



2009

Biological Monitoring Report
for the
Crestridge Ecological Reserve

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Endangered Habitats Conservancy

Prepared by
Conservation Biology Institute



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Table of Contents

<u>Section</u>	<u>Page</u>
EXECUTIVE SUMMARY	v
INTRODUCTION	1
RARE PLANTS	
San Diego Thornmint (<i>Acanthomintha ilicifolia</i>)	2
Lakeside Ceanothus (<i>Ceanothus cyaneus</i>)	5
San Diego Sagewort (<i>Artemisia palmeri</i>)	10
Palmer's Grapplinghook (<i>Harpagonella palmeri</i>)	11
Ramona Horkelia (<i>Horkelia truncata</i>)	13
San Diego Goldenstar (<i>Bloomeria [=Muilla] clevelandii</i>)	14
Engelmann Oak (<i>Quercus engelmannii</i>)	14
Rush-like Bristleweed (<i>Xanthisma (=Machaeranthera) junceum</i>)	18
Interior Live Oak (<i>Quercus wislizeni</i> var. <i>frutescens</i>)	19
INVASIVE PLANT SPECIES	19
CALIFORNIA GNATCATCHERS	24
REFERENCES	25
APPENDICES	
A Plant Species List	
B Rare Plants	
C Invasive Plants	
D California Gnatcatchers	



LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Priority Sensitive Plant Species	2

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Distribution of Rainfall near the Crestridge Ecological Reserve, 2000-2009	3
2	Distribution of Rainfall near the Crestridge Ecological Reserve 2000 versus 2009	4
3	Sensitive Plants Mapped on Crestridge Ecological Reserve in 2000	6
4	Sensitive Plants Mapped on Crestridge Ecological Reserve in 2009	7
5	Comparison of Sensitive Plants Mapped on Crestridge Ecological Reserve in 2009 and Selected Plants Mapped in 2000	8
6	Engelmann Oak Size Classes, Horsemill Road Oak Grove	16
7	Distribution of Engelmann Oaks, Horsemill Road Oak Grove	17
8	Engelmann Oak Acorn Production, Horsemill Road Oak Grove	18
9	Interior Live Oak (<i>Quercus wislizeni</i> var. <i>frutescens</i>)	20
10	Invasive Species Mapped on Crestridge Ecological Reserve in 2000	21
11	Invasive Species Mapped on Crestridge Ecological Reserve in 2009	23



Executive Summary

In 2009, biological monitoring was conducted on the Crestridge Ecological Reserve (CER) in San Diego County, California by the Conservation Biology Institute and Klein-Edwards Professional Services. Survey efforts focused on detecting and assessing the status of seven MSCP priority plant species and one bird species. Additional sensitive or unique species were mapped or recorded where observed, and invasive species were mapped in selected areas. The 2009 surveys constitute the first monitoring on CER since initial baseline surveys in 2000.

The majority of CER burned in the 2003 Cedar fire. The 2009 surveys revealed that the extent of the burn was greater than previously depicted, particularly in the eastern portion of the reserve. For the most part, post-fire vegetation is recovering, although invasive species appear to have increased in areal extent in some locations.

The post-fire condition of priority species is variable; however, most species detected in 2009 are considered stable. Two species, Ramona lilac and Palmer's grapplinghook, appear to have decreased in areal extent since the fire. Three priority species, San Diego thornmint, San Diego goldenstar, and coastal California gnatcatcher were not detected in 2009. The status of all priority species monitored in 2009 is summarized below, along with recommendations for future monitoring or management.

Species	Status	Recommendations
San Diego Thornmint (<i>Acanthomintha ilicifolia</i>)	Unknown (not detected in 2009)	<ul style="list-style-type: none">• Annual presence/absence monitoring• Annual population monitoring if species is detected• Control invasives• Document weed control effort
Ramona Lilac (<i>Ceanothus cyaneus</i>)	Stable	<ul style="list-style-type: none">• Population monitoring every 3-5 years• Annual photoplot monitoring• Seed collection
San Diego Sagewort (<i>Artemisia palmeri</i>)	Stable/Increasing	<ul style="list-style-type: none">• Presence/absence monitoring every 3 years• Annual photoplot monitoring• Flag and avoid during management activities
Palmer's Grapplinghook (<i>Harpagonella palmeri</i>)	Stable	<ul style="list-style-type: none">• Annual presence/absence monitoring• Collect stand-specific information• Control invasives



Species (con't.)	Status	Recommendations
Ramona Horkelia <i>(Horkelia truncata)</i>	Stable	<ul style="list-style-type: none"> • Population monitoring every 3 years • Annual photoplot monitoring • Seed collection • Flag and avoid during management activities
San Diego Goldenstar <i>(Bloomeria [=Muilla] clevelandii)</i>	Unknown (not detected in 2009)	<ul style="list-style-type: none"> • Presence/absence surveys during optimal rainfall years
Engelmann Oak <i>(Quercus engelmannii)</i>	Stable/Declining	<ul style="list-style-type: none"> • Outplanting into revegetation sites, as appropriate, using genetic stock from onsite • Annual photoplot monitoring
Coastal California Gnatcatcher <i>(Polioptila californica californica)</i>	Unknown (not detected in 2009)	<ul style="list-style-type: none"> • Annual monitoring



Introduction

The Crestridge Ecological Reserve (CER) occupies 2,638 acres in the central part of the reserve network established as part of the Multiple Species Conservation Program (MSCP) in San Diego County, California. Baseline surveys and vegetation mapping were initially conducted for CER in the year 2000. In 2003 almost the entire reserve burned in the Cedar Fire. The Habitat Management and Monitoring Plan for CER (2002, updated in 2009) calls for monitoring of selected plant and animal species. This report summarizes results of the initial monitoring efforts, conducted in spring of 2009, with recommendations for future monitoring and management.

Monitoring focused on MSCP priority plant species previously detected onsite or with a high potential for occurrence. Specific tasks included:

- Re-visiting mapped occurrences of priority species to collect presence/absence information, map or refine population boundaries, as appropriate, and qualitatively assess current status and threats.
- Surveying selected areas for the presence of priority species not known from the site but considered to have a high potential for occurrence.
- Surveying newly acquired parcels (240 acres) in the western portion of the reserve for the presence of priority species.

Information was also collected on invasive plants or notable plant species, where feasible. Relatively few 'new' plants were documented on CER in 2009. An updated plant list, including 2009 additions, is included as Appendix A.

Klein-Edwards Professional Services (KEPS) performed presence-absence surveys for the federally threatened coastal California gnatcatcher (*Polioptila californica californica*) within previously mapped (Diegan) coastal sage scrub (CSS) on CER and on the more recently added western parcels.

Rare Plants

The CER Habitat Management and Monitoring Plan (CBI and EHC 2009) identifies seven priority plant species for long-term management. These species are listed in Table 1 along with their regulatory status and monitoring guidelines. An additional sensitive plant species, rush-like-bristleweed (*Xanthisma [=Machaeranthera] junceum*), was mapped where encountered in 2009. Interior live oak (*Quercus wislizeni* var. *frutescens*) was detected onsite for the first time in 2009. Although this oak is not sensitive, it typically occurs at higher elevations and east of CER; therefore, its occurrence onsite is noteworthy.



Table 1
 Priority Sensitive Plant Species

Scientific Name (Common Name)	Status	Monitoring Guidelines
<i>Acanthomintha ilicifolia</i> (San Diego thornmint)	FT/CE/1B.1 MSCP Covered Species	Population trends, seed collection, weed control, pollinators
<i>Artemisia palmeri</i> (San Diego sagewort)	4.2	Presence/absence
<i>Ceanothus cyaneus</i> (Lakeside ceanothus)	1B.2 MSCP Covered Species	Population trends, age structure, seed collection, pollinators
<i>Harpagonella palmeri</i> (Palmer's grapplinghook)	4.2	Presence/absence; pollinators
<i>Horkelia truncata</i> (Ramona horkelia)	1B.3	Presence/absence, seed collection, pollinators
<i>Bloomeria (=Muilla)</i> <i>clevelandii</i> (Cleveland's goldenstar)	1B.1 MSCP Covered Species	Population trends, reproductive strategies, pollinators
<i>Quercus engelmannii</i> (Engelmann oak)	4.2	Recruitment; insect host and infestations

Because species-specific monitoring guidelines are subject to both budgetary constraints and the status – or detectability – of individual species, monitoring guidelines in Table 1 were not followed precisely. For example, San Diego thornmint has not been observed onsite since 2000. Until this species is relocated, monitoring activities will necessarily focus on presence/absence and/or habitat management rather than population trends or seed collection. In addition, some monitoring tasks were addressed by parties other than CBI (e.g., oak infestation), and are not discussed in detail in this report.

Sensitive plant survey methodology is included in Appendix B.1. Population size estimates and GPS locations are included in Appendix B.2. Plant Monitoring Data Forms are referenced in Appendix B.3, and attribute information for interior live oak is in Appendix B.4.

San Diego Thornmint (*Acanthomintha ilicifolia*)

Previous Surveys

San Diego thornmint was observed on south and west-facing slopes above Rios Canyon in 2000 (McMillan and CBI 2002). Subsequent efforts to re-locate this species (SDNHM surveys, 2003, 2004, 2005; C. Chadwick, pers. comm.) have been unsuccessful. In addition, thornmint habitat burned during the 2003 Cedar fire.

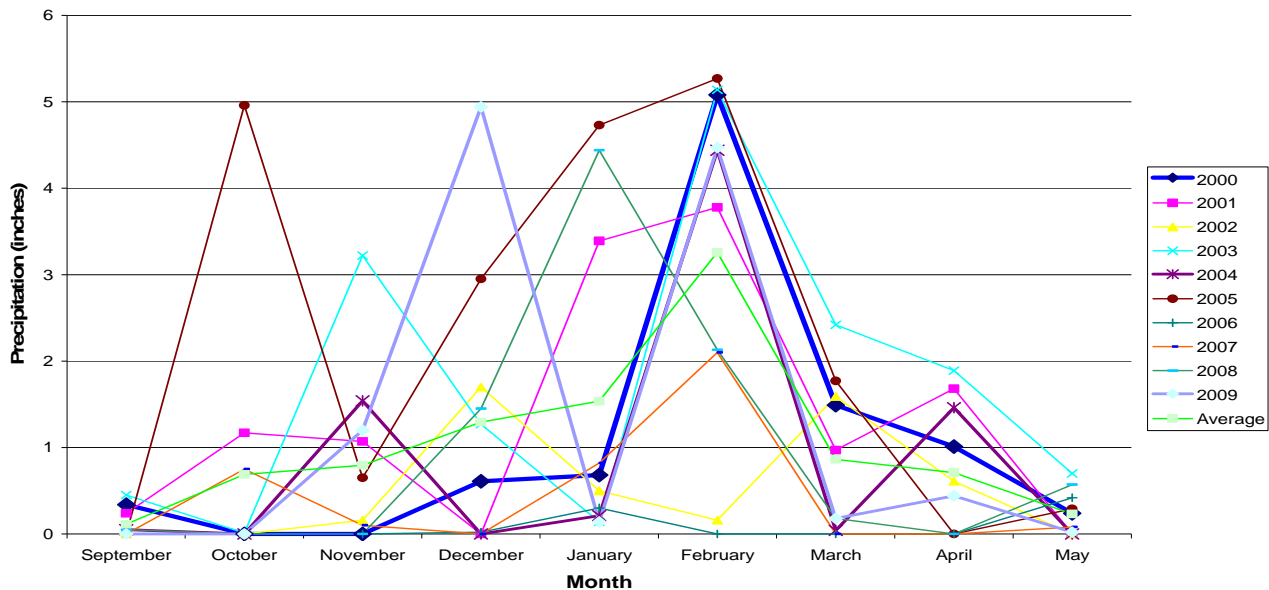


Current Status

In 2009, surveys for San Diego thornmint focused on relocating known populations on slopes above Rios Canyon ('Thornmint Hill'). In addition, the survey area was expanded to include lands to the east, north, and south. Thornmint surveys were conducted in March, April, and May (Appendix B). No sign of thornmint was detected during these surveys.

The reasons for the apparent absence of this species onsite are unclear. Suboptimal rainfall is a potential limiting factor for annual species, although the distribution of that rainfall may be equally important. A comparison of rainfall patterns¹ during the 2000-2009 growing seasons² indicates that conditions in 2000 (when thornmint was last observed) were unique and unmatched in subsequent years (Figure 1). In 2000, there was little rainfall between September and January, followed by a relatively wet February. Lack of rainfall early in the season may inhibit germination of nonnative forbs and grasses that potentially out-compete the later-germinating thornmint. Thornmint was not observed in 2003, 2004, or 2005, years marked by significant rainfall events prior to February. Likewise, the nearly 5 inches of rain in December 2008 (considered part of the 2009 growing season) may have stimulated nonnative species germination to the detriment of thornmint germination or establishment. Figure 2 depicts the differences in rainfall distribution between the 2000 and 2009 growing seasons.

Figure 1. Distribution of Rainfall near the Crestridge Ecological Reserve, 2000-2009.

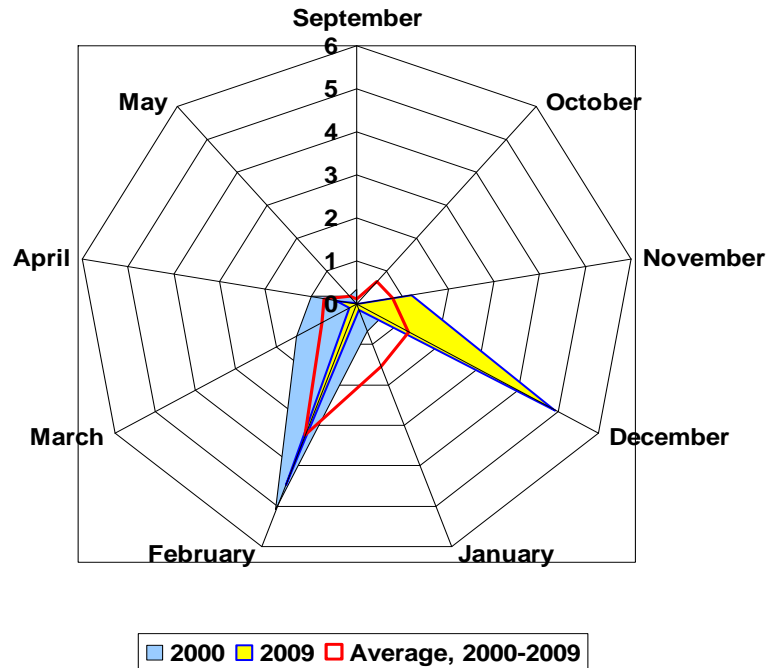


¹ Measured in Alpine, California, the nearest weather station to the Crestridge Ecological Reserve.

² The growing season is considered to be September through May to take into account fall-germinating nonnative forbs.



Figure 2. Distribution of Rainfall near the Crestridge Ecological Reserve, 2000 versus 2009.



Factors other than precipitation likely affect thornmint germination. This species did germinate in other locations in spring 2009 (F. Sproul, pers. comm., M. Klein, pers. comm., B. Miller, pers. comm.). Population estimates showed a range of variability, with some populations depressed, some stable, and others elevated over 2008 estimates.

The following differences were noted (qualitatively) between thornmint habitat and species associations in 2000 and 2009:

- White sage, which possibly acted as a ‘nurse’ plant for thornmint, burned in the 2003 fire and currently exists at lower densities than in 2000;
- While some associated species observed in thornmint habitat in 2000 were observed in 2009, such as dwarf plantain (*Plantago virginica*), Palmer’s grapplinghook, and splendid mariposa (*Calochortus splendens*), other species were notably absent, such as small-flowered morning-glory (*Convolvulus simulans*).
- Weed species (e.g., tocalote [*Centaurea melitensis*], short-podded mustard [*Hirschfeldia incana*]) appear to have increased in cover since 2000, although bare (open) areas still exist on higher slopes.
- The dense concentrations of ground-nesting bees observed around thornmint plants in bare areas in 2000 were absent in 2009.



Threats

Although San Diego thornmint habitat burned in the 2003 Cedar fire, it is assumed that the seedbank still persists. If this assumption is correct, then the biggest threat to this species is likely to be the continued spread of invasive plants, particularly those that outcompete or displace native species and lead to altered habitat conditions. On Thornmint Hill, the primary invasive species of concern are fountaingrass (*Pennisetum setaceum*) and false brome (*Brachypodium distachyon*). Tocalote also occurs in this area.

Recommendations

1. Conduct presence/absence surveys annually for San Diego thornmint. Annually document climate and other habitat conditions.
2. Conduct population monitoring (including estimating population size and mapping areal extent) annually if thornmint is present.
3. Develop and implement a comprehensive invasive plant control program for the slopes above Rios Canyon, focusing on those species most likely to adversely affect sensitive plant populations, including San Diego thornmint. The California Department of Fish and Game has proposed implementing initial invasive control measures in summer 2009 (J. Ekhoﬀ, pers. comm.).
2. Document weed control efforts.

Lakeside Ceanothus (*Ceanothus cyaneus*)

Previous Surveys

The CER supports perhaps the largest population of Lakeside ceanothus in San Diego County. This species was well-documented during 2000 surveys in the east-central portion of the site (Figure 3).

Current Status

The majority of the Lakeside ceanothus population on CER burned during the 2003 Cedar fire. The 2009 surveys assessed the post-fire status of this species, and expanded the population mapping in the easternmost portion of the reserve. In addition, efforts were made to collect data relevant to the species' biology and habitat affinities.

A total of 45 'stands' of Lakeside ceanothus were mapped onsite in 2009 (Figure 4). While a direct comparison of population extent and size between years is not possible due to mapping methodologies, there are some striking differences (Figure 5). Many of the stands mapped in 2009 occur in proximity to stands mapped in 2000; however, very few plants were recorded within the largest polygons mapped in 2000. Furthermore, the distribution of plants in 2009 appears more restricted or 'clumped' than in 2000. Finally, stands were mapped in the easternmost portion of the reserve where Lakeside ceanothus had not been observed in 2000.

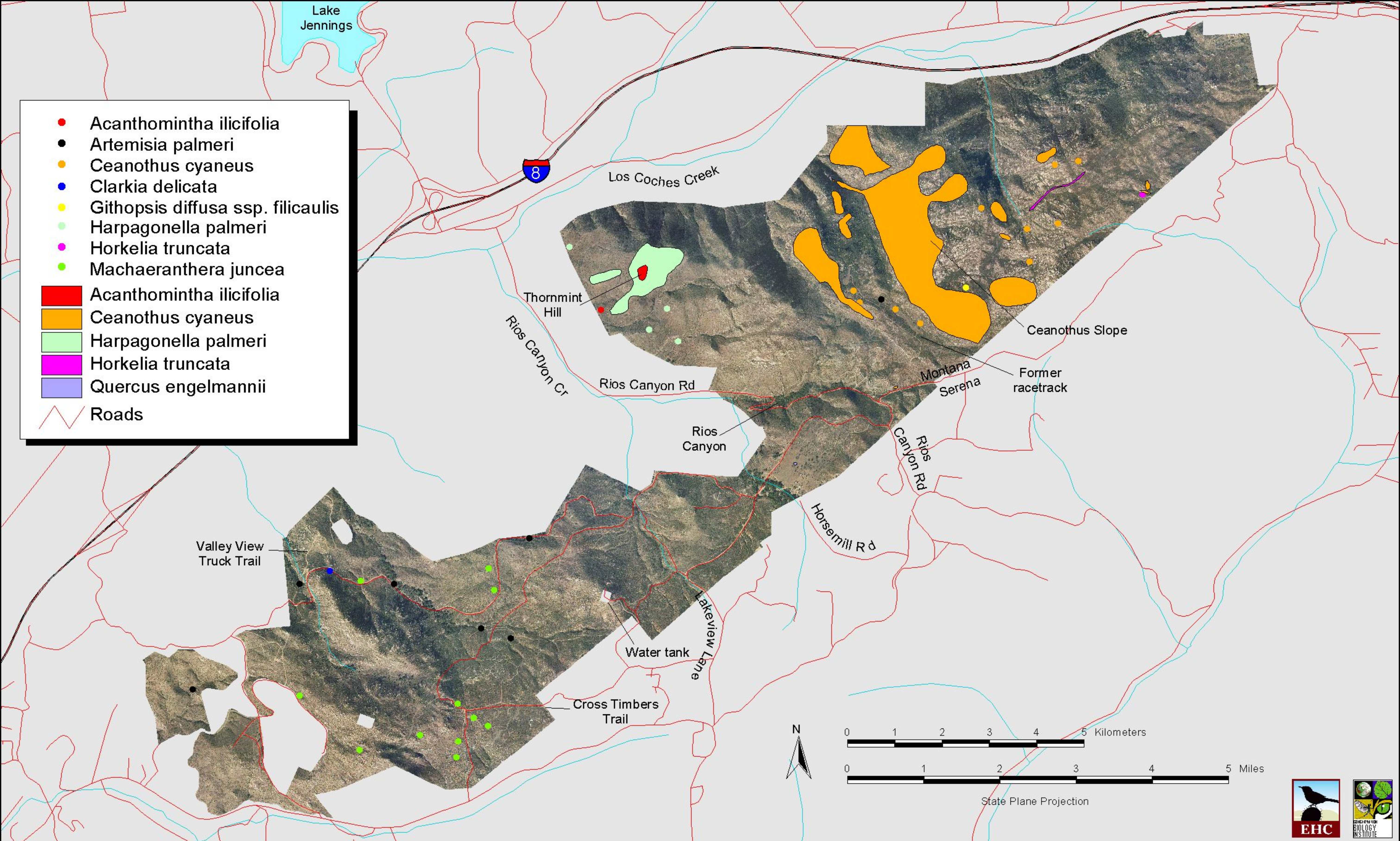


Figure 3. Sensitive Plants Mapped on Crestridge Ecological Reserve in 2000.



Sensitive plant species

- *Artemisia palmeri*
- *Ceanothus cyaneus*
- *Harpagonella palmeri*
- *Horkelia truncata*
- *Quercus engelmannii*
- *Xanthisma junceum**

▭ Lakes

▬ Roads

*formerly *Machaeranthera juncea*

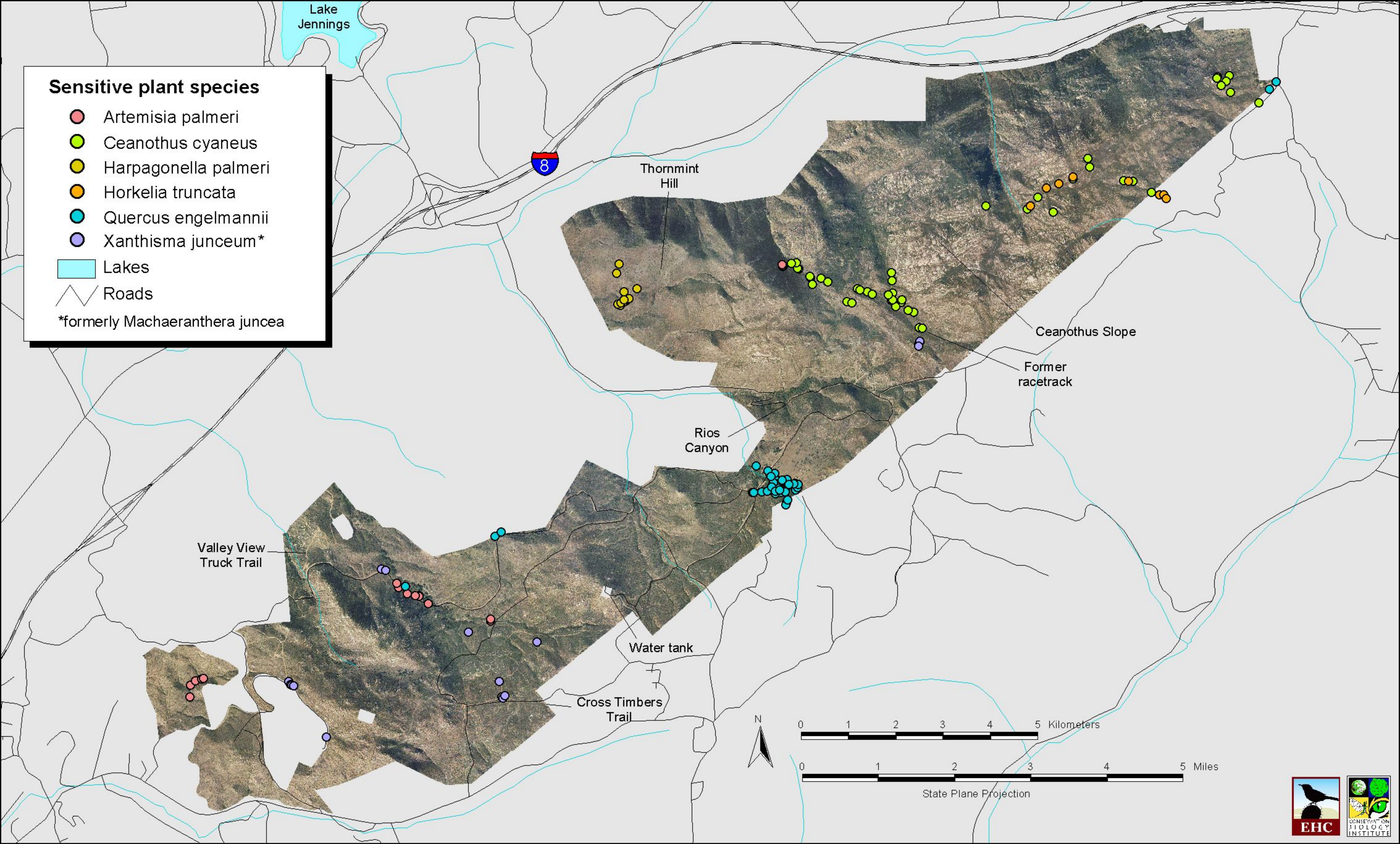


Figure 4. Sensitive Plants Mapped at Crestridge Ecological Reserve in 2009.

Sensitive plant species (2009)

- *Artemisia palmeri*
- *Ceanothus cyaneus*
- *Harpagonella palmeri*
- *Horkelia truncata*
- *Quercus engelmannii*
- *Xanthisma junceum**

Population boundaries (2000)

- *Ceanothus cyaneus*
- *Harpagonella palmeri*
- Lakes
- Roads

*formerly *Machaeranthera juncea*

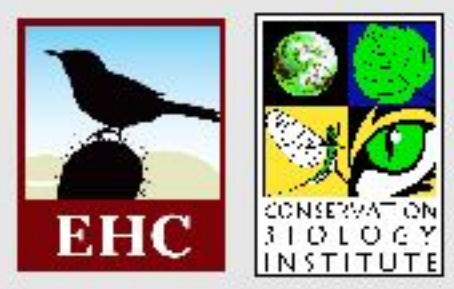
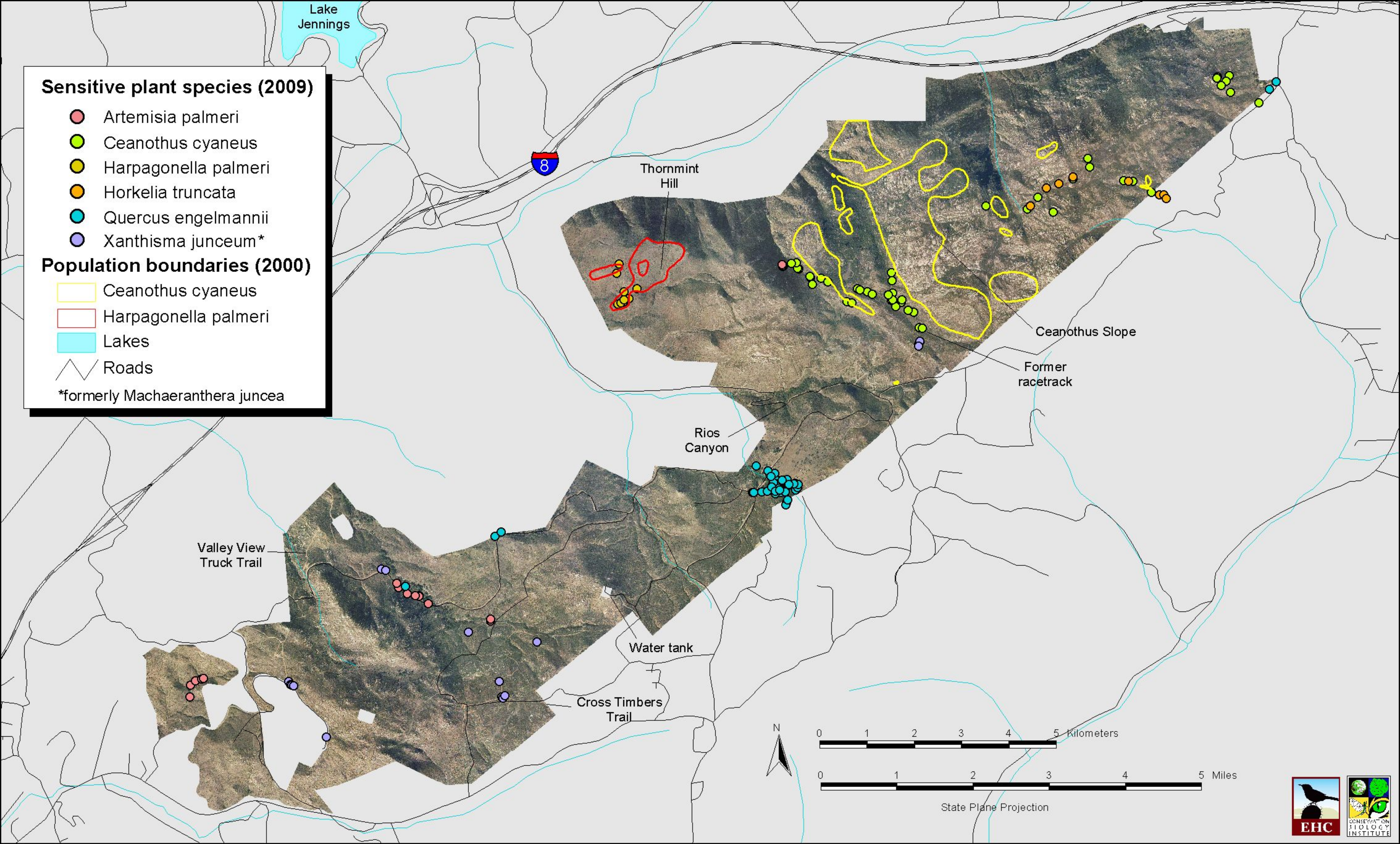


Figure 5. Comparison of Sensitive Plants Mapped on Crestridge Ecological Reserve in 2009 and Selected Plants Mapped in 2000.



Population estimates in 2009 range from 1-200 individuals per stand (a stand = a dot on Figure 3), with a total estimated population size of 1,465 individuals. Surveys were conducted during the species' peak blooming period, which enhanced the ability of surveyors to locate this plant, even at a distance. Nonetheless, because population counts were estimates and not all areas of the site were visited, it is presumed that the population of Lakeside ceanothus onsite is larger than reported here. The 2000 surveys for this species did not attempt to record population size estimates for most stands due to the density and inaccessibility of those stands. During 2009, however, the relatively open, post-fire habitat allowed for greater accessibility into some areas. The density of shrubs appeared much lower in 2009 than in 2000 in certain areas, such as the upper slopes and ridges directly east of the 'racetrack.'

Nearly all stands of Lakeside ceanothus encountered during 2009 were even-aged, with shrubs ranging from approximately 2–8 (typically 5-8) feet in height and exhibiting little or no dead material. All plants – even those in the smallest size classes – had buds or were blooming during the survey period. No seedlings or senescent plants were observed. A small number of plants (<5) exhibited signs of sprouting from the base, but in all cases, these appeared to be related to trampling or perhaps freezing, rather than fire damage. Overall, the plants observed in 2009 appeared healthy and thriving.

Additional information (e.g., soil texture, topography, slope exposure, phenology, pollinators, and associated species) was collected at a limited number of stands (8) (Appendix B.3). Because of the relatively small sample size, this information is not intended to be conclusive but rather, to provide a preliminary understanding of the ecological attributes governing the distribution and occurrence of Lakeside ceanothus onsite, as well as providing insights into the species' biology.

A summary of this information indicates that:

- Soil texture (where recorded) ranges from moderately coarse sandy loams to moderately fine clay loams;
- The species occurs most commonly on mid- to lower slopes in the central part of the site, and on upper slopes and ridgelines in the east;
- The species was observed on all exposures, but may have an affinity for northwest-facing slopes;
- Stands in the far eastern end of the site bloom several weeks later than stands in the central portion of the site;
- Potential pollinators observed on Lakeside ceanothus flowers include European honeybees and native bees.



The two most common plant species found in association with Lakeside ceanothus are chamise (*Adenostoma fasciculatum*) and laurel sumac (*Malosma laurina*). Other species with a high degree of association include peak rush-rose (*Helianthemum scoparium*), Ramona lilac (*Ceanothus tomentosus*), deerweed (*Lotus scoparius*), and red brome (*Bromus rubens*). Scrub oak (*Quercus berberidifolia*) and big-berry manzanita (*Arctostaphylos glauca*) are strong associates in the eastern portion of the site.

Threats

All stands of Lakeside ceanothus encountered in 2009 appeared to be healthy and thriving. No evidence of disease or senescence was observed. Because this species occurs in more remote portions of the reserve, it is not directly threatened by human activities. However, fire continues to be a concern. Lakeside ceanothus regenerates after fire from a persistent seed bank. While some replenishment of the seed bank has likely occurred since the 2003 Cedar fire, it is unknown (and possibly unlikely) that this seed bank has developed sufficiently for the population to be able to survive another similarly-sized fire without adverse consequences.

Recommendations

1. Initiate a multi-year seed collection and storage program to preserve an adequate representation of the genetic diversity of this species and allow for its re-introduction onsite in the event of a catastrophic disturbance event such as fire.
2. Conduct population monitoring every 3-5 years (in the absence of fire or other catastrophic events). Monitoring should include an assessment of overall health (including evidence of insect infestation and estimation of population size and age class structure).
3. Establish permanent photoplots at key populations to develop a photographic record of this species over time and identify emerging problems in the interval between population monitoring. These plots can be positioned along a linear transect, from slopes west of the racetrack to the eastern edge of the reserve.

San Diego Sagewort (*Artemisia palmeri*)

Previous Surveys

During 2000 surveys, San Diego sagewort was mapped (but not counted) in seven locations on the reserve (Figure 3). This species was documented in most major drainages, as well as several smaller drainages. It was also found away from drainages, as in the understory of coast live oak woodland on north-facing slopes, along roads, and at the edge of chaparral or scrub habitats.



Current Status

During 2009 surveys, San Diego sagewort was mapped and counted, with 19 stands and an estimated 200 individuals recorded (Figure 4). Because of the density of some stands, particularly near the oak grove in the west-central portion of the site, the actual population number may be somewhat higher than reported here. Some stands represent a more detailed mapping of 2000 occurrences, while others represent new localities. At all locations, plants appear to be thriving. Several size classes (seedlings, young plants, mature plants) were noted in or near the oak grove in the west-central portion of the site.

Threats

San Diego sagewort does not appear to have been adversely affected by the 2003 Cedar fire. Many stands are robust with a variety of age classes, including mature, flowering individuals. Because this species often occurs at the edge of trails, it faces potential threats from trampling, invasives control efforts, or trail improvement projects.

