
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 24 projects in 2019 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 7,267 acres. Botanical survey coverage during the 2019 survey season was approximately 5,075 acres with 177.5 miles of surveyed roads (includes 8.8 miles of road surveyed for Howell’s montia), altogether totaling 5,903 acres. This year on HRC property we found 27 new occurrences of six of our Special Status plant species, which represent six new populations, bringing the total number of rare plant populations detected on HRC land to 176. 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 39 occurrences of five 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 2019 and *Montia howellii* road surveys (MOHO Research) from 2005 to 2019.

California Natural Diversity Data Base (CNDDDB) forms for the Special Status and Watch List species occurrences will be provided on CD to CNDDDB and are available to the HCP Wildlife Agencies on request.

We surveyed 8.8 miles of roads for *Montia howellii* in 2019. 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 one new site on a road system 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. One of these “open” sites was visited in 2019 (Wrigley Rd). The results of monitoring efforts are presented in the summary tables below and are included in tables found in Appendix 7.

Proposed Changes for 2020

HRC does not propose any significant changes to the Rare Plant Program for the 2020 survey season.

INTRODUCTION

HRC employees, foresters, and consultants conducted plant habitat assessments and seasonally appropriate floristic plant surveys in 2019 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 2019 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 CNDDDB 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 2019/2020 field season.

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

WATCH LIST PLANTS

In 2006 we developed our Watch List (CRPR 3 and 4²) and began recording occurrences of these plants which we encountered while conducting our operational surveys.

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.

Table 2. HRC's Watch List Plants for the 2019/20 field season.

Scientific Name/Common Name	Status	On HRC
<i>Astragalus rattanii</i> var. <i>rattanii</i> Rattan's milk-vetch	G4T3, S4, CRPR 4.3	Yes
<i>Calamagrostis bolanderi</i> Bolander's reed grass	G4, S4, CRPR 4.2	
<i>Calamagrostis foliosa</i> leafy reed grass	G3, S3, CRPR 4.2	
<i>Carex buxbaumii</i> Buxbaum's sedge	G5, S3, CRPR 4.2	
<i>Castilleja ambigua</i> var. <i>ambigua</i> Johnny nip	G4T4, S3S4, CRPR 4.2	
<i>Chrysosplenium glechomifolium</i> Pacific golden saxifrage	G5?, S3, CRPR 4.3	Yes
<i>Collomia tracyi</i> Tracy's collomia	G4, S4, CRPR 4.3	
<i>Coptis laciniata</i> Oregon goldthread	G4?, S3?, CRPR 4.2	Yes
<i>Epilobium septentrionale</i> Humboldt County fuchsia	G4, S4, CRPR 4.3	Yes
<i>Erigeron biolettii</i> streamside daisy	G3?, S3?, CRPR 3	
<i>Erigeron robustior</i> robust daisy	G3, S3, CRPR 4.3	
<i>Fritillaria purdyi</i> Purdy's fritillary	G4, S4, CRPR 4.3	
<i>Hemizonia congesta</i> ssp. <i>tracyi</i> Tracy's tarplant	G5T4, S4, CRPR 4.3	Yes
<i>Hosackia gracilis</i> (<i>Lotus formosissimus</i>) harlequin lotus	G3G4, S3, CRPR 4.2	Yes
<i>Iris longipetala</i> coast iris	G3, S3, CRPR 4.2	
<i>Lathyrus glandulosus</i> sticky pea	G3, S3, CRPR 4.3	Yes
<i>Leptosiphon</i> (<i>Linanthus</i>) <i>acicularis</i> bristly leptosiphon	G4?, S4?, CRPR 4.2	
<i>Lilium kelloggii</i> Kellogg's lily	G3, S3, CRPR 4.3	Yes
<i>Lilium rubescens</i> redwood lily	G3, S3, CRPR 4.2	Yes
<i>Lilium washingtonianum</i> ssp. <i>purpurascens</i> purple-flowered Washington lily	G4T4, S3S4, CRPR 4.3	
<i>Listera cordata</i> heart-leaved twayblade	G5, S4, CRPR 4.2	Yes
<i>Lycopodium clavatum</i> running-pine	G5, S3, CRPR 4.1	Yes
<i>Lycopus uniflorus</i> northern bugleweed	G5, S4, CRPR 4.3	
<i>Mitellastrum caulescens</i> (<i>Mitella caulescens</i>) leafy-stemmed mitrewort	G5, S4, CRPR 4.2	Yes
<i>Navarretia linearifolia</i> ssp. <i>pinnatisecta</i> pinnate-leaved navarretia	G4G5T4, S4, CRPR 4.3	
<i>Piperia michaelii</i> Michael's rein orchid	G3, S3, CRPR 4.2	
<i>Pityopus californicus</i> California pinefoot	G4G5, S4, CRPR 4.2	Yes
<i>Platanthera stricta</i> slender bog-orchid	G5, S3, CRPR 4.2	
<i>Pleuropogon refractus</i> nodding semaphore grass	G4, S4, CRPR 4.2	Yes
<i>Ribes laxiflorum</i> trailing black currant	G5?, S3, CRPR 4.3	Yes
<i>Ribes roezlii</i> var. <i>amictum</i> hoary gooseberry	G5T4, S4, CRPR 4.3	Yes
<i>Sidalcea malachroides</i> maple-leaved checkerbloom	G3, S3, CRPR 4.2	Yes
<i>Usnea longissima</i> Long-beard lichen	G4, S4, CRPR 4.2	Yes
<i>Wyethia longicaulis</i> Humboldt County wyethia	G4, S4, 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 CNDDDB 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” (CDFW 2018). 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 requirements 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 2019 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 CNDDDB meaning of “occurrence.”

