MAPPING PLANT BIODIVERSITY HOTSPOTS AT THE COUNTY SCALE:
A NEW TOOL FOR ESTABLISHING RESOURCE CONSERVATION STRATEGIES

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ABSTRACT
Mapping Plant Biodiversity Hotspots at the County Scale: A New Tool for Establishing Resource Conservation Strategies

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Myers first identified the world’s 25 biodiversity hotspots and pioneered innovative ideas about the usefulness of biodiversity models for establishing long-term resource conservation strategies at global scales. Since Myers, most of the subsequent studies using hotspot science for biodiversity modeling have used large spatial scales like countries, provinces or states, and other biogeographic regions. The California Floristic Province continues to be one of the recognized global biodiversity hotspots. Our study site, San Luis Obispo County is within this hotspot and we created a map of plant biodiversity hotspots at the county scale using GIS technology. We wanted to determine the effectiveness and applicability of biodiversity hotspot mapping at this scale with anticipation that the map will serve as a new tool for establishing long-term resource conservation strategies in the County. Our plant biodiversity hotspot map is based on distribution data collected from herbarium specimens of San Luis Obispo County’s rare flora. These data were extracted from the Hoover Herbarium at Cal Poly and manually digitized into GIS. We built a model with GIS to identify, locate, and quantify the resultant hotspots from the data. The overall approach was successful at identifying and quantifying the attributes and geographic extents of plant biodiversity hotspots at the county scale. Our results are highly applicable for establishing local and regional plant conservation priorities at lower resolutions, which is frequently where land acquisition and reserve establishment occurs. We conclude that biodiversity hotspot modeling with GIS is an effective tool that can be applied to many other finer-scale biological inventories for conservation purposes.

Index terms: biodiversity hotspot, endemism, rarity, geographic information system (GIS)
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# Table of Contents

LIST OF TABLES ................................................................. vii

LIST OF FIGURES ............................................................. viii

LIST OF APPENDICES ......................................................... ix

GENERAL INTRODUCTION .................................................. 1-3

CHAPTER

I. BACKGROUND AND LITERATURE REVIEW ......................... 4-19
   i. BIODIVERSITY ............................................................ 4
   ii. HOTSPOT SCIENCE ..................................................... 6
   iii. CALIFORNIA FLORISTIC PROVINCE .............................. 8
   iv. SAN LUIS OBISPO COUNTY ........................................ 9

II. HERBARIUM, GIS, MODELING, AND MAPPING PLANT BIODIVERSITY
    HOTSPOTS IN SAN LUIS OBISPO COUNTY ......................... 19-59
   i. RESEARCH QUESTIONS ............................................... 19
   ii. METHODS ............................................................... 19
   iii. RESULTS .............................................................. 25
   iv. DISCUSSION .......................................................... 55

CONCLUSION ................................................................. 59

LITERATURE CITED ........................................................... 61-66
LIST OF TABLES

TABLE:

1. Biodiversity Hotspot Weighted Value Scheme .................................................. 23
2. Results Summary – Plant Biodiversity Hotspots Identified in San Luis Obispo County.......................................................... 28
3. San Luis Obispo – Plant Biodiversity Hotspot .................................................. 30
4. Arroyo de La Cruz – Plant Biodiversity Hotspot ............................................. 34
5. Morro Bay Area – Plant Biodiversity Hotspot.................................................. 38
6. Big Coreopsis Hill – Plant Biodiversity Hotspot------------------------------ 42
7. Red Hill Mesa – Plant Biodiversity Hotspot................................................... 46
8. Indian Knob – Plant Biodiversity Hotspot....................................................... 49
9. Carpenter Canyon – Plant Biodiversity Hotspot............................................ 52
LIST OF FIGURES

FIGURE:

1. Myers 25 Global Biodiversity Hotspots .................................................... 7
2. San Luis Obispo County Within the Context of the California Floristic Province…. 11
3. Hoover (1970) Map of San Luis Obispo County ...................................... 14
4. Topographic Map of San Luis Obispo County ........................................ 16
5. Aerial Photograph of San Luis Obispo County ........................................ 18
6. Diagram of the Plant Biodiversity Hotspot GIS Model ............................ 26
7. Plant Biodiversity Hotspots within San Luis Obispo County .................. 27
8. San Luis Obispo Region Plant Biodiversity Hotspot .............................. 33
9. Arroyo de La Cruz Plant Biodiversity Hotspot ....................................... 37
10. Morro Bay Area Plant Biodiversity Hotspot ........................................ 41
11. Big Coreopsis Hill Plant Biodiversity Hotspot ..................................... 45
12. Red Hill Mesa Plant Biodiversity Hotspot .......................................... 48
13. Indian Knob Plant Biodiversity Hotspot ............................................. 51
14. Carpenter Canyon Plant Biodiversity Hotspot ..................................... 54
LIST OF APPENDICES

APPENDIX:

A. Scientific Database Query Results
B. Special Status Plant Species of San Luis Obispo County
C. Special Status Plant Species Not Included in the Analysis
GENERAL INTRODUCTION

The intention of this chapter is to provide some additional insight into why I wanted to conduct this research and to explain the overall organization of my thesis project. I have worked as a botanist for environmental consulting firms for more than eight years. My primary duties as a consulting botanist are to help facilitate accordance with the current state and federal regulations that pertain to botanical and biological resources for a variety of private, county, and city development, restoration, and infrastructure projects. This experience has been valuable and certainly educational.

However on many levels, my consulting experience increased my awareness regarding the vast differences between the academic environment and the body of scientific theories associated with conservation biology and ecology and the various ways such disciplines are actually being practiced in the professional fields of natural resource management and regional planning. Ideally, conservation policies and practices should be based on well-supported scientific data analyses and the resultant principles. Unfortunately, my experiences have made it apparent that this is frequently not the case. Often natural resource management and regional planning decisions are more heavily based on the current political climates and agendas of their jurisdictions and are also typically dictated by their existing economic constraints and limitations. In theory, conserving biodiversity is straightforward, but in practice it is convoluted, nebulous, and seemingly distant from the everyday mandated practices, policies, and procedures generally employed by planