

Landscape level botanical management in an industrial timberland environment: development of the County Line Botanical Management Area

Introduction

Green Diamond Resource Company (GDRCo) has been conducting pre-disturbance floristic surveys for Timber Harvesting Plans (THPs) for over twenty years, covering over 160,000 acres and nearly 40% of the current ownership. Surveys focus on detecting special status plant species and their associated habitat. Detections are reported to the California Natural Diversity Database (CNDDB) and housed in an internal GIS system. Plant protection measures (PPMs) are developed in partnership with the Department of Fish and Wildlife (CDFW).

In 2008, GDRCo developed a Sensitive Plant Conservation Plan (SPCP) in partnership with CDFW. The SPCP utilizes a vast dataset from surveys to guide management of special status plant species at a landscape level, rather than on a project-by-project basis. Botanical Management Areas (BMAs) are established and paired with region-specific Botanical Management Plans (BMPs), outlining compatible land management practices and plant protection measures for the sensitive plants that occur in target areas.

BMAs are informed by a spatial analysis that incorporate several variables: the known distribution of sensitive plants and plant communities, watershed boundaries, eco-regions, geology, disturbance history, rainfall, temperature, elevation, distance to the coast, as well as others.

In 2023, GDRCo collaborated with CDFW to develop the County Line Botanical Management Area (CLBMA), spanning approximately 54,000 acres in the Coastal Klamath region of Northwest California. The CLBMA is an ideal candidate for several reasons: (1) the area has a predictable forest type, (2) it has been extensively surveyed by GDRCo botanists, (3) there are relatively few special status species known to occur in the area.

Study Area

The CLBMA is 53,707 acres in the Lower Klamath River watershed in Northwest California. The CLBMA is bound by the Klamath River to the north and east, by the watershed boundary between Johnson and Mettah Creeks to the southeast, and by the watershed boundary of the Klamath River and Redwood Creek to the south and west. GDRCo owns 44,852 acres (84%), with the remaining ownership managed by Redwood National Park and several private parties.

Survey Coverage

From 2001-2023, GDRCo botanists have implemented protocol level (CDFW 2009, 2018) botany surveys covering just under 25,000 acres or 55% of holdings within the CLBMA (Figure 1).

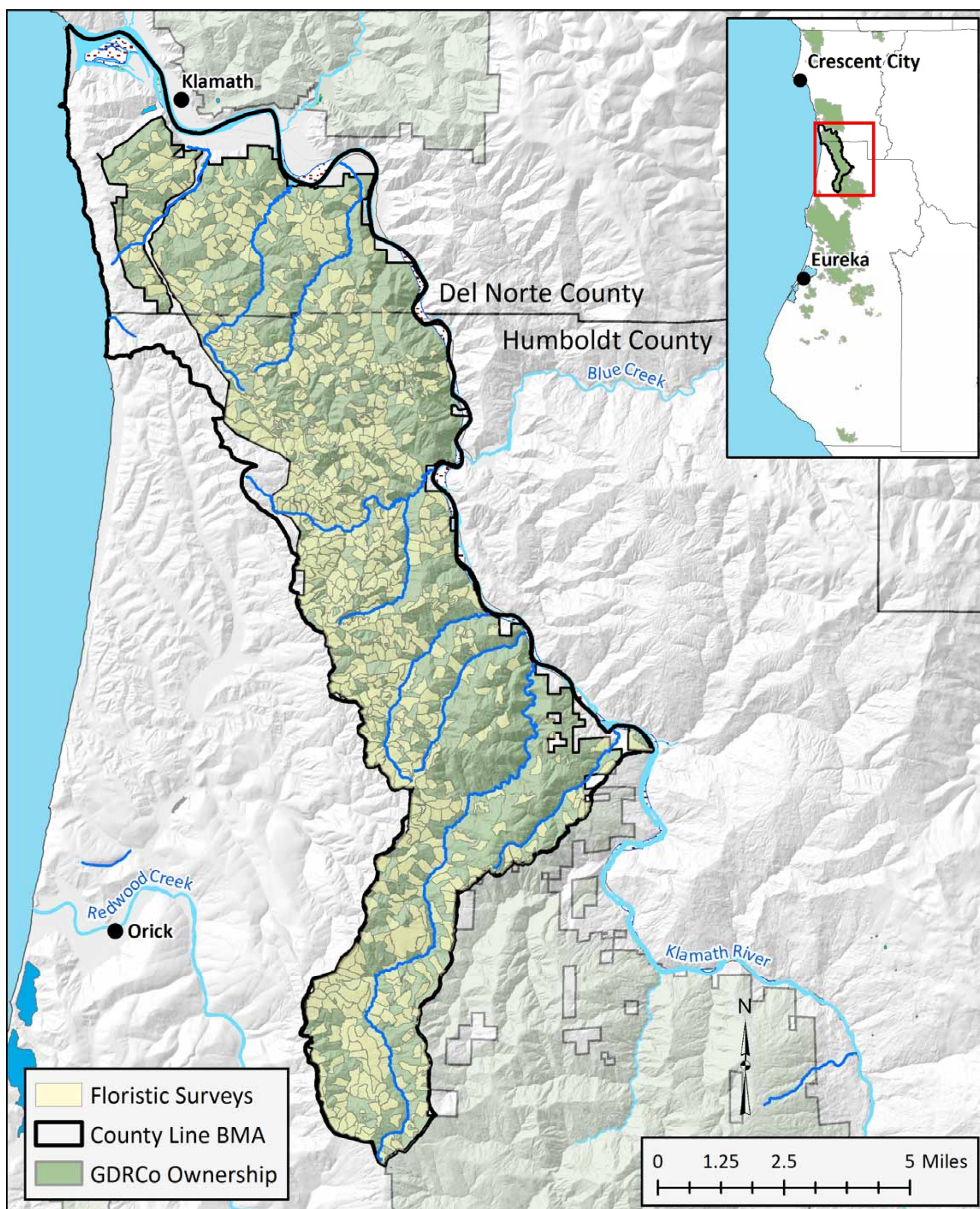


Figure 1. An overview of GDRCo's ownership in California highlighting the boundary of the CLBMA. Surveys from 2001-2023 are depicted in the CLBMA footprint.

Vegetation Communities

- Sequoia sempervirens (Redwood forest) alliance is the most prevalent across the BMA, occupying all but the easternmost upland portions of the plan area.
- Alnus rubra* (red alder) alliance is represented in lower slopes and in riparian areas throughout the BMA.
- Pseudotsuga menziesii* (Douglas fir) alliance is represented in the easternmost upland portions of the project area.
- Picea sitchensis* (Sitka Spruce) alliance is found in the NW section of the project area, nearest to the coast.

Cashman, G.¹, Lamphear, D.¹, Budesilich, M.¹, Shedlock, A.¹
gabe.cashman@greendiamond.com

¹Green Diamond Resource Company, 900 Riverside Road, Korb, CA 95550

Special Status Plant Species

- There are no federally or state listed species known to occur in the BMA
- There are four species with a California Rare Plant Rank (CRPR) of 1 or 2
- There are nine species with a CRPR of 3 or 4

Table 1. Special status plants (CRPR list 1-4) on GDRCo lands known to occur within the County Line Botanical Management Area. CEQA 15380 qualifying plants (CRPR 1 or 2) are shown in bold.

Scientific name	Common name	CRPR/Fed/CA	# of detections on GDRCo property
<i>Cardamine angulata</i>	Seaside bittercress	2B.1/ NA / NA	56
<i>Chrysosplenium glechomifolium</i>	Pacific golden saxifrage	4.3/ NA / NA	47
<i>Coptis laciniata</i>	Oregon goldthread	4.2/ NA / NA	7
<i>Erythronium revolutum</i>	Coast fawn lily	2B.2/ NA / NA	9
<i>Listera cordata</i>	Heart leaved twayblade	4.2/ NA / NA	57
<i>Mitellastrum caulescens</i>	Leafy-stemmed mitrewort	4.2/ NA / NA	44
<i>Monotropa uniflora</i>	Ghost pipe	2B.2/ NA / NA	22
<i>Pityopsis californicus</i>	California pinefoot	4.2/ NA / NA	81
<i>Pleuropogon refractus</i>	Nodding semaphore grass	4.2/ NA / NA	14
<i>Ribes laxiflorum</i>	Trailing black currant	4.3/ NA / NA	105
<i>Sidalcea malachroides</i>	Maple leaved checkerbloom	4.2/ NA / NA	27
<i>Sidalcea malviflora ssp. patula</i>	Siskiyou checkerbloom	1B.2/ NA / NA	1
<i>Tiarella trifoliata var. trifoliata</i>	Threeleaf foamflower	3.2/ NA / NA	1