RESULTS

SURVEY RESULTS

We assessed and/or surveyed 24 projects for Special Status plants in 2019, covering a total of approximately 5,903 acres; including 177.5 miles of roads (this includes 8.8 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. 2019 Assessed/surveyed acres by month.

Year	Month	Unit Survey/Assessment Acres*
2018	December	261.0
2019	January	132.0
2019	February	103.0
2019	March	134.0
2019	April	1,235.0
2019	May	1,743.0
2019	June	652.0
2019	July	396.0
2019	August	419.0
2019	September	0
2019	October	0
2019	November	0
Total 2019 Unit Survey/Assessment Acres		5,075.0
2019	Road Survey/Assessment Acres	807.0
2019	Howell's montia Surveys	21.0
Total 2019 Survey/Assessment Acres		5,903.0

*This value is generated in ArcGIS by creating polygons from survey route data. Total 2019 project acres from database records are approximately 7,267.0. 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 2019. These data are also included in tables in Appendix 2: 2019 Plant Detections, Appendix 5: Rare Plant Detections and Rare Plant Road Surveys maps.

Table 4. Summary of 2019 Special Status Plant detections and property-wide totals.

Species	2019 occurrences	New populations	Total populations ³	# new plants*	Total plants**
<i>Astragalus agnicidus</i>	10	0	1	359	7,225
<i>Carex arcta</i>	0	0	3	0	55
<i>Erythronium revolutum/oregonum</i>	1	1	30	54	7,508
<i>Gilia capitata ssp. pacifica</i>	2	1	26	192	14,240
<i>Montia howellii</i>	6	1	45	3,894	42,343
<i>Packera bolanderi var. bolanderi</i>	2	0	37	8	11,147
<i>Piperia candida</i>	6	3	25	165	2,093
<i>Sidalcea malvaeflora ssp. patula</i>	0	0	9	0	2,808
Totals	27	6	176	4,672	87,419

*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 CNDDDB definition of "occurrence".

The CNDDDB 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 CNDDDB office no later than the last week of December 2019.

In 2019 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 CNDDDB report form and will be sent along with the new occurrence reports by the end of December 2019.

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.

Five 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 2020 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 18 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 CNDDDB.

METHODS

Survey Methods

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

This season HRC botany staff recorded one new watch list species on the property. An occurrence of *Epilobium septentrionale* (Humboldt County fuchsia) was recorded from a large rock outcrop in an area of open coastal prairie near Kneeland in the northeast corner of the HRC properties.

