

VEGETATION ASSESSMENT

Vegetation Sampling Methods

The vegetation of CDLO was sampled using the Rapid Vegetation Assessment (RVA) protocol as prescribed by the California Native Plant Society (Appendix I). The premise of this method is to evaluate vegetation without having to do detailed measurements using quadrants or transects. This method uses a “coarse filter” approach in which broad ecological perspectives are utilized to assess site quality, composition and habitat for purposes of conservation. In effect, wide spectrums of habitat are the focus rather than individual species. (One variation from the version of the protocol provided is that location data were recorded in NAD 83, not NAD27.)

Fifty-six sample sites were selected (Figure CDLOVEG-1). Sampling was conducted between May 10, 2008 and August 17, 2008. Each assessment took about 45-60 minutes to complete, depending on the size and accessibility of the stand. Although the size of the stand was taken into consideration (stands generally less than 20 acres), site selection was mainly determined by the relative homogeneity of dominant species present amongst a given stand as well as accessibility. Homogeneity is influenced by compositional and structural factors. Stand composition is a reflection of relative amalgamation of dominant species. This composition can have very definite boundaries with adjacent stands or it can be barely discernable as one stand effectively merges into another.

The composition and stand boundaries are very much affected by the structural or physical factors influencing a given site. Therefore, physical factors such as slope and aspect were also taken into consideration when defining a particular site. If the stand was uniform in its composition, then it was not deemed necessary to sample the entire area. Rather, a small area was sampled and then extrapolated to the rest.

For each stand, a list of up to 12 major native tree, shrub, and/or herb species was recorded (scientific names of plants follow Hickman (1993)). All species were categorized by a height stratum (low= ≤ 0.5 meters, medium= >0.5 to 5 m, and tall= >5 m), and their abundance or percent was assessed by estimating the percentage of ground area covered by living parts. In some cases, a given species could be placed into more than one stratum (*e.g.*, *Umbellularia californica* could be found in the low, medium and tall layers). As such, percent cover was estimated separately for each stratum. Additional variables recorded include total vegetative cover, total tree, shrub, and herb cover, and degree aspect and degree slope when applicable. Each stand was given a GPS waypoint using Universal Transverse Mercator (UTM), North American 1983 datum (NAD 83). Digital photos were taken in the eight cardinal directions for all of the stands. These have been placed on DVD for the purpose of long-term monitoring.

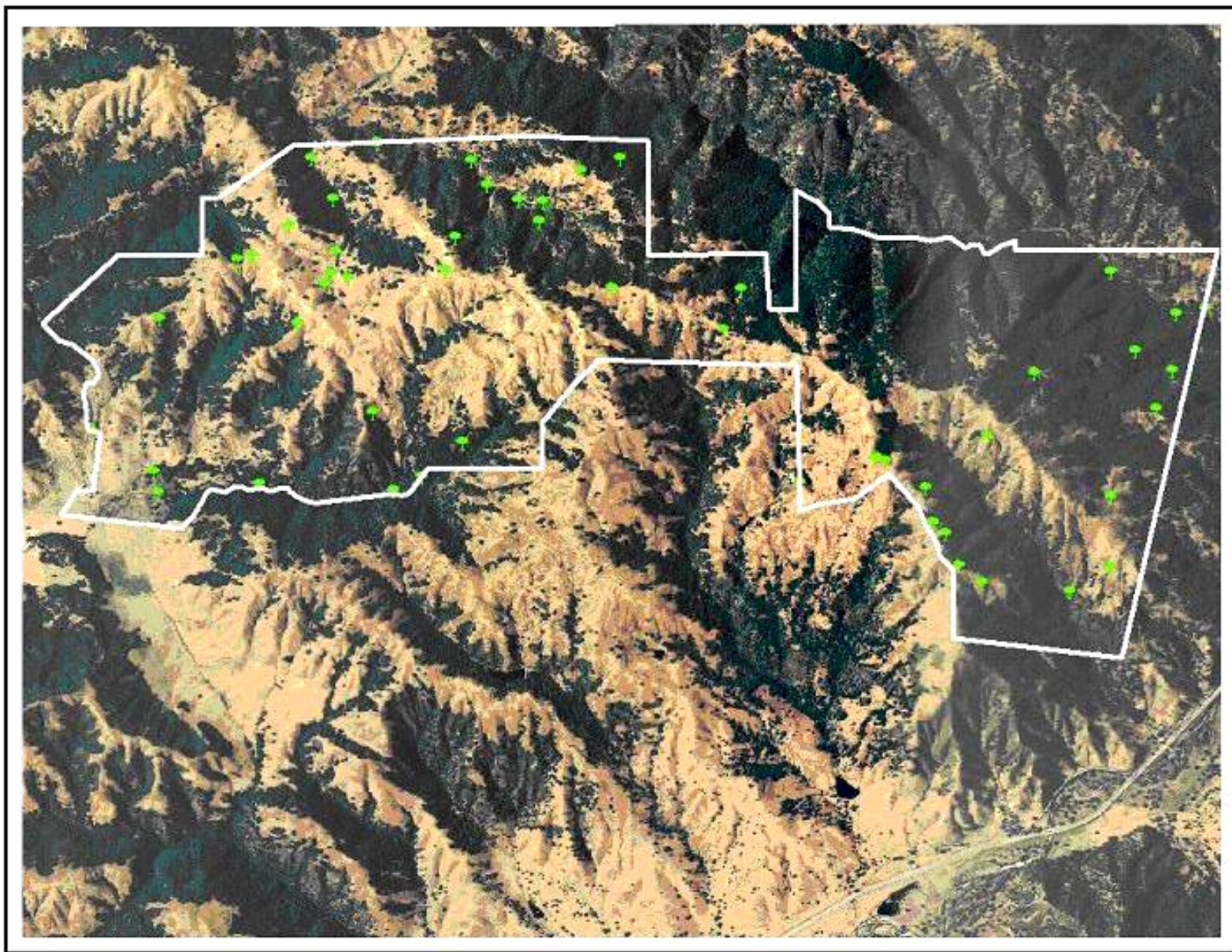


Figure CDLOVEG-1. Rapid Vegetation Assessment sampling points on CDLO

Post-Sampling Data Processing

The CDFG Wildlife and Habitat Branch of the Habitat Conservation Division in Sacramento performed post sampling data processing. The vegetation was delineated using the sampling data entered into an Access database. Delineations were based on features such as percent cover of stand associates, height and diameter at breast height (DBH) classes.