Recommendations

1. Conduct presence/absence monitoring every 3 years to ensure that populations are not adversely impacted by recreational activities. This monitoring may include population estimates.
2. Establish permanent photoplots at key populations to develop a photographic record of this species over time and identify emerging problems in the interval between presence/absence monitoring.
3. Flag individual plants to avoid impacts from invasives control, trail repair, or other management activities.

Palmer's Grapplinghook (*Harpagonella palmeri*)

Previous Surveys

During 2000 surveys, a large population of Palmer's grapplinghook was detected on south and west-facing slopes above Rios Canyon (Figure 3). This species occurred in association with San Diego thornmint and small-flowered morning-glory, but was also found beyond the limits of those two species. This population was mapped, but population size data were not systematically obtained. However, visual estimates of selected areas and subsequent extrapolations to the larger area occupied by this species indicated that population size may have been in excess of 500,000 individuals. This species was also observed in the area during post-fire floristic surveys conducted by the SDNHM in 2004 and 2005.

Current Status

In 2009, Palmer's grapplinghook was observed on south- and west-facing slopes above Rios Canyon, in a portion of the area documented in 2000 (Figure 4). Plants were abundant,



particularly on mid- to upper slopes in relatively open habitat. Several GPS point locations were recorded to provide an approximation of the extent of this population; these data are meant to complement, rather than supersede, 2000 boundaries. As in 2000, a visual estimate of population size was recorded. The highest population estimate on the data form is >10,000 individuals, and this was the category scored for this species.

Although a direct comparison of population size and extent between 2000 and 2009 is not possible, the 2009 areal extent appears much reduced from the 2000 mapping (Figure 5). Nonetheless, plants were abundant in 2009 and formed a nearly continuous vegetative mat in many locations. In addition, plants successfully flowered and set seed.

Supplemental information was collected at two locations for Palmer's grapplinghook (Appendix B.3). Both occurrences were on relatively steep (15-20°), southwest-facing slopes, and were further characterized by moderately fine sandy clay loam to moderately fine clay loam soils, a relatively high surface cover of small rocks (50-80%), and significant areas of bare ground or litter (19-49%). Visually, these areas appear as 'balds,' or open areas of cobbly, gravelly soils with native forbs well-distributed but often short (<1 m) and stunted in relation to their occurrence in adjacent habitat. While nonnative species such as tocalote are present in these balds, they occur in much lower densities than in adjacent habitat.

When first assessed in mid-March, Palmer's grapplinghook was in full flower. By late April, plants were completely dried and in the process of dehiscing, or breaking apart, although fruits were still present on many individuals. Ants were in abundance at one of the sampling locations, but were not observed dispersing seed.

Threats

The primary threat to this species may be invasive species that have the potential to degrade habitat and displace plants or adversely alter habitat conditions. Invasive species of concern include fountain grass, false brome, and tocalote.

Recommendations

1. Conduct presence/absence surveys annually for Palmer's grapplinghook and map population boundaries. Annually document climate and other habitat conditions. Monitoring of this species will help inform management decisions about San Diego thornmint.
2. Collect additional stand-specific information to expand the understanding of the ecological parameters of this species.
3. Develop and implement a comprehensive invasives control program for slopes above Rios Canyon, focusing on those species most likely to adversely affect sensitive plant populations, including Palmer's grapplinghook. The CDFG has proposed initiating invasive control measures in summer 2009 (J. Ekhoff, pers. comm.).



Ramona Horkelia (*Horkelia truncata*)

Previous Surveys

In 2000, Ramona horkelia was found in the eastern portion of CER, where it occurred at the edge of dense chaparral, typically in open areas adjacent to or along trails (Figure 3). An estimated 300 plants were observed onsite. Focused surveys were not conducted for this species in 2000, nor were post-fire surveys conducted for this species.

Current Status

In 2009, Ramona horkelia was found in approximately the same locations as in 2000, which are in or adjacent to the east-west oriented trail between the Gibson cattle gate and the area east of the 'racetrack' (Figure 4). Plants were counted and mapped, and additional species/habitat information was collected at three locations (Appendix B.3). A total of 8 stands and 107 mature plants were mapped. In addition, approximately 70-100 seedlings were noted at one stand. All stands occur in or adjacent to the trail. The Cedar fire opened up habitat in this portion of the reserve, making some areas more accessible than in 2000. Despite numerous forays into previously inaccessible habitat, Ramona horkelia was never observed more than a few feet from the trail.

Because adjacent habitat shows evidence of having burned in the 2003 Cedar fire, it seems reasonable to conclude that the Ramona horkelia population was directly affected by the fire, as well. This may explain, in part, the reduced population size observed in 2009. However, all plants observed in 2009 (exclusive of seedlings) were robust, as characterized by large size, numerous flowering branches, and abundant flowers. Additional observations include:

- Phenology in early May ranged from 60-90% flowering and 10-30% fruiting;
- All stands occurred on relatively flat terrain (1-5° slope)
- Insect visitors to flowers were common, and included European honeybees, at least 2 species of native bees, and small (black) beetles;
- Herbivory (insect-damage) was minimal and noted on only a few flowers.

Threats

The most obvious threats to Ramona horkelia on CER are 1) its relatively small population size, and thus, its susceptibility to extirpation from disturbance events, and 2) its position along a trail. In addition, the trail shows evidence of moderate to severe erosion. While the population occurs in a relatively remote area, some evidence of vehicular traffic (old motorcycle tracks) and livestock (old cattle droppings) were present in 2009.



Recommendations

1. Conduct population monitoring every 3 years to ensure that populations are not adversely impacted by trampling or erosion.
2. Establish permanent photoplots at key points along the trail to develop a photographic record of this species over time and identify emerging problems in the interval between presence/absence monitoring.
3. Initiate a seed collection and storage program to preserve an adequate representation of the genetic diversity of this species and allow for its re-introduction onsite in the event of a catastrophic disturbance event such as fire.
4. Flag individual plants to avoid impacts from invasives control, trail repair, or other management activities.

San Diego Goldenstar (*Bloomeria [=Muilla] clevelandii*)

Previous Surveys

San Diego goldenstar was found just offsite during the 2000 surveys, near the southeast corner of the property where it was growing in clay soils in disturbed southern mixed chaparral.

Current Status

Potential habitat onsite (clay soils) and offsite habitat occupied by San Diego goldenstar in 2000 were re-surveyed in 2009. No evidence of this species was observed in either location. Clay soils in this portion of the CER support a dense cover of nonnative, weedy species, while adjacent clay soils (offsite) support a high proportion of native forbs.

Threats

The disturbed nature of potential habitat onsite may be a key factor in the absence of San Diego goldenstar. If present, however, conditions may not have been optimal for the production of vegetative material or flowers, as evidenced by the absence of this species in known habitat.

Recommendations

1. Survey for San Diego goldenstar during an optimal rainfall year to determine its presence or absence on CER and assess habitat suitability.

Engelmann Oak (*Quercus engelmannii*)

Previous Surveys

Engelmann oaks were noted in many oak woodlands on CER, including the oak grove near Horsemill Road and oak woodlands on north-facing slopes south of I-8. In most of these areas, Engelmann oaks were subdominant to coast live oak. Engelmann oaks were also found in



riparian areas, although they typically occurred at the outer margins of the drainages, on slightly drier sites than either riparian tree species or coast live oaks (*Quercus agrifolia*). Engelmann oaks were not specifically mapped onsite. Where these oaks occurred as part of well-developed woodlands, they were noted as a constituent of those woodlands in the 2000 vegetation mapping effort (McMillan and CBI 2002).

A large number of hybrid oaks (*Q. engelmannii* x *Q. berberidifolia*) were also noted on the CER in previous surveys, but were not mapped. These often occurred away from denser woodland habitats, as in chaparral.

Current Status

Engelmann oaks (exclusive of hybrids) were mapped where encountered throughout the reserve in 2009 (Figure 4), although this mapping is not comprehensive. In the oak grove near Horsemill Road, for example, mapping of some oaks (i.e., GPS points) was inhibited by dense stands of poison oak and active bee hives.

In the Horsemill Road oak grove, oak mapping focused on mapping tree locations and collecting information on size class and acorn production. A total of 44 Engelmann oak trees were mapped in the Horsemill Road oak grove and it is acknowledged that an additional 5+ Engelmann oak trees are present but could not be mapped due to the factors above. The distribution of Engelmann oaks by size class in the Horsemill Road oak grove is presented in Figure 6. Of the 44 trees, 4 (9%) are saplings or pole trees (diameter at breast height [dbh] ≤ 10 cm (3.9 in)). The top and bottom three size classes, respectively, support the fewest trees (9 trees; 20% of the total), while the remaining (middle) 5 size classes support 35 trees (80%). An estimated 23 seedlings were also noted in the Horsemill Road oak grove. Figure 7 depicts the location of all oaks (seedlings, saplings/pole trees, mature trees) mapped in the Horsemill Road oak grove.