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 CNDDDB 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 CNDDDB 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 (*Piperia candida*)
- Redwood House Selection THP 1-16-004HUM (*Packera bolanderi* var. *bolanderi*)
- PBL THP 1-14-149HUM (*Astragalus agnicidus*)
- LVD 17 1-17-107HUM (*Packera bolanderi* var. *bolanderi*)
- Yearly Howell's montia monitoring (*Montia howellii*)

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 seemed 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. The monitoring schedule for this project calls for visits in year one and three after harvest and roadwork. Harvest was completed in 2018. A monitoring visit was conducted this year (2019) and the site will be visited for a final time in 2021. HRC shall conduct the final visit early 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	2019
PICA	1660	82	137	46	15	55
	Change in number		+55	-91	-31	+40
	% Change		+67.1	-66.4(-43.9 from baseline)	-67.4(-81.7 from baseline)	+266.7(-32.9 from baseline)

Following a decline between 2015 and 2018 plant numbers have rebounded to 32.9% below baseline. Plant distribution on site has changed, with more of the extant plants located on the cut bank and at the top of the cut bank above the occupied road. Plants in the center of the road prism and closest to the travelled surface have not been re-located and may have been lost during road use and grading activities.

This THP was the site of a controlled burn to improve and enhance oak woodland and coastal prairie habitats during the fall of 2019. This site will be visited again in 2021 for a final monitoring visit, although HRC botanists plan to visit the area in the spring of 2020 to assess the effects of the prescribed burn on adjacent vegetation and will likely check the *Piperia* population at that time.

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 several 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 are 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 portions of 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 have 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 (i.e., occurrence 4815). Table 6 contains results of the 2018 and 2019 monitoring visits. 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	2019	Notes
PABOBO	716	137	436	563	Site 1: Programmatic Buffer
PABOBO	716	50	162	111	Site 2: Site Specific - Minimal Corridor in Buffer.
PABOBO	716	175	243	241	Site 3: Site Specific - Minimal Corridor in Buffer
PABOBO	716	105	242	240	Site 4: Programmatic Buffer
PABOBO	4292	20	18	0	Roadside, semi-circle buffer - not included in

Species Code	Occurrence ID	2016	2018	2019	Notes
					calculation
PABOBO	4307	72	49	68	Site 5: Site Specific - Corridors in buffer
PABOBO	4308	39	20	72	Site 5: Site Specific - Corridors in buffer
PABOBO	4309	17	30	53	Site 5: Site Specific - Corridors in buffer
PABOBO	4815		3	10	New detection outside of buffers - not included in calculation

Plant Totals	595	1182	1348
Percent Change		98.7	14.0
Percent Change from Baseline		98.7	126.6

It is evident from the collected data that the mitigation measures were successful in reducing the impacts from timber harvest to a less than significant level. It is also evident that this species can withstand some impacts and habitat disturbance and may even benefit from the activities; plant numbers are up nearly 127% from pre-harvest counts and plants have spread into newly disturbed areas from the protected cores of the buffered zones.

However, roadsides and portions of the yarding corridors in and around these selected sites have become occupied by *Cortaderia jubata* (jubata grass) which is an aggressive invasive plant species which has the ability to outcompete many natives and create dense monocultures in recently disturbed sites, especially in areas with little canopy cover. The species is shade intolerant and usually dies back when overstory canopy cover increases but will persist in open areas for years. This species can inhabit sites that are suitable for *Packera bolanderi* var. *bolanderi* and both reduce the amount of suitable habitat and outcompete and cover over extant plants.

2019 marks the end of the monitoring period for these sites, no further visits for mitigation effectiveness monitoring for this THP are scheduled.

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.

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 did not end until 2018. The 2017 monitoring efforts focused on sections of road with recent roadwork or newly constructed road sections. The results of the monitoring visits are shown on Table 7, these data represent re-visits to known sites within and adjacent to the mitigation monitoring sites as well as documentation of newly detected sites in areas of recent roadwork within and adjacent to the specific monitoring sites. HRC plans additional monitoring visits in 2020 and 2021.