Scoping

- A comprehensive scoping list was created by querying the CNPS inventory and the CNDDB for known occurrences from all USGS 7.5' quadrangles in the project area and every adjacent quadrangle.
- A query of these twenty-two quadrangles resulted in 56 plants.
- Plants that may occur in the BMA in habitats not owned by GDRCo (i.e., coastal strand and serpentine soils) were considered to have no probability of occurring on GDRCo ownership.
- A total of 18 plants were determined to have the potential of occurring on GDRCo lands (Table 2).

Table 2. Special status plants (CRPR list 1 or 2) determined to potentially have habitat on GDRCo property within the County Line Botanical Management Area. Plants with an asterisk are known to occur within the CLBMA.

Scientific Name	Common Name	CRPR
<i>Astragalus umbraticus</i>	Bald Mountain milk-vetch	2B.2
<i>Cardamine angulata</i> *	seaside bittercress	2B.1
<i>Carex lenticularis var. limnophila</i>	Lagoon sedge	2B.2
<i>Carex viridula ssp. viridula</i>	Green yellow sedge	2B.3
<i>Erythronium revolutum</i> *	coast fawn lily	2B.2
<i>Iliamna latibractea</i>	California globe mallow	1B.2
<i>Kopsiopsis hookeri</i>	small groundcone	2B.3
<i>Lilium occidentale</i>	western lily	1B.1
<i>Moneses uniflora</i>	woodnymph	2B.2
<i>Monotropa uniflora</i> *	ghost-pipe	2B.2
<i>Montia howellii</i>	Howell's montia	2B.2
<i>Oenothera wolfii</i>	Wolf's evening-primrose	1B.1
<i>Packera bolanderi var. bolanderi</i>	seacoast ragwort	2B.2
<i>Piperia candida</i>	white-flowered rein orchid	1B.2
<i>Potamogeton foliosus ssp. fibrillosus</i>	fibrous pondweed	2B.3
<i>Sanguisorba officinalis</i>	great burnet	2B.2
<i>Sidalcea malviflora ssp. patula</i> *	Siskiyou checkerbloom	1B.2
<i>Thermopsis robusta</i>	robust false lupine	1B.2

Plants associated with wet areas

Half of the plants listed as having potential to be detected on GDRCo within the BMA (Table 2) grow in wet areas or habitats associated with wet areas. These habitats are protected on GDRCo ownership in California under the California Forest Practice Rules (CFPRs) and GDRCo's Aquatic Habitat Conservation Plan (AHCP).

Plants associated with disturbance

Several of the potentially present plants are associated with recently disturbed habitats. These plants, except *Oenothera wolfii*, have been detected on GDRCo property in habitats that are non-forested, recently disturbed, or heavily disturbed. Adverse risks to the longevity and persistence of these plants on GDRCo ownership are low, as their life histories are compatible with GDRCo's management practices.

Plants associated with other habitats

The remainder of plants listed as having potential to be detected on GDRCo property within the BMA (Table 2) are associated with a variety of other habitats. Risks to these species can be mitigated using targeted surveys, habitat assessments, and botanical survey history. Each of these six plants will be discussed individually, as the approach to risk mitigation is different for each species.