Vegetation classification follows a hierarchical scheme using the National Vegetation Classification System (Grossman *et al.*, 1988) and the Manual of California Vegetation (Sawyer and Keeler-Wolf, 1995). For CDLO, much of the vegetation was delineated into either Alliances or Associations where an Association is described as a group of samples with similar dominant and characteristic species in the overstory plus other important or indicator species. Associations are grouped to the next level in classification, the Alliance. From those delineations, a database was prepared for use in conjunction with the creation of an ARCGIS vegetation map for CDLO.

Vegetation Map

The vegetation map was created in ARCGIS using an orthophoto base layer from the National Agricultural Imagery Program (NAIP) with the Cañada de los Osos Ecological Preserve boundary as an overlay (Figure CDLOVEG-2).

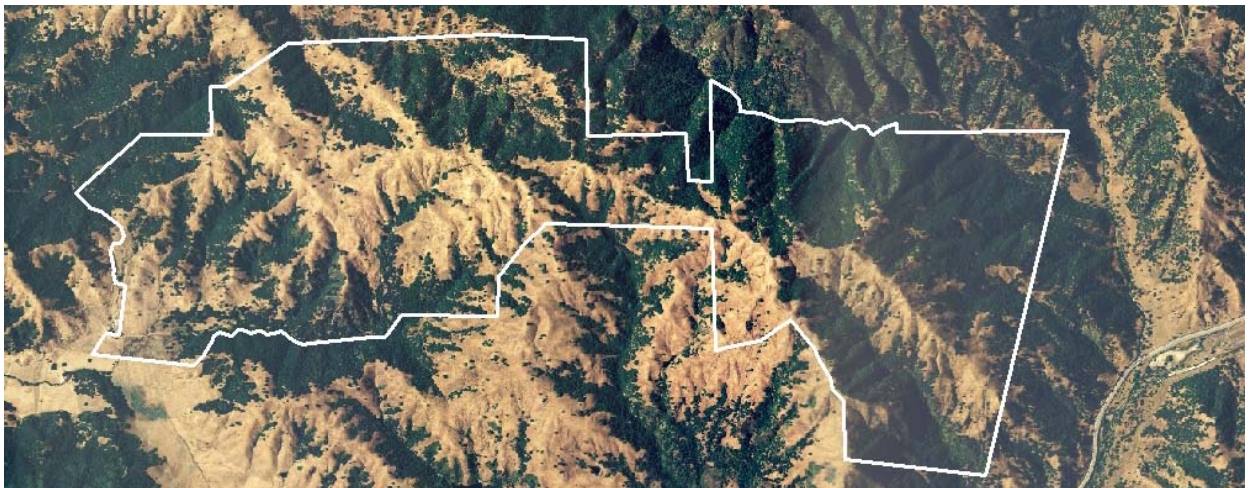


Figure CDLOVEG-2. NAIP image of CDLO with boundary layer.

The original database derived for the purpose of creating a vegetation map for CDLO contained an appreciable level of detail and consequent large number of classifications that were not suitable for the mapping process. Therefore, all subsets of a classification were grouped into a single classification while retaining the vegetation labels defined by the Wildlife and Habitat Branch. For example, while there may have initially been four or five different types of *Umbellularia californica* – *Quercus agrifolia* habitat based on

percent cover, height and DBH classes etc., there is now only one type of *Umbellularia californica* – *Quercus agrifolia* habitat based on dominant species indicated on the map. Furthermore, all of the features used to delineate a given subset of the original classification scheme do not apply to the modified classifications used to create the map. As a result, the original database was retained and a copy of that was modified and saved. The modified database was used as an attributes table for the vegetation shape files in the map.

Mapping consisted of creating vegetation polygons on the NAIP layer within ARCGIS. Vegetation at the Alliance level is generally more easily mapped by aerial photo than that described at the Association level. Therefore, it was necessary to ground-truth for purposes of quality control.

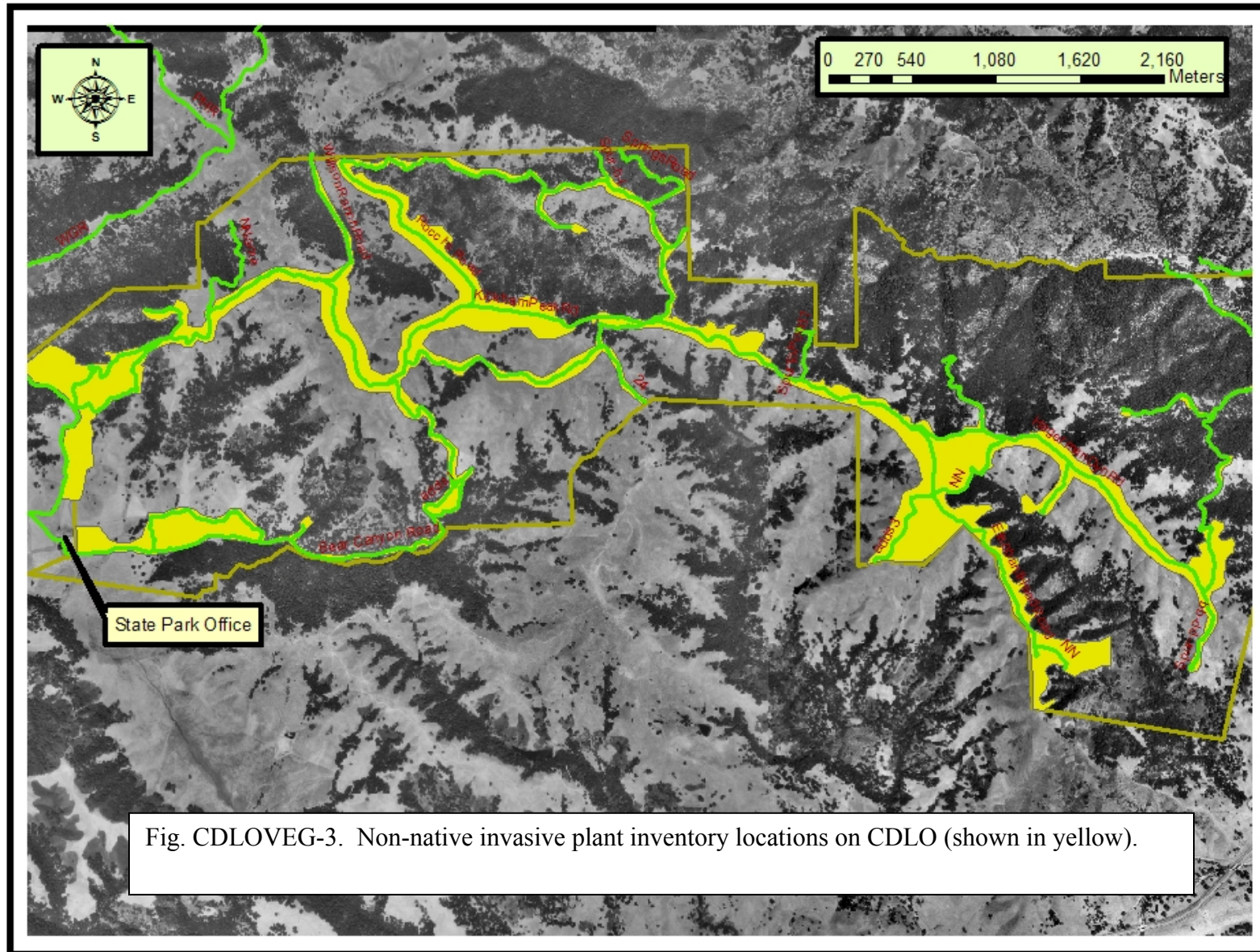
Certain “mapping rules” were created to maintain consistency when creating polygons.