Table 7 Monitoring Results – Plant Counts for ASAG at PBL

Species Code	Occurrence ID	2012	2014	2016	2017	2019	Notes
ASAG	87	0	225		14		Roadwork in 2013, not disturbed since then. Not part of THP specific monitoring, did not re-visit in 2019
ASAG	115		9	4	4		Minor roadwork, plants on edge of mainline. Not part of THP specific monitoring, did not re-visit in 2019
ASAG	267	0	1		5		Minor roadwork, plants on edge of mainline. Not part of THP specific monitoring, did not re-visit in 2019
ASAG	271		38		106		Minor roadwork, new plants on road edges. Not part of THP specific monitoring, did not re-visit in 2019
ASAG	272	1			0	0	Minor roadwork, more work was planned at this location but did not occur, plants came up on adjacent new road spurs (occ. 4541)
ASAG	273	1	5		9	17	Plants in recently opened road and landing
ASAG	274	11	22		40	54	Recent grading and minor roadwork, new spurs contain newly occupied sections (occ. 4538, 4539, 4540, 5023, 5024)
ASAG	4532				4	3	New sites in areas of recent roadwork (construction or re-construction), these roads were surveyed prior to roadwork and no plants were detected at these sites.
ASAG	4533				166	12	New 2017
ASAG	4534				46	121	New 2017
ASAG	4535				1		New 2017, Not part of THP specific monitoring, did not re-visit in 2019

Species Code	Occurrence ID	2012	2014	2016	2017	2019	Notes
ASAG	4536				23		New 2017, Not part of THP specific monitoring, did not re-visit in 2019
ASAG	4537				3	0	New 2017
ASAG	4538				21	56	New 2017
ASAG	4539				33	65	New 2017
ASAG	4540				22	35	New 2017
ASAG	4541				267	388	New 2017
ASAG	4542				17		New 2017, off road, not re-visited
ASAG	5019					14	New 2019
ASAG	5020					6	New 2019
ASAG	5023					6	New 2019
ASAG	5024					24	New 2019
ASAG	5025					5	New 2019
ASAG	5026					18	New 2019
ASAG	5027					1	New 2019
ASAG	5028					278	New 2019
ASAG	5029					1	New 2019
ASAG	5030					6	New 2019

Totals (All Sites)	13	300	4	781	1110
Total (Monitoring Sites)	13	27	0	652	1110

Percent Change (from baseline)

4011%

From the monitoring data it appears that mitigation measures were effective in reducing the impacts to this species to a less than significant level. The results indicate that plant populations within the monitored area increased by more than 4,000 percent following harvest and roadwork activities. New plants were found in areas of new road construction and in areas with significant road work and adjacent timber harvest. New occurrences were often found in places that were not occupied prior to disturbance and are likely sourced from dormant seedbank either located at the site of the new occurrence or pushed in from adjacent areas during road work. HRC will continue to monitor these sites for two more years. It is likely that in an absence of new disturbance these populations will dwindle as adjacent competing vegetation increases and overstory canopy cover closes in. This “boom and bust” pattern has been documented in several

other effectiveness monitoring efforts associated with this species in THPs on HRC properties in this watershed.

LVD 17 THP 1-17-107HUM

The LVD 17 THP, located in the Hely Creek planning watershed^[SC1], was surveyed during the 2017 and 2018 survey seasons. The subject THP is not located on Hely Creek but is centered around an unnamed tributary to the Van Duzen River which enters from the south side of the Van Duzen across from Riverside Park. The THP contains several occurrences of the sensitive plant species *Packera bolanderi* var. *bolanderi* (seacoast ragwort, PABOBO). Two of these occurrences are in areas of proposed road work or new road construction. Occurrence 603 was found on the cut-bank of a seasonal road at the site of a steep sandstone bluff. The road at this point had partially failed and HRC road crew had to excavate into the occupied cut-bank in order to restore the road surface to a drivable width and condition. Road work took place in late 2018. The site was visited in July of 2019 and it was noted at that time that the road at that site had partially failed again. Additional road work was conducted at the site in late 2019, the plants were marked in the field and operators were instructed to avoid plants as possible and feasible. Occurrence 4742 is a small but scattered occurrence located at the site of proposed new road construction. Road construction at this occurrence took place in late 2019 and will not be re-visited until the 2020 survey season. In an agreement with CDFW HRC has agreed to monitor both sites for at least two years after road work. Table 8 shows the results of monitoring efforts to date. No conclusions regarding the effectiveness of the mitigation measures are presented at this time. Occurrence 603 has two groups, only one is included in this monitoring report and plant numbers reported here will differ with numbers reported to CNDDDB and numbers included in Appendix 7, which report the total of both groups.