Risk Analysis

Management activities on GDRCo ownership

Various timber harvest related activities are ongoing across the ownership and have potential to impact sensitive plant populations. These management activities could impact any of the 18 CRPR list 1 or 2 plants determined to potentially have habitat on GDRCo ownership in the County Line BMA. Some of these plants may benefit from these management activities, while others may be adversely impacted. Regardless, these risks can be mitigated so they do not inflict significant impacts that endanger the persistence of populations in their preferred habitats.

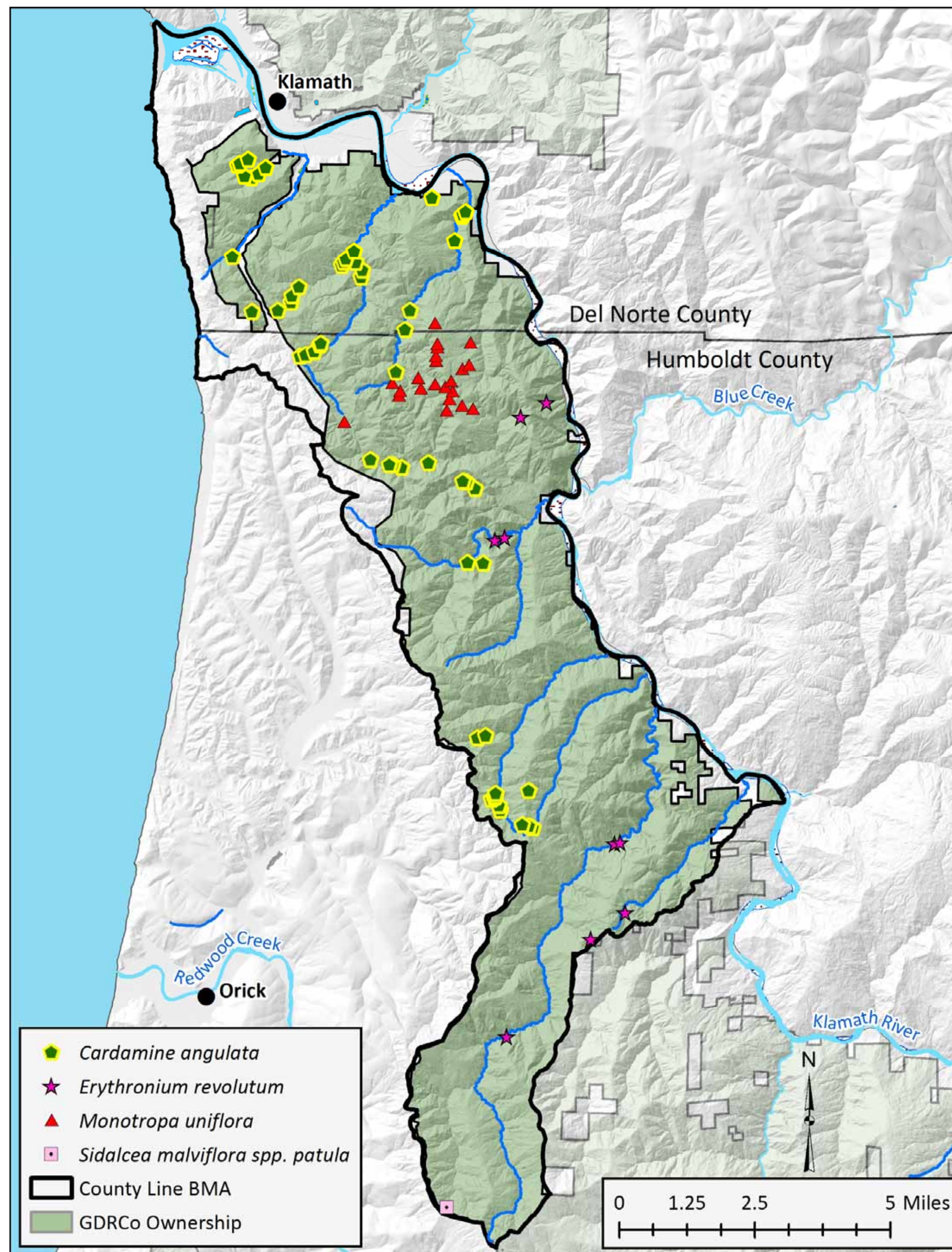


Figure 3. Sensitive plants (CRPR list 1 and 2) on GDRCo lands within the County Line Botanical Management Area.