- Trees separated from a larger, woodland stand by greater than two times their canopy width were not included within the larger stand.
- Similarly, grassland polygons can contain trees that do not appear associated with an adjacent woodland polygon.
- Trees within grassland forming an apparent savannah community were mapped as a community separate from the extenuating grassland. If members of that community appeared to merge with adjacent woodland, they were retained in the savannah polygon.
- Areas of grassland or scrubland surrounded by woodland and less than five meters in width were incorporated into the woodland polygon.

Non-native Invasive Plant (Weed) Inventory

During RVA sampling and other field work, a number of noxious invasive plant species were observed on the reserve. Focused surveys were done along roads to identify the distribution of some of these thought to be particularly detrimental to wildlife habitat quality, and that seemed to be in discrete enough patches that control could be feasible. Patches of the following were identified and mapped along roads (Figure CDLOVEG-3): poison hemlock, Fuller’s teasel, Harding grass, medusa head, yellow star thistle, and bull thistle. Other non-native invasive species, such as Italian thistle, were found to be too wide-spread throughout the property for mapping or control to be feasible.

Area Covered to Create Weed maps



Results

Thirty-three vegetation types were identified on CDLO, using the classification system described in *A Manual of California Vegetation* (Sawyer and Keeler – Wolf, 1995). These are “crosswalked” (correlated) with nine Wildlife Habitat Relationships (WHR) vegetation types (Table CDLOVEG-1). Because some of the vegetation types would be impossible to accurately distinguish from aerial photography (e.g. *Nasella pulchra* (perennial) grasslands versus *Lolium multiflorum* or *Bromus diandrus* (annual) grasslands), vegetation types were “lumped” into 11 classifications for mapping purposes.

The following vegetation classifications were mapped for CDLO (Figure CDLOVEG-4) and described using *A Manual of California Vegetation*:

- *Artemisia californica* – *Mimulus aurantiacus* (Sage brush – sticky monkeyflower) Association
 - Part of coastal scrub found in uplands on steep, south-facing slopes with shallow soils, rarely in areas that receive seasonal flooding
- *Baccharis pilularis* – *Artemisia californica* – *Toxicodendron diversilobum* – *Monardella villosa* (Coyote brush – sagebrush – poison oak) Association*
 - Found on coastal bars, river mouths, coastal bluffs, open slopes and terraces. Coyote brush stands have the potential to remain fixed or develop into woodland communities.
- California Annual Grassland Alliance
 - Covers all aspects in upland topography with many alien and native species present. As noted above, this category includes native perennial grasslands indistinguishable from annual grasslands using aerial photography.
- *Quercus douglasii* (Blue oak) Alliance
 - Found in valleys and on gentle-to-steep slopes in shallow, nutrient-poor soils.
- *Quercus lobata* – Annual Grassland (Valley oak – annual grassland) Association
 - Present in wetlands and floodplains that receive seasonal flooding and uplands including valleys and gentle slopes with alluvial or residual soils.
- *Quercus lobata* – *Quercus* spp. – *Toxicodendron diversilobum* – *Rhamnus californica* (Valley oak – oak spp. – poison oak) Association
 - Present in wetlands and floodplains that receive seasonal flooding and uplands including valleys and gentle slopes with alluvial or residual soils.

* *Monardella villosa* is not present within this Association at Cañada de los Osos