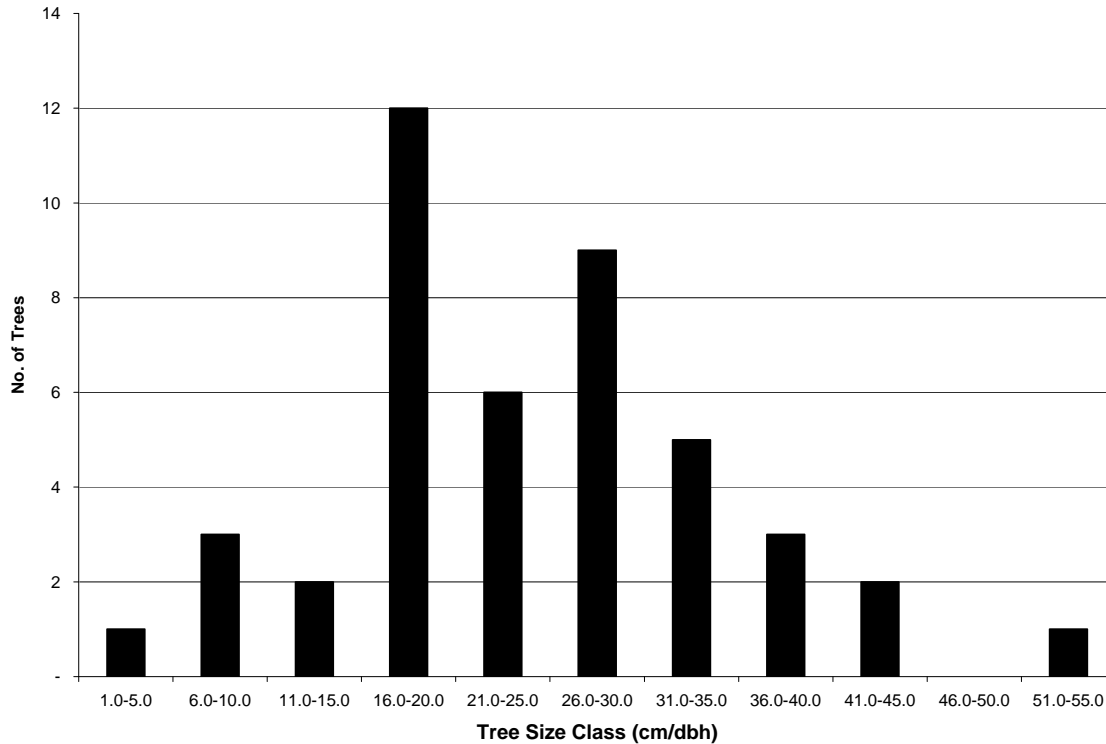
Many of the Engelmann oak trees in the Horsemill Road oak grove were bearing acorns by August 2009. Assessment of acorn production (presence/absence) was cursory and constrained to some degree by foliage height. Nonetheless, it appears that acorn production may be limited by size class, with production maximized in trees with a dbh of 16.0-40.0 cm (6.3-15.7 in) (Figure 8).

A San Diego County plant pathologist examined oak trees in the Horsemill oak grove in February 2008 and determined that no disease is present. However, prolonged drought, human use resulting in soil compaction, and effects of the 2003 Cedar fire have stressed the trees, making them susceptible to bark beetles. In 2009, U.S. Forest Service entomologist Tom Coleman examined oaks in the Horsemill Road oak grove for evidence of goldspotted oak borer (*Agrilus coxalis*), a new insect pest that is damaging oaks in eastern San Diego County (Coleman and Seybold 2008). Possible evidence of this species was detected in coast live oaks (*Quercus agrifolia*) in the grove; Engelmann oaks currently seem to resist infestation from this pest.



Away from the Horsemill Road oak grove, many of the Englemann oak trees show evidence of having burned in the 2003 Cedar fire. Several dead trees were noted; overall, however, many of the burned trees appear to be recovering, as evidenced by new growth.

Figure 6. Englemann Oak Size Classes (N = 44).



Threats

Perhaps the biggest threat to Englemann oak trees onsite is low recruitment. Seedlings were observed only in the Horsemill oak grove. Relatively few saplings and pole trees were observed at the edge of the Horsemill oak grove; these numbers are not sufficient to replace mature trees.

Recommendations

1. Incorporate Englemann oaks into revegetation sites, as appropriate, to offset the apparently low recruitment rate of this species, as well as losses from fire. Plant material used in this process should be grown from acorns harvested onsite to preserve the genetic integrity of the Englemann oak population on CER.
2. Establish permanent photoplots at key points to develop a photographic record of this species over time.

- Engelmann Oak
Size Classes
(number of occurrences)**
- Seedling (23)
 - ▲ Sapling/pole (17)
 - ⬠ Small tree (20)
 - Medium tree (6)
 - Large tree (2)

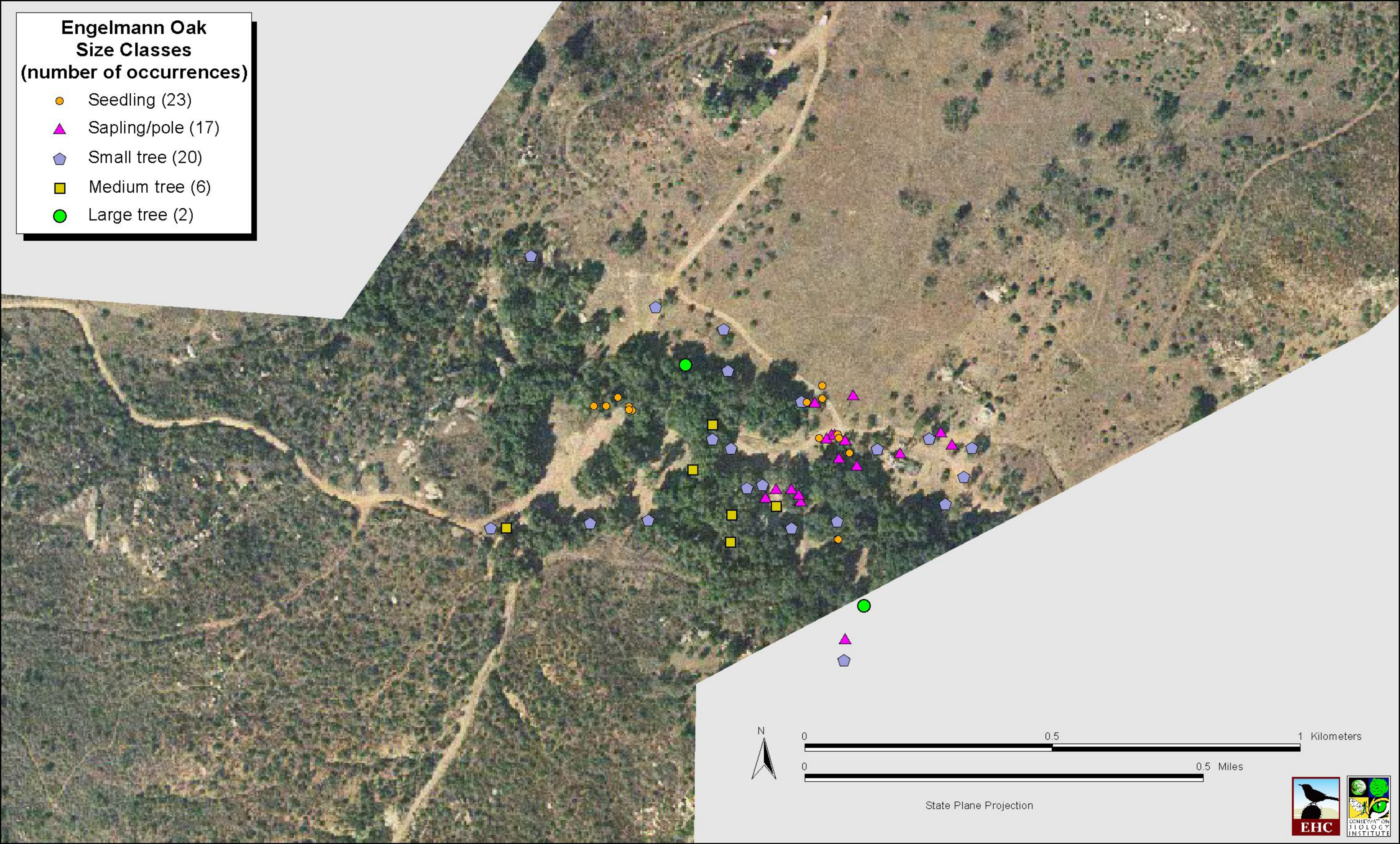
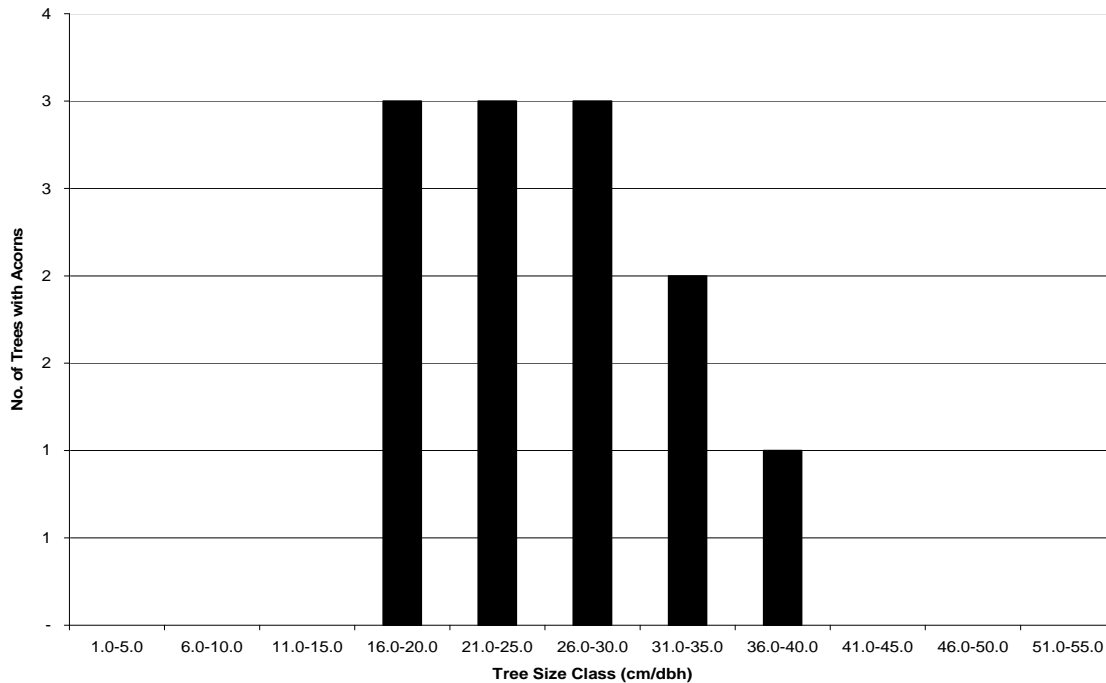