***Kopsiopsis hookeri* (small groundcone)** is a parasitic plant that typically associates with *Gaultheria*, *Arctostaphylos*, *Arbutus* or *Vaccinium*. While host species are present in the CLBMA and the greater GDRCo ownership, there has never been a conclusive detection. The risk of impacts is very low given the very low likelihood of its presence in the area.

***Moneses uniflora* (woodnymph)** has been detected within the County Line BMA, growing on CalTrans ownership near the property line with GDRCo. This species has never been detected on GDRCo ownership but is known from two locations nearby. Both locations are dominated by *Picea sitchensis*. To mitigate the risk of impacting this species, GDRCo botanists will perform seasonally appropriate surveys where *M. uniflora* is most likely to occur.

***Packera bolanderi var. bolanderi* (seacoast ragwort)** is most often associated with riparian areas but can also be a forest generalist. Known populations on GDRCo ownership are almost exclusively associated with cutbanks or bluffs in riparian areas in the Eel River and Smith River watershed. The nearest population is over 10 miles away from the boundary of the BMA, and the thorough botanical survey coverage throughout the area further indicates this species is unlikely to occur in the BMA. Since this species is typically associated with protected riparian features, the risk of impacts from timber harvesting operations are extremely low. Due to the low potential to occur in the BMA and the minimal associated risk, there will not be any THP level surveys for this species.

***Sidalcea malviflora ssp. patula* (Siskiyou checkerbloom)** habitat is best described as coastal prairie, oak woodlands, open coastal forests, and coastal bluff scrub. While these habitats are not present within the County Line BMA on GDRCo ownership, there is one historic occurrence of *S. malviflora ssp. patula* mapped on GDRCo ownership within the County Line BMA. It is hypothesized that the mapped population on GDRCo ownership is actually referring to an extent population on Redwood National Park. Overall, no prairie habitats are known to occur in the BMA and risks to this species are low.

***Monotropa uniflora* (ghost pipe)** is a myco-heterotroph dependent on a fungal associate with a host tree species from which it obtains nutrients. In western North America, *M. uniflora* is specifically associated with members of the Pinaceae family: *Pseudotsuga menziesii*, *Tsuga heterophylla* and *Picea sitchensis*. GDRCo hosts over 1000 known populations of *M. uniflora* across its ownership, with a majority (over 800) of those in the Smith River area. There are 22 known populations of *M. uniflora* spread across an approx. 1500-acre area within the County Line BMA. Floristic surveys performed across the CLBMA have shown the species to be restricted to one small region on GDRCo ownership (see figure 5). Risks of impacting *M. uniflora* within the BMA will be mitigated by conducting focused surveys in the area where the species is known to occur.

***Piperia candida* (white flowered rein orchid)** has been documented to occur in areas of North Coast Coniferous Forest or broadleaved upland forest. While these habitats exist throughout the BMA, the conditions within the BMA appear largely unsuitable for this species. GDRCo's floristic survey data consistently indicates that *Piperia candida* is associated with more inland habitats with increased summer temperatures and lower humidity. The BMA is far too coastal, temperate and humid for this species. The southeastern edge of the BMA, however, does host suitable habitat, as it has been detected just outside the BMA in this area (see Figure 7). This area is defined as the ridge between Johnsons/Tectah and Mettah Creeks. Timber harvest units in this area will receive focused surveys. Conducting surveys through this area will reduce the risks of impacting this species in the BMA to less than significant levels.

Survey Protocols

Pre-survey review (THP specific scoping): Thorough office review using an extensive botanical database and Geographic Information system (GIS) of each THP in the BMA will be performed to determine the potential presence of suitable sensitive plant habitat in the harvest plan area. Factors considered include: (1) habitats and special survey areas present in the THP area, and (2) forest composition. Forestry staff will assist with identifying these areas, since they have first exposure to and intimate on-the-ground knowledge of the THP area.