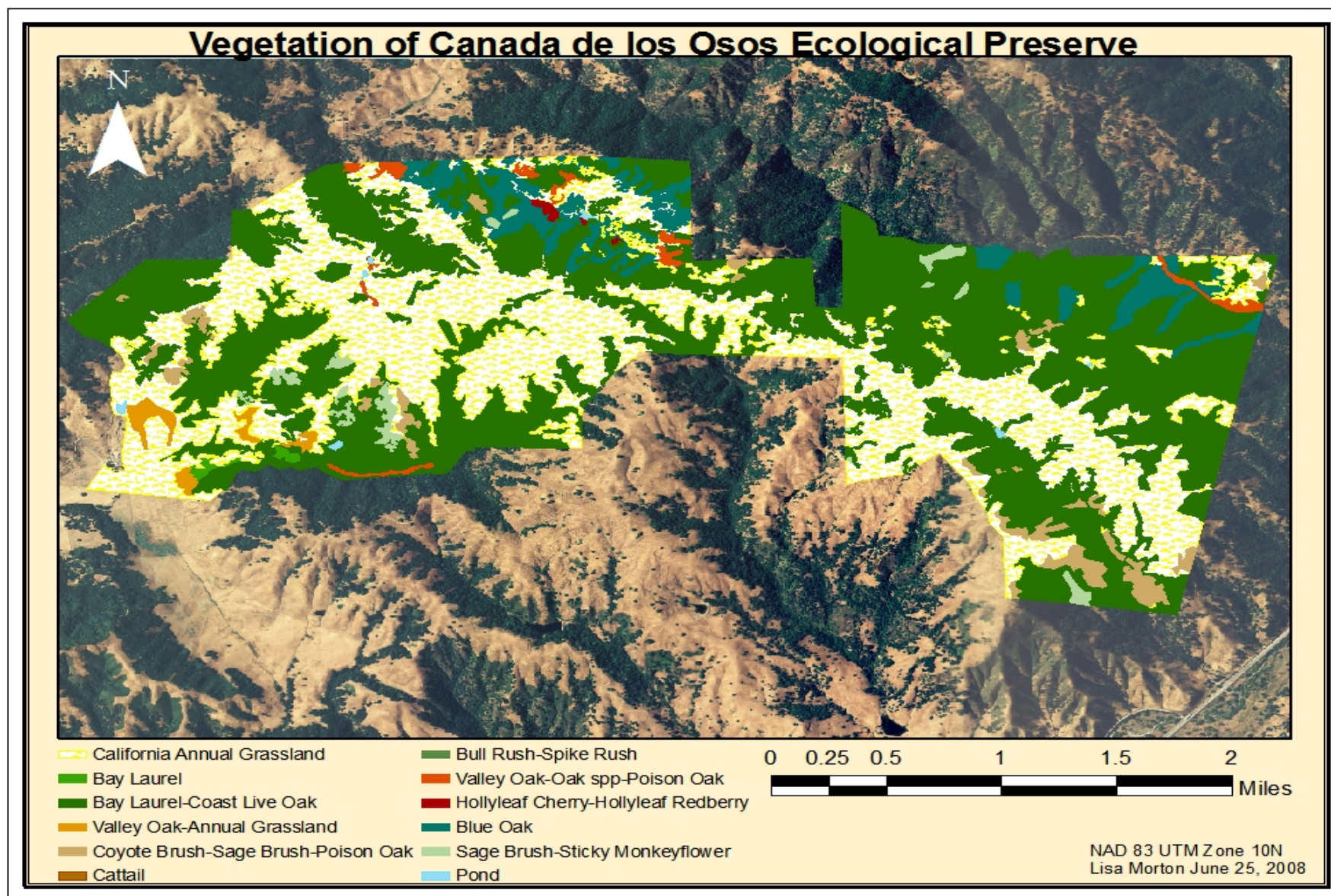


Figure CDLOVEG-4. Vegetation of CDLO Ecological

- *Prunus ilicifolia* – *Rhamnus crocea* (Hollyleaf cherry – hollyleaf redberry) Provisional Association[†]
- *Scirpus californicus* – *Eleocharis macrostachya* (Bull rush – spike rush) Association
 - Found in alkalai, brackish or freshwater wetlands that receive permanent, regular, semi permanent, seasonal, or irregular flooding on bay, estuary, dune swale, slough terrace edges; berm, backwater, bank, bottomland margins of rivers; channel, creek, ditch margins; lake beds; lagoon, pond, reservoir margins; along geologic faults.
- *Typha domingensis* (Cattail) Provisional Association[†]
 - Found in alkalai, brackish or freshwater wetlands that receive permanent, regular, semi permanent, seasonal, or irregular flooding on bay, estuary, dune swale, slough terrace edges; berm, backwater, bank, bottomland margins of rivers; channel, creek, ditch margins; lake beds; lagoon, pond, reservoir margins; along geologic faults.
- *Umbellularia californica* (Bay laurel) Alliance
 - Present in wetland where flooding is intermittent and upland habitat at all aspects. For a stand to be a member of this series, California bay must be the tree canopy dominant. In many cases, California bay is the only tree species present in old stands and few shrubs and herbs are present.
- *Umbellularia californica* – *Quercus agrifolia* (Bay laurel – coast live oak) Association
- Pond[‡]

Forty-six plant species that are classified as “noxious weeds” by the California Invasive Plant Council (CAL-IPC) were identified on CDLO. The greatest distribution of the “weedy” species targeted for mapping was at the western portion of the reserve (Figures CDLOVEG 5a-g). In the areas surveyed, poison hemlock was found only in the Cañada de los Osos Valley, and was heaviest in and near locations that had been dry-land farmed in the past. Harding grass, bull thistle and teasel were found in areas that may have been heavily disturbed in past years by dry-land farming or heavy cattle use near ponds. Small or moderate amounts of yellow star thistle were found in all but one of the mapped areas. Medusa head was found in several large patches at the eastern and central areas of the reserve, with small patches found at the western end.

A complete list of plants identified in vegetation surveys and incidental to other field work is given in Table CDLOVEG-2.