Table 8 Monitoring Results – Plant Counts for PABOBO at LVD 17

Species Code	Occurrence ID	2004	2018	2019	Notes
PABOBO	603	206	415	136	Roadwork in 2018 and 2019. Monitoring planned for 2020 and 2021.
PABOBO	4742		16		Roadwork in 2019, monitoring planned for 2020 and 2021.

***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 2004-2019 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 one of these roads (Wrigley Road) in 2019. 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 9, Figure 1).

The numbers at Wrigley Road have been in decline after an increase following some light grading and road maintenance that was conducted there in 2011. Plant numbers since that disturbance have varied and in 2019 plant numbers are up from the last count. 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 tracks from light seasonal use. This site is included in an upcoming THP and road upgrading project set to commence in 2020. The site will be re-visited after operations to assess changes in plant numbers and distribution.

In all, the average change in plant numbers across "open road" sites show an increase of 19% when comparing the latest plant counts with the baseline counts done in 2005 and 2007.

Individually the sites have varied greatly;

- Wrigley Road – 95.4% increase from baseline

- Jordan Creek – 64.7% increase from baseline
- Riverside – 48.3% decrease from baseline
- Cummings Creek – 98.5% decrease from baseline
- Upper Newman Creek – 81.6 increase from baseline

The variety in both year to year plant counts within sites and therefore the change from baseline conditions between sites creates a large standard deviation in the mean of population changes (86.9%) making determination as to the significance and cause of the change difficult to determine without additional data collection and deeper statistical analysis.

Total plants at the mitigated sites (Table 10) revisited this year have decreased by 1,447 plants (25%) since the last count. These are known sites that were re-visited in 2019 and do not include new occurrences found at locations that did not previously have recorded occurrences. As in the open roads the variety of values in both the plant numbers and percent change across these sites creates a large standard deviation and makes determination of significance and comparison between treatments difficult without additional analysis.

Table 9. *Montia howellii* plant numbers (Open Roads).