Survey efforts: THP level surveys will be limited to areas of high potential for target species AND potential for adverse effects. A summary list of habitats that will receive focused surveys in the County Line BMA is given below:

- Stands that have a significant component of *Picea sitchensis* will be surveyed for *Moneses uniflora*.
- The *Monotropa uniflora* study area (Figure 5).
- The *Piperia candida* study area (Figure 7).
- Rock outcrops to be utilized as a rock source that have not received botanical surveys in the past.

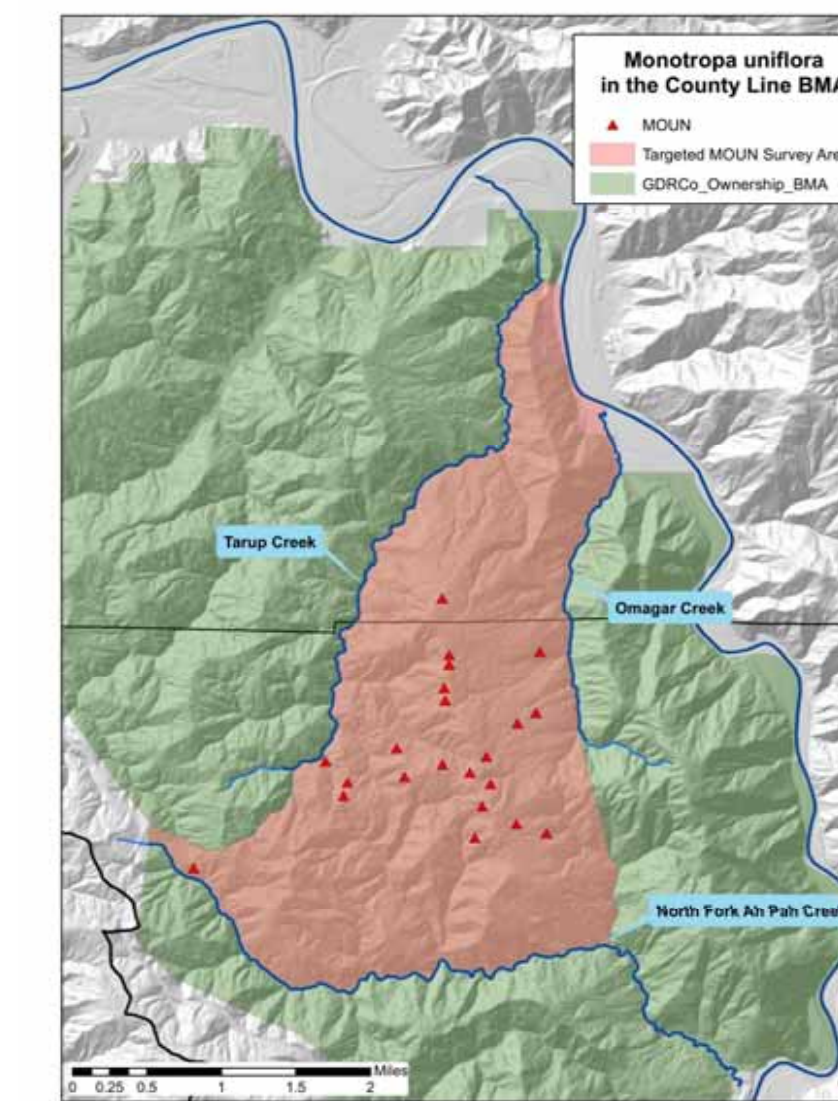


Figure 5. Designated *M. uniflora* specific survey area within the CLBMA with all known occurrences of the species.



Figure 6. *M. uniflora* in peak flower.