Map #1

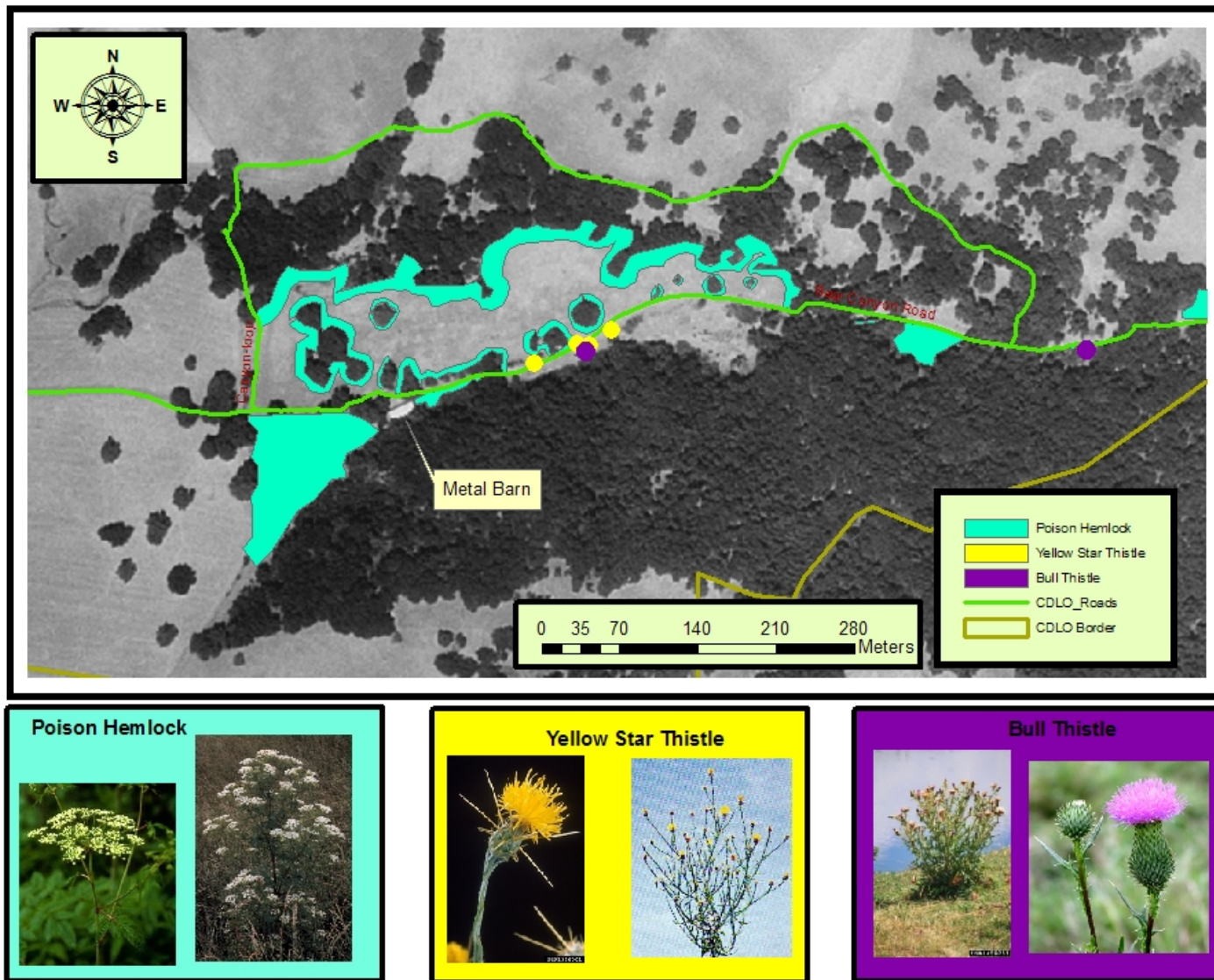


Figure CDLOVEG – 5b. CDLO “Weed” site map #1.

Map #2

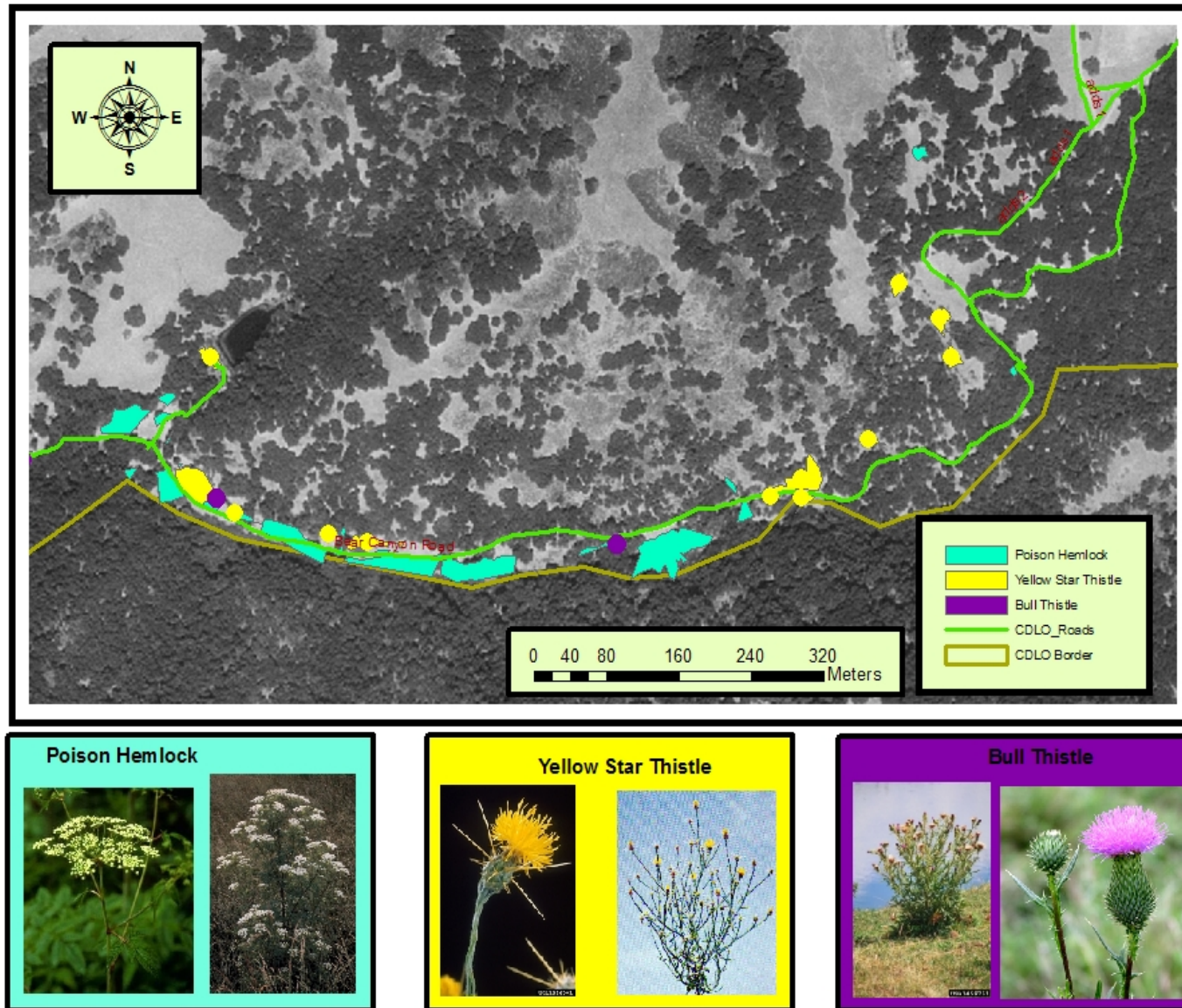


Figure CDLOVEG – 5c. CDLO “Weed” site map #2.