Figure 7. Distribution of Engelmann Oaks, Horsemill Road Oak Grove.



Figure 8. Engelmann Oak Acorn Production according to Size Class.



Rush-like Bristleweed (*Xanthisma [=Machaeranthera] junceum*)

Previous Surveys

In 2000, rush-like bristleweed was observed in the western portion of CER in open, disturbed areas of chaparral and along dirt trails, where it typically occurred in small numbers (Figure 3). The species was also observed in post-fire surveys conducted by the SDNHM.

Current Status

Although not a priority species, rush-like bristleweed was mapped and counted where it was encountered in 2009 (Figure 4). A total of 19 stands and an estimated 476 plants were recorded onsite, with stand size ranging from 1 to 160 individuals. Most (but not all) occurrences mapped in 2000 were re-located in 2009. In 2000, this species was mapped only in the western portion of the reserve. In 2009, a sizeable stand was detected in the central portion of the reserve, at the edge of a trail south of the 'racetrack.' All stands observed in 2009 occur in or adjacent to habitat that burned in the 2003 Cedar fire.

Rush-like bristleweed blooms later than many native species and can be relatively inconspicuous when not in flower. This species was detected in late May when plants were beginning to bloom. Most occurrences were along trails or in open (post-burn) habitat within 5-10 feet of the trail edge.



Threats

Because of its occurrence along trails, this species is potentially threatened by trampling, invasives control along trails, or trail improvement activities.

Recommendations

5. Flag individual plants to avoid impacts from invasives control, trail repair, or other management activities.

Interior Live Oak (*Quercus wislizeni* var. *frutescens*)

Interior live oak was documented in the east-central portion of the reserve. This species is of interest because it constitutes a new shrub for the reserve and a slight westward extension for this species. One individual was mapped adjacent to a rock outcrop, just north of the east-west trail through this portion of the site. The GPS location for this plant is included in Appendix B.2; photographs of this species are depicted in Figure 9.

In San Diego County, interior live oak typically occurs above 3,000 feet elevation on mountain slopes and canyons in chaparral, oak woodland, and forests in the Palomar, Cuyamaca, and Laguna Mountains (Beauchamp 1986; Roberts 1995). The species has been collected in a few locations west of the mountains. The San Diego Natural History Museum's Plant Atlas shows locations near Viejas Mountain, El Cajon Mountain, Lyon Peak, and Mt. Woodson.

Although only one shrub was detected onsite, no focused surveys were conducted for interior live oak, and additional individuals may occur on the reserve. Attributes of the individual observed are included in Appendix B.4.

Invasive Plant Species

Previous Surveys

A total of seven invasive plant species were mapped on CER in 2000 (Figure 10), although this mapping was not considered comprehensive. These species included:

- Tocalote (*Centaurea melitensis*)
- Pampas grass (*Cortaderia selloana*)
- Eucalyptus (*Eucalyptus* sp.)
- Horehound (*Marrubium vulgare*)
- Fountain grass (*Pennisetum setaceum*)
- Natal grass (*Melinis* [= *Rhynchelytrum*] *repens*)
- Tamarisk (*Tamarix* sp.)



Figure 9. Interior live oak (*Quercus wislizeni* var. *frutescens*).



Photo, above: *Quercus wislizeni* var. *frutescens* growing on rock outcrop in the eastern part of the CER.
Photo, left: Closeup of leaves and inflorescence.

Invasive species

- Centaurea melitensis*
- Cortaderia selloana*
- Eucalyptus* spp.
- Marrubium vulgare*
- Pennisetum setaceum*
- Rhynchelytrum repens*
- Tamarix* sp.
- Lakes
- Roads

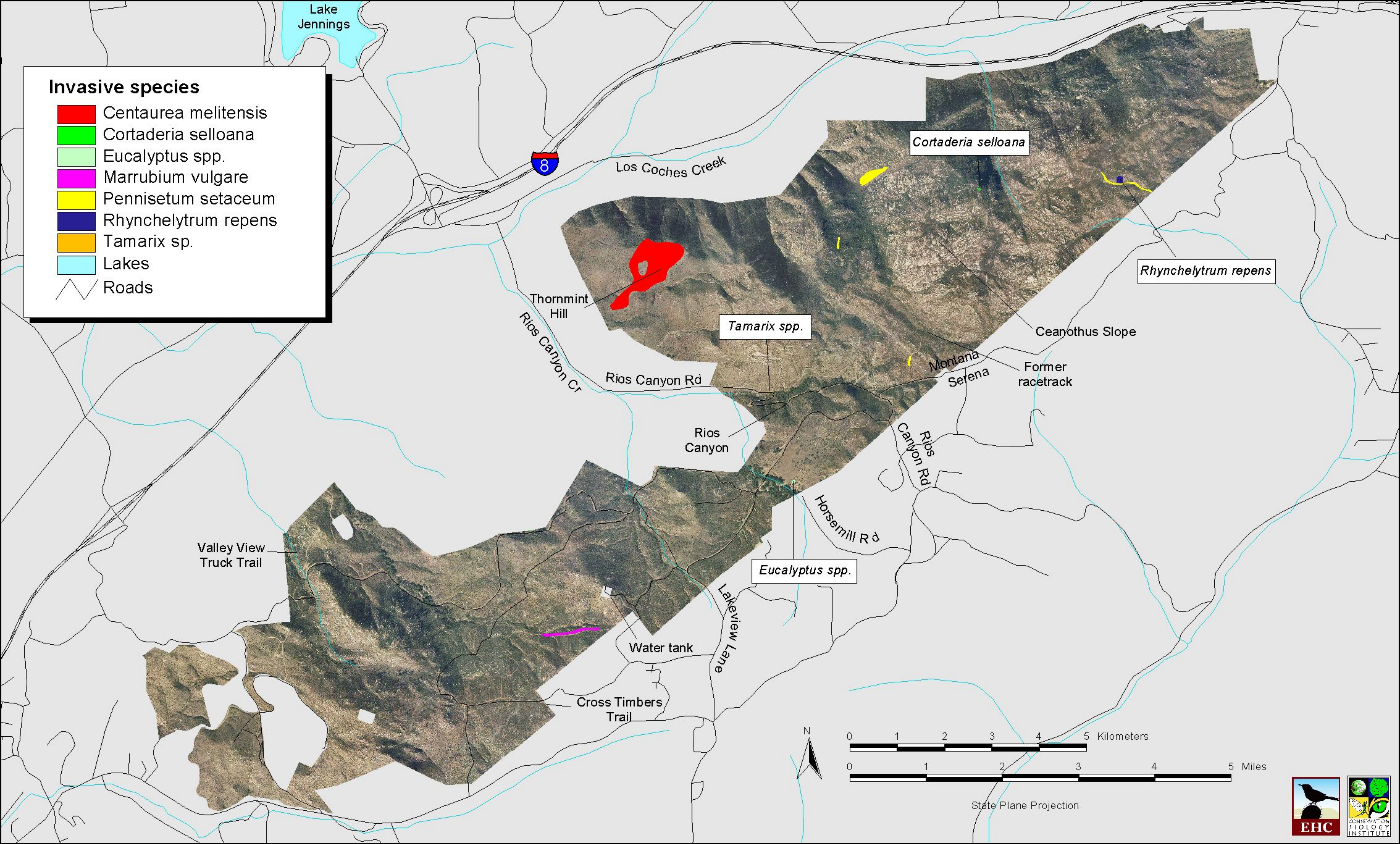


Figure 10. Invasive Species Mapped on Crestridge Ecological Reserve in 2000.