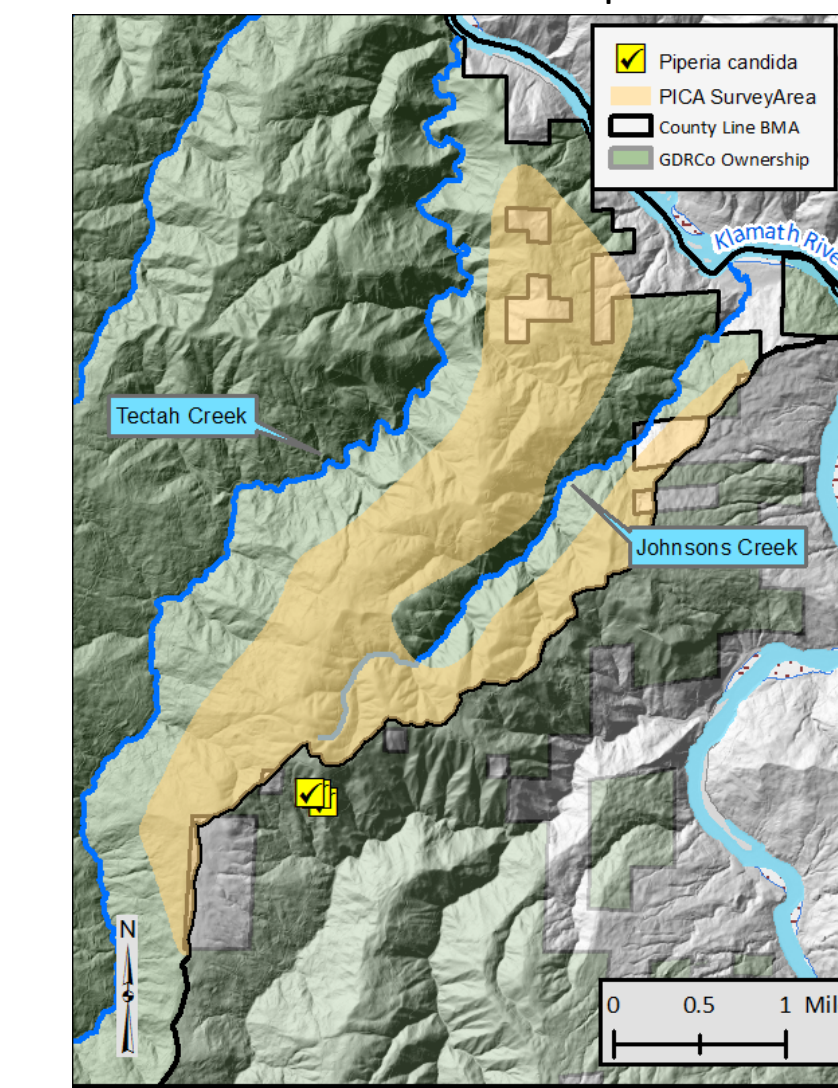


Figure 7. Designated *P. candida* specific survey area within CLBMA.



Figure 8. *P. candida* with characteristic white petals and short petal spur.

Monitoring

Focused non-THP surveys

GDRCo botanists will conduct focused surveys in high quality habitats that lack survey coverage. This proactive survey effort will allow us to effectively survey areas that may never be assessed for Timber Harvesting Plans and will lead to a greater understanding of the distribution of sensitive plants in the BMA.

Species specific effectiveness monitoring

Each year the GDRCo botany department will revisit and monitor a selection of known special status (CRPR list 1 or 2) plant populations within the BMA on GDRCo ownership. These follow-up visits will monitor the effectiveness of GDRCo's plant protection measures imposed for each population, as well as serving as indicators for the species well-being throughout the area.

Why Landscape Level Management?

Focus on long term management of special status plants

- Reactive approach to rare plant management focuses all available expertise to detecting and avoiding impacts at the THP level with little contribution landscape level understanding. A proactive approach can minimize risk to known species and allocate time to restorative efforts and non-THP surveys.

Active management of known special status plant species

- Many special status plants on timberlands are disturbance dependent we can use active management to maintain and enhance these occurrences.

Habitat enhancement of sensitive ecological areas

- Conifer encroachment, invasive species, and succession can be curbed by active habitat maintenance.

Acknowledgements

We would like to thank previous Green Diamond botanists including Cheri Sanville, Bianca Hayashi, and Elicia Goldsworthy. Many thanks to all of the field botanists who braved the elements, poison oak, and steep terrain!