Map #3

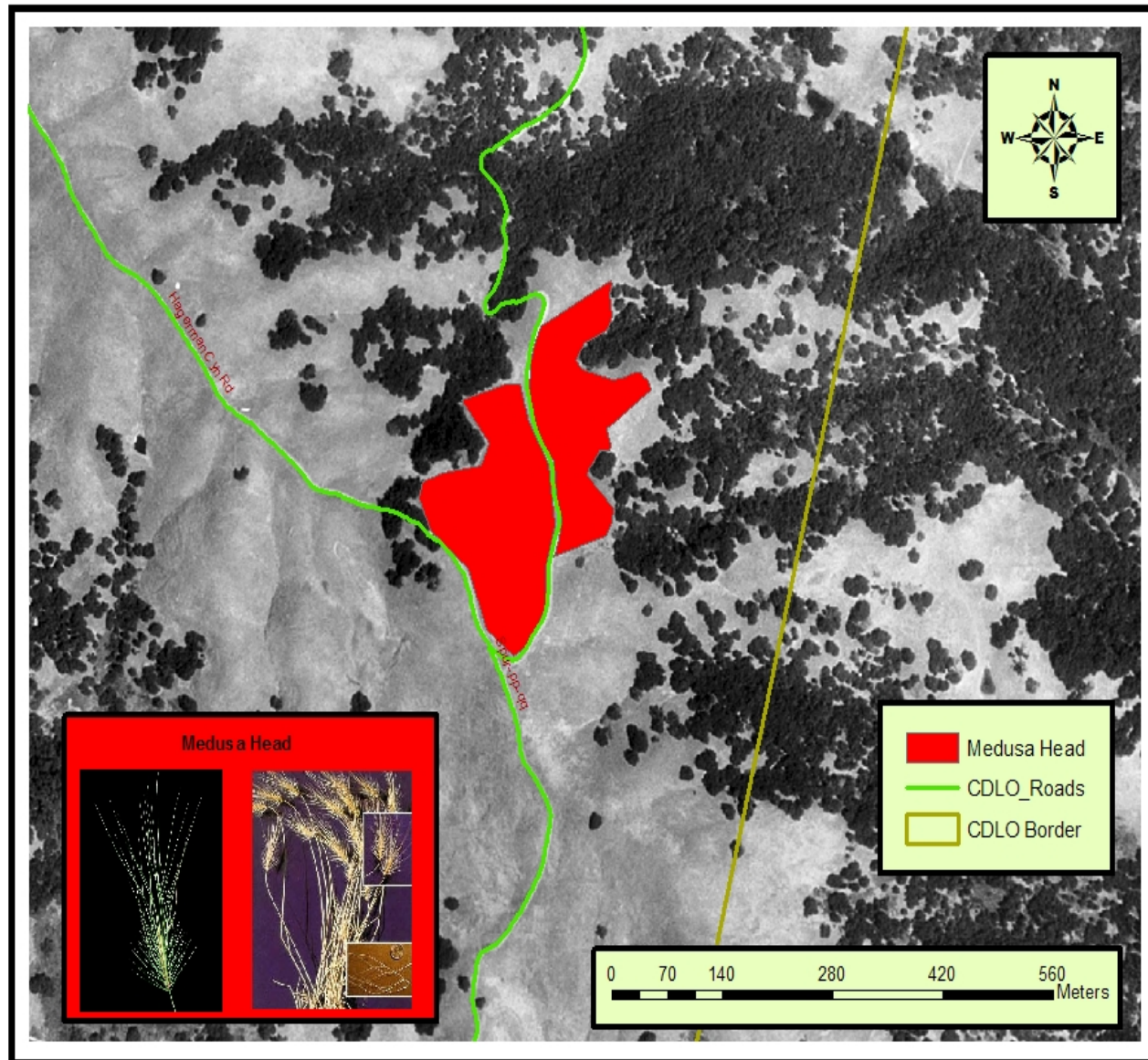


Figure CDLOVEG – 5d. CDLO “Weed” site map #3.



