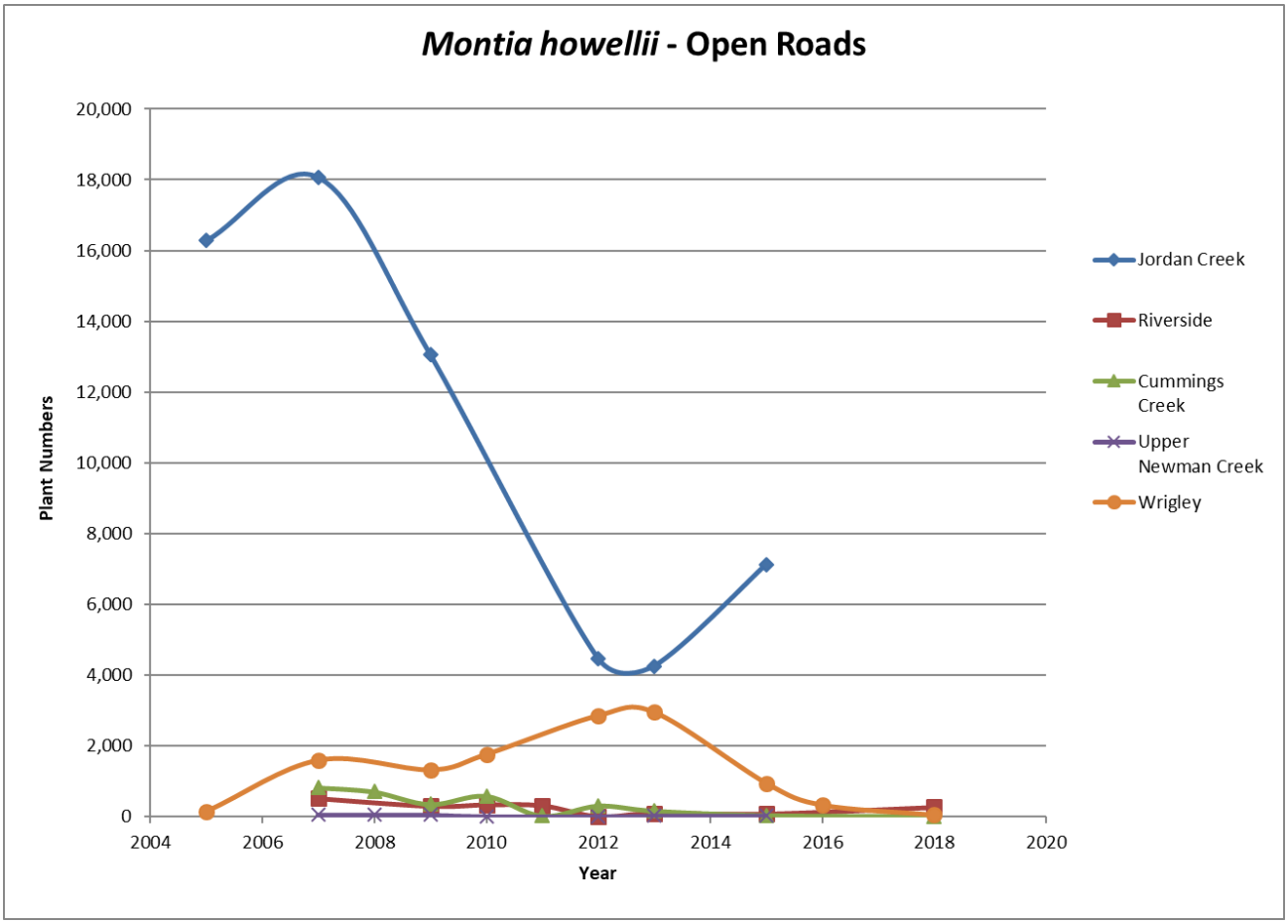
Location	Road Number	Occurrence IDs	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Wrigley	U11	374, 563, 564	152	1,598		1,323	1,765		2,861	2,950		943	328	819	45
Jordan Creek	A51.19	351	16,284	18,066		13,047	†		4,456	4,250		7,119		26,825	
Riverside	L46	163		511		294	336	312	3	99		77		194	264
Cummings Creek	L33	40		821	702	350	585	19	308	165		42		322	12
Upper Newman Creek	C07.2327	82		49	47	47	1		0	17		17		89	

† Portions of this location were revisited coincidentally with other surveys and approximately 8,000 plants were observed.

Table 8. *Montia howellii* plant numbers (Mitigated Sites).

Occurrence ID	Plant ID	Township	Range	Section	Previous Quantity	Previous Year	2018 Quantity	Change in Plant Numbers	Percent Change
7	MOHO	4N	1E	3	0	2017	0	0	
40	MOHO	2N	2E	29	322	2017	12	-310	-96.3
56	MOHO	1S	2E	6	4	2014	0	-4	-100.0
160	MOHO	1N	2E	12	192	2014	791	599	312.0
163	MOHO	1N	2E	6	194	2017	264	70	36.1
294	MOHO	2N	2E	19	20	2014	13	-7	-35.0
310	MOHO	1N	1E	19	205	2014	468	263	128.3
353	MOHO	1N	1E	19+20	451	2014	1,618	1167	258.8
371	MOHO	1N	3E	19	19	2014	78	59	310.5
374	MOHO	4N	1W	25	819	2017	45	-774	-94.5
378	MOHO	3N	2E	2+3	459	2015	1,610	1,151	250.8
379	MOHO	3N	2E	10	2	2014	104	102	5,100.0
385	MOHO	2N	2E	31	0	2014	0	0	
535	MOHO	2S	3E	3	600	2014	7	-593	-98.8
557	MOHO	2N	2E	31	0	2014	0	0	
559	MOHO	2N	2E	29	0	2016	1	1	
842	MOHO	1N	1E	30	62	2014	243	181	291.9
1016	MOHO	2N	2E	19+30	4	2016	14	10	250.0
1250	MOHO	1S	2E	10	323	2017	170	-153	-47.4
1441	MOHO	4N	2E	23	215	2014	750	535	248.8
1628	MOHO	1N	2E	1	12	2015	0	-12	-100.0
3892	MOHO	2N	2E	33	898	2016	304	-594	-66.1
3893	MOHO	2N	2E	33	101	2014	513	412	407.9
4160	MOHO	4N	1E	12	1	2017	1	0	0.0
4427	MOHO	2N	2E	3	38	2017	76	38	100.0
4550	MOHO	2N	2E	35	351	2017	40	-311	-88.6
				Totals	**5,292**		**7,122**	**1,830**	**34.6**

Figure 1. *Montia howellii* plant numbers (Open Roads)



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