With the exception of tocalote and fountain grass, most of these species were limited in number and extent. Tocalote was mapped on Thornmint Hill because of its potential to impact sensitive plant species, and was observed elsewhere onsite, as well. Several stands of fountain grass were mapped in the eastern portion of the site.

Current Status

Although not a focus of the 2009 plant surveys, five invasive plant species were mapped where encountered and population estimates recorded, to the degree feasible (Figure 11). Appendix C lists GPS coordinates for invasive species detected in 2009. Invasive plant species mapped on CER in 2009 include:

- Fountain grass (*Pennisetum setaceum*)
- False brome (*Brachypodium distachyon*)
- Natal grass (*Melinis [=Rhynchyletrum] repens*)
- Long-leaved veldt grass (*Erharta longiflora*)
- Blessed milk-thistle (*Silybum marianum*)

Fountain grass was mapped onsite in both 2000 and 2009. It was noted but not mapped on Thornmint Hill in 2000. In 2009, sizeable stands of fountain grass were mapped on Thornmint Hill, with population sizes ranging from 1-50 individuals. This species also occurs on the westernmost parcels, and scattered to the east (primarily along trails). A relatively large stand of fountain grass was mapped on slopes east of the racetrack in 2000; this stand was not observed in 2009, but is presumed to be present. Plants observed along a trail in the eastern part of the site in 2000 were not present in 2009.

False brome was noted but not mapped on Thornmint Hill in 2000. In 2009, sizeable stands of this species were mapped on Thornmint Hill, although no population estimates were recorded. This species appears to be increasing in areal extent.

Natal grass was recorded onsite in both 2000 and 2009 in the eastern portion of the site. Additional locations for this species were mapped on the westernmost parcels in 2009.

Long-leaved veldt grass was not recorded on CER in 2000, but was present at several locations in 2009, with the largest stands occurring at the racetrack and in the Horsemill Road oak grove.

Blessed milk thistle was mapped in 2009 at the racetrack, where plants form a nearly continuous groundcover in disturbed habitat.

Tocalote was not mapped in 2009, but occurs in the same locations as observed in 2000, and is particularly prevalent on Thornmint Hill.

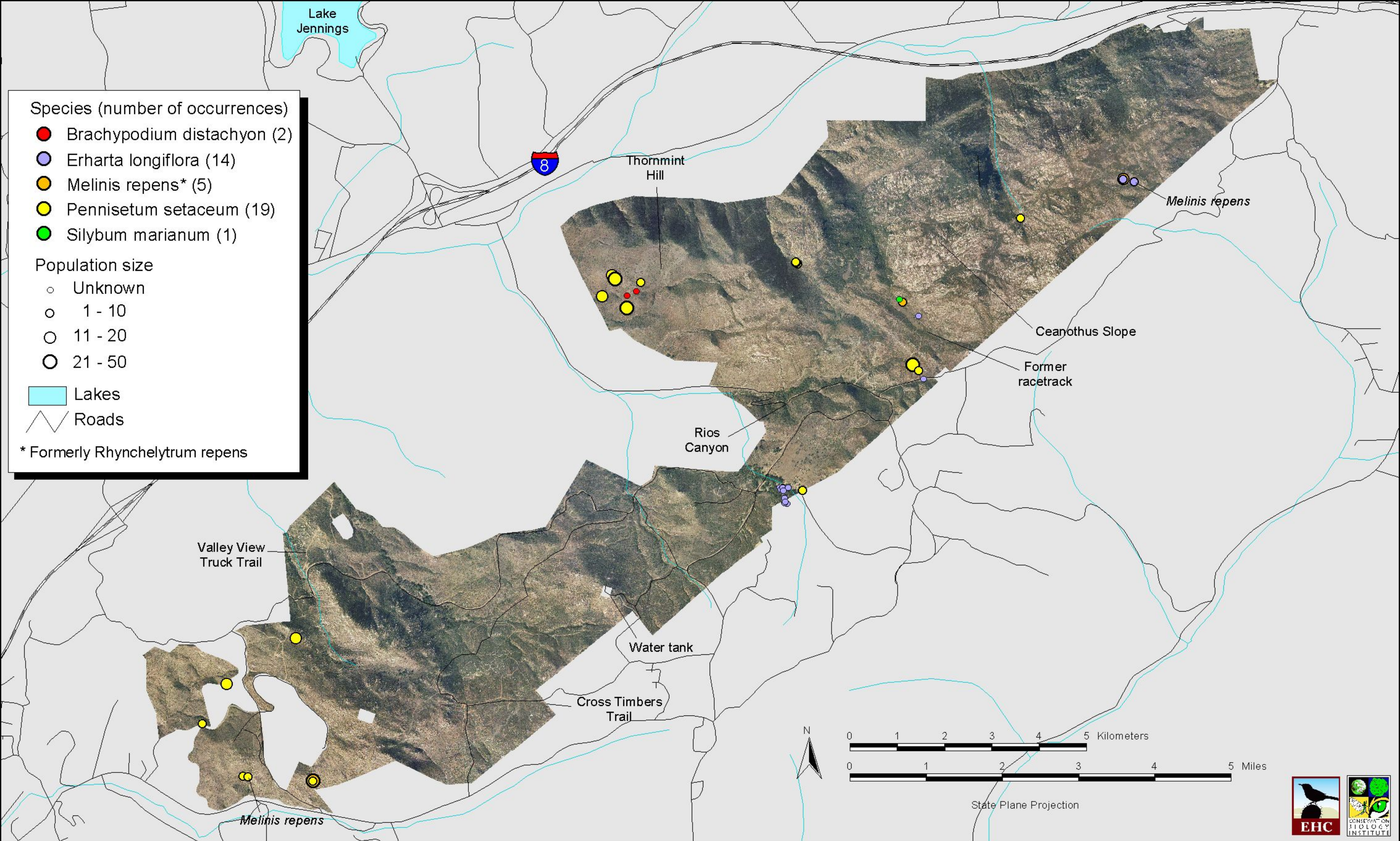


Figure 11. Invasive Species Mapped on Crestridge Ecological Reserve in 2009.



Occurrences of pampas grass, eucalyptus, horehound, and tamarisk mapped in 2000 were not observed in 2009. A small eucalyptus grove occurs along Vista de Montemar, in the western portion of the reserve, but was not mapped in 2009.

Threats

Invasive plants pose one of the greatest threats to the biological integrity of CER because of their ability to displace native species, degrade wildlife habitat, and alter ecosystem processes (Cal-IPC 2006). Invasive species are a particular concern on Thornmint Hill, where they threaten populations of sensitive plant species.

Recommendations

The California Department of Fish and Game (CDFG) is developing an invasive species management program for CER (J. Ekhoﬀ, pers. comm.). To inform the CDFG process, and facilitate management and long-term monitoring, the following measures are recommended:

1. Conduct a one-time mapping of selected invasive plants on CER, focusing on areas not visited in 2009 and on invasive species for which control efforts would likely be implemented.
2. Develop a long-term, ongoing invasives monitoring program that utilizes quarterly or semi-annual monitoring to detect early invasions. This monitoring effort should focus on portions of CER most susceptible to invasions, with surveys conducted on a rotating schedule.

California Gnatcatchers

Previous Surveys

Focused surveys were conducted for California gnatcatchers in spring and summer 2001. No gnatcatchers were observed onsite, although gnatcatchers were known to nest on the western acquisitions, which were not included in the 2001 surveys. In addition, a single gnatcatcher was identified approximately 0.25 mi west of Crestridge in November 2001.

Current Status

No California gnatcatchers were found recorded or detected within the mapped CSS onsite. However, several blue-gray gnatcatchers (*P. caerulea*) were found at different locations within chaparral and are presumed to be nesting. In addition, Southern California rufous-crowned sparrows (*Aimophila ruficeps canescens*) were seen and heard within CSS habitat at several different locations within CER, but their numbers and specific locations were not documented. Their presence indicates an apparent successful return to recovering CSS on CER.



Threats

Prior to the 2003 Cedar fire, much of the sage scrub at Crestridge was quite dense, potentially reducing its suitability as gnatcatcher habitat. The 2009 surveys indicated that the structure of scrub habitat onsite is currently suitable to support gnatcatchers. Maintaining appropriate fire intervals may be critical to the viability of habitat onsite for gnatcatchers.

Recommendations

1. Monitor gnatcatchers on a yearly basis. Based on the extent and quality of CSS in the western portion of the reserve, gnatcatchers may be expected to eventually move into and utilize this habitat.



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