Map #4

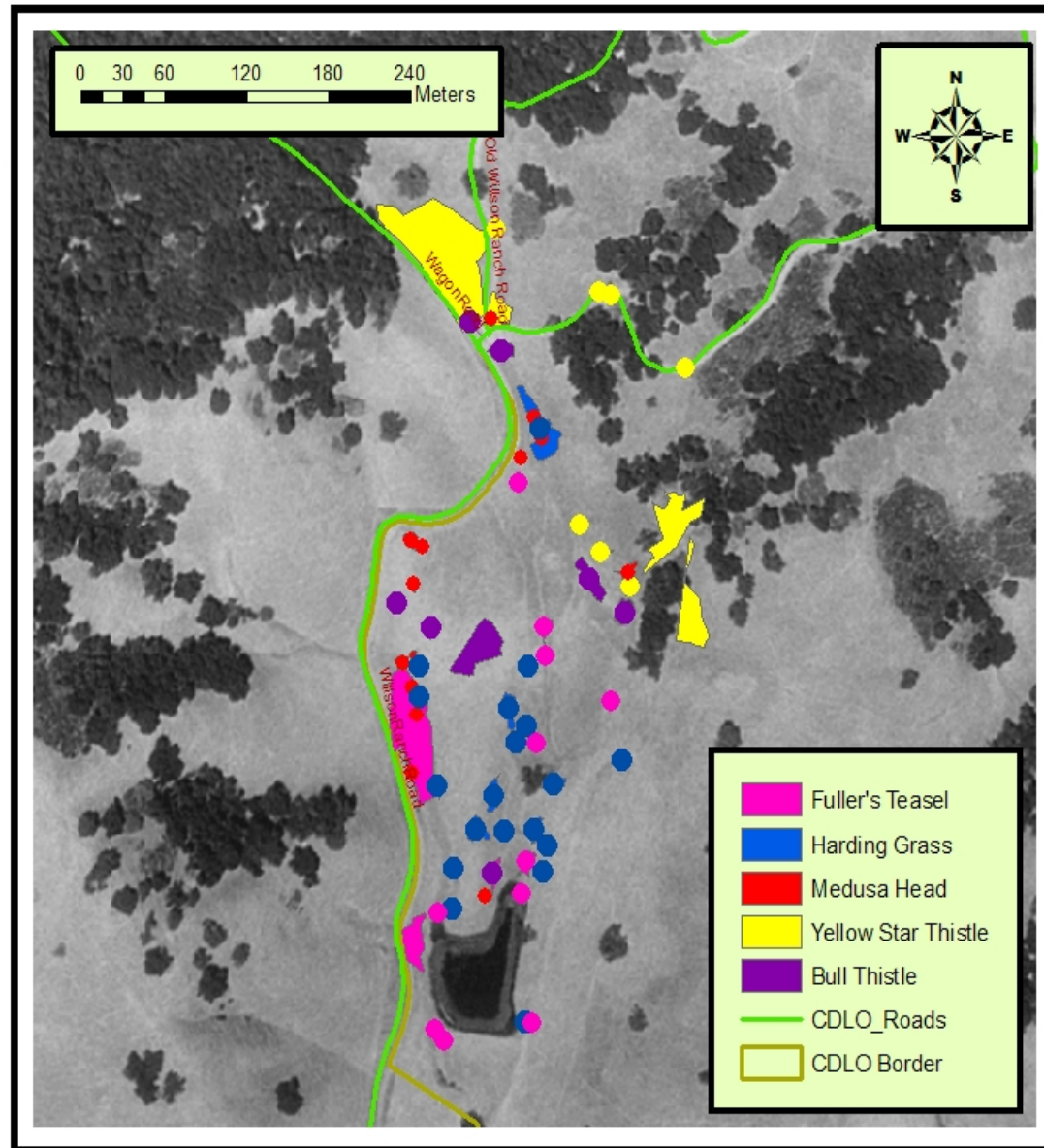
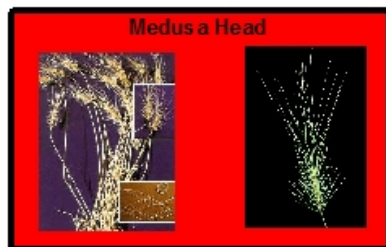


Figure CDLOVEG – 5e. CDLO “Weed” site map #4.



Map #5

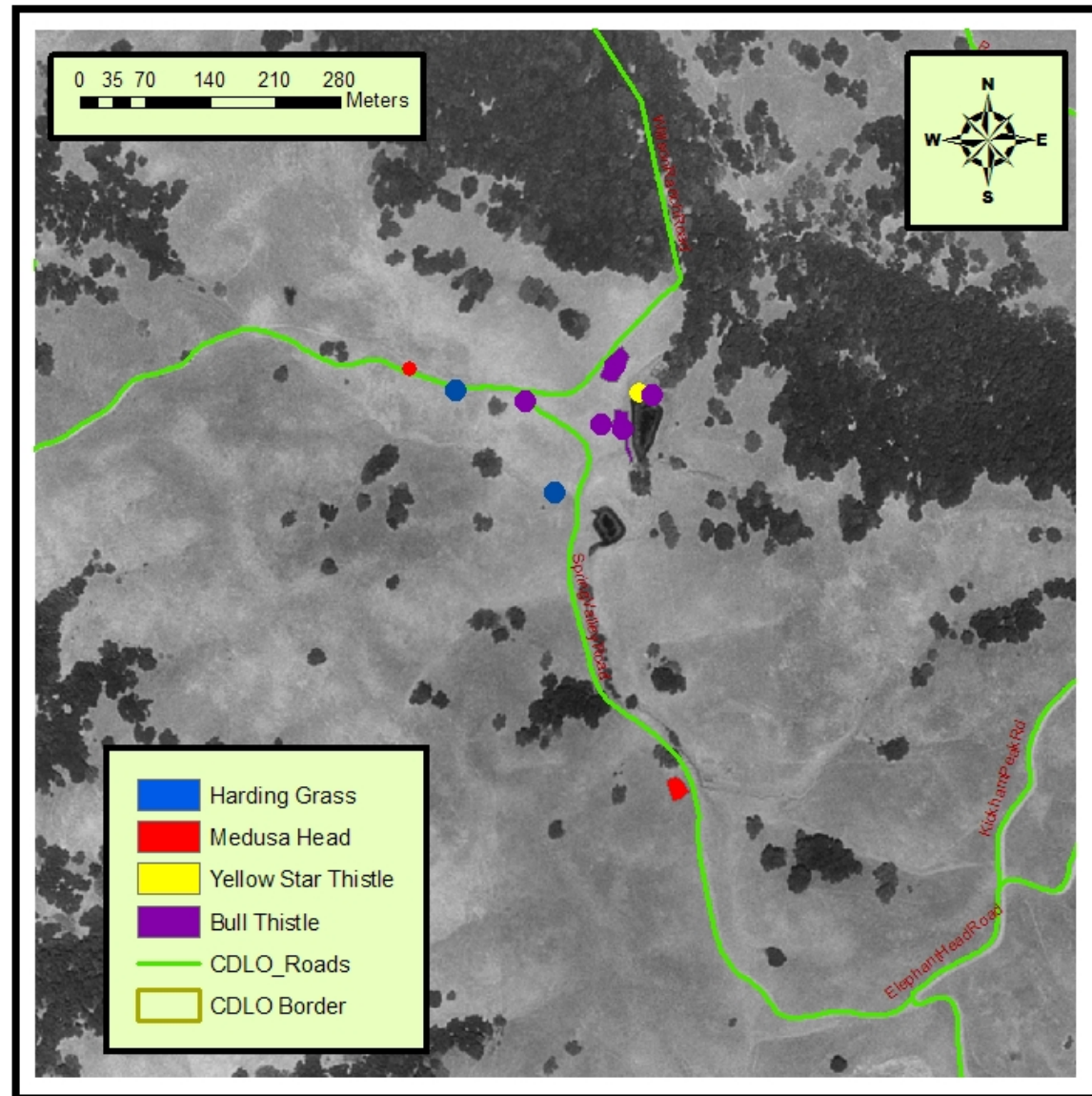


Figure CDLOVEG – 5f. CDLO “Weed” site map #5.

Map #6

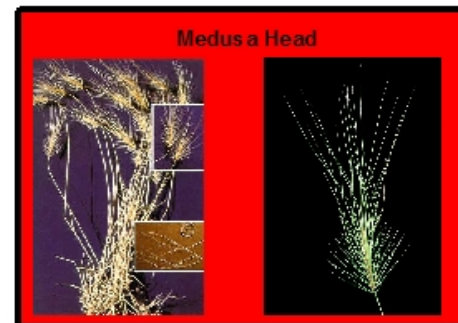
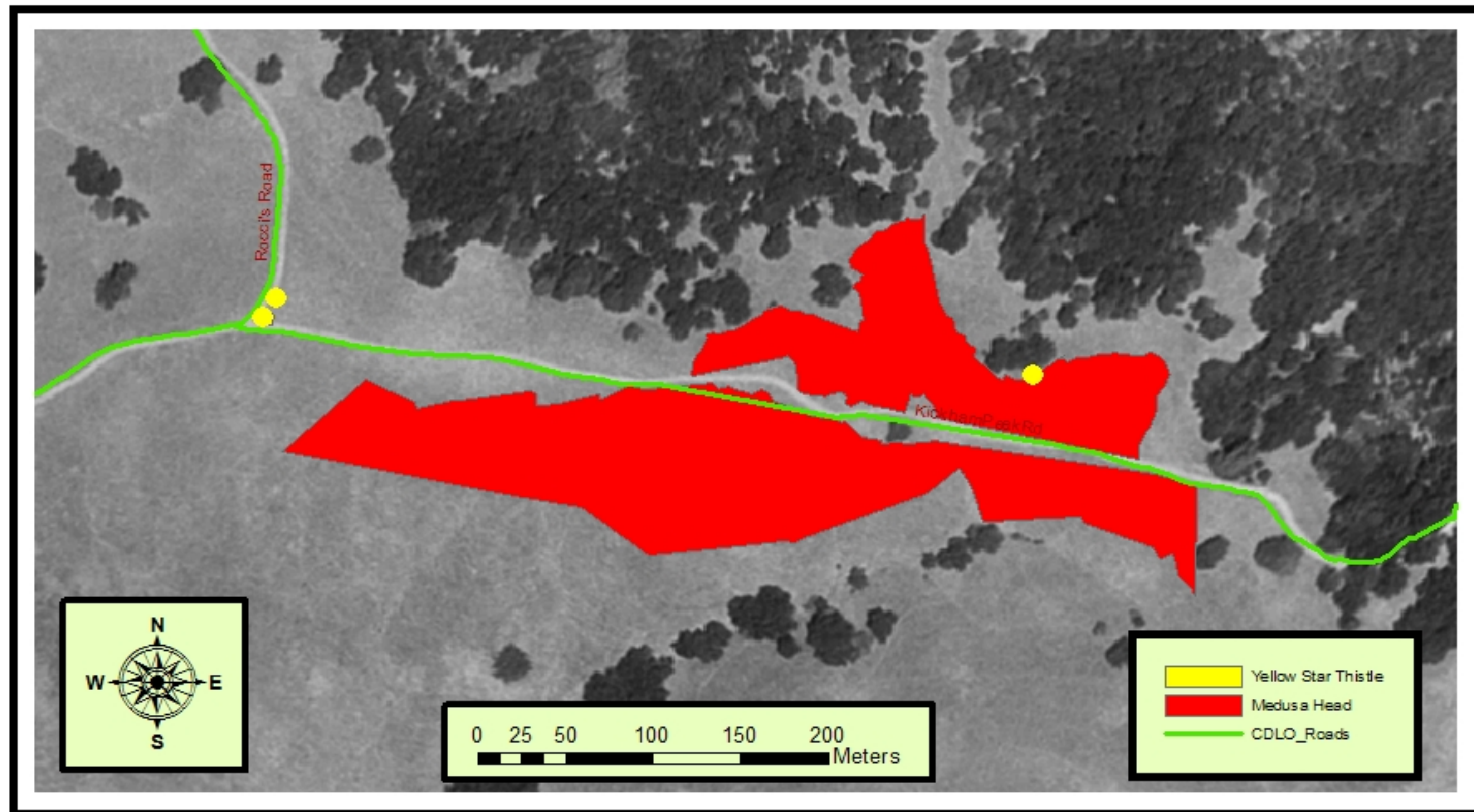


Figure CDLOVEG – 5g. CDLO “Weed” site map #6.

Discussion and Recommendations for Future Work

The vegetation map developed for this project was at a level thought to be useful for current management applications on the property. As mentioned, the classifications mapped indicate dominant species, and may be a combination of several habitat types based on structural differences (percent cover, height, DBH classes). The designations of these finer classifications are available for each point in the data base (provided in the electronic version of this report). In the future, these additional data may be useful for more focused floristic studies or for identification of changes in vegetation over time.

Recommendations for future vegetation assessment:

- Conduct focused mapping of particular habitat types that don't show up in broader classifications (e.g. stands of *Quercus kelloggii*, *Populus fremontii* and *Platanus racemosa*)
- Map of large and/or significant stands of native grasses (e.g. *Nassella* spp, *Festuca* spp, *Koeleria macrantha*, *Melica* spp, *Leymus triticoides*, *Danthonia californica*).
- Extend mapping of “weedy” species beyond road areas.
- Continue monitoring “weedy” species to determine spread and efficacy of control measures.
- Include hoary cress in the list of “weedy” species to be monitored.