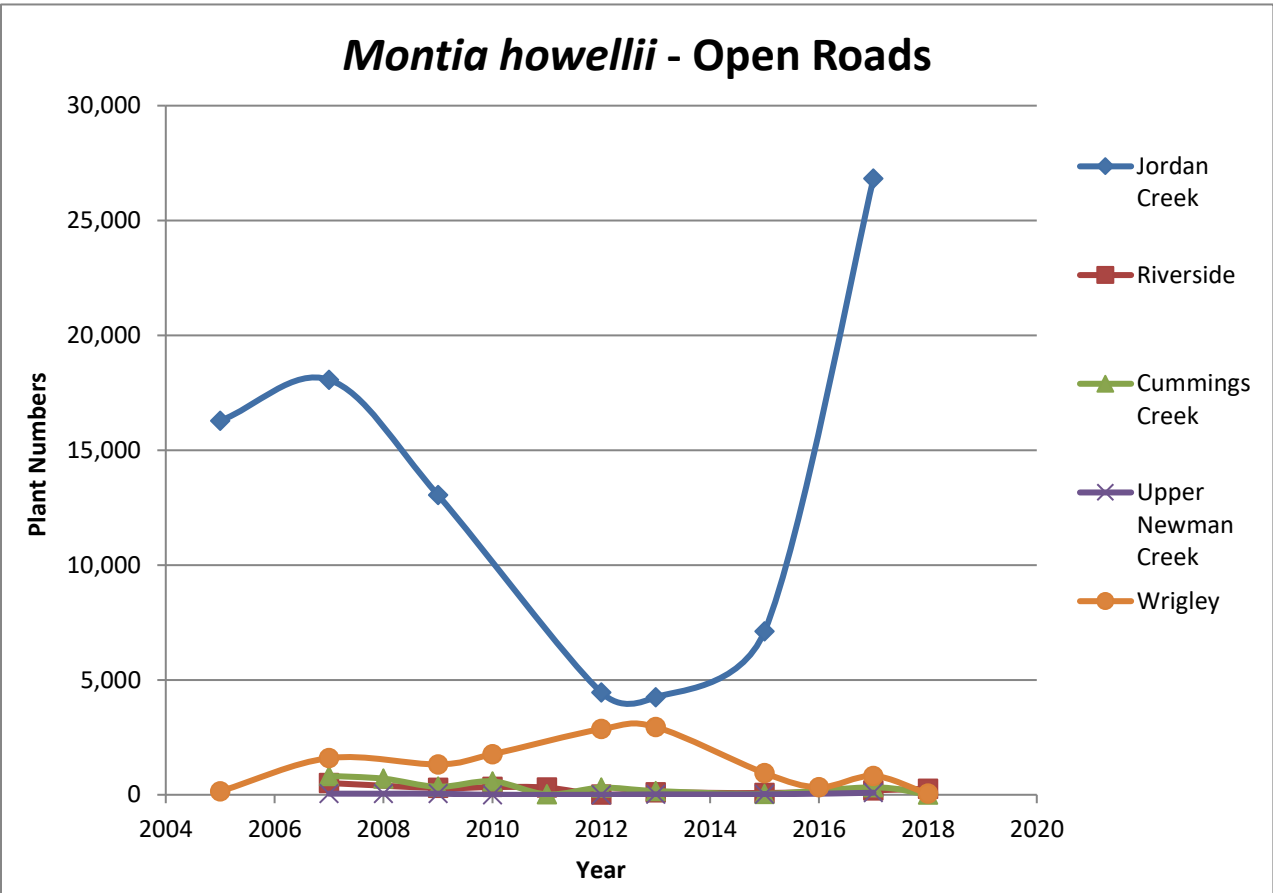
Location	Road	Occ IDs	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wrigley	U11	374, 563, 564	152	1,598		1,323	1,765		2,861	2,950		943	328	819	45	297
Jordan Creek	A51.19	351	16,284	18,066		13,047	†		4,456	4,250		7,119		26,825		
Riverside	L46	163		511		294	336	312	3	99		77		194	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 10. *Montia howellii* plant numbers (Mitigated Sites).

Occurrence ID	Plant ID	Township	Range	Section	Previous Quantity	Previous Year	2019 Quantity	Change in Plant Numbers	Percent Change		
7	MOHO	4N	1E	3	0	2018	0	0	0.0		
34	MOHO	1N	2E	8	80	2015	0	-80	-100.0		
68	MOHO	2N	2E	27	1	2016	10	9	900.0		
83	MOHO	1N	1E	19	264	2015	329	65	24.6		
100	MOHO	1N	1E	19	0	2015	5	5	NA		
114	MOHO	1N	2E	8	0	2015	1	1	NA		
156	MOHO	1N	2E	5	3367	2015	1	-3366	-100.0		
235	MOHO	1N	1E	19	0	2015	0	0	0.0		
236	MOHO	1N	2E	6	14	2015	0	-14	-100.0		
237	MOHO	1N	2E	8	0	2015	0	0	0.0		
537	MOHO	2N	2E	31	20	2015	155	135	675.0		
555	MOHO	2N	1E	36	1568	2015	951	-617	-39.3		
556	MOHO	2N	2E	31	0	2015	0	0	0.0		
558	MOHO	1N	2E	8	0	2015	0	0	0.0		
797	MOHO	1N	2E	8	19	2015	0	-19	-100.0		
841	MOHO	1N	1E	19	0	2015	1	1	NA		
843	MOHO	1N	1E	19	37	2015	429	392	1059.5		
883	MOHO	2N	2E	31	0	2015	0	0	0.0		
884	MOHO	2N	1E	36	23	2015	176	153	665.2		
1628	MOHO	1N	2E	1	0	2018	0	0	0.0		
4160	MOHO	4N	1E	12	1	2018	31	30	3000.0		
4427	MOHO	2N	2E	3	76	2018	14	-62	-81.6		
4556	MOHO	1N	1E	19	23	2017	2238	2215	9630.4		
4558	MOHO	1N	1E	33	295	2017	0	-295	-100.0		
					Totals		5788		4341	-1447	-25

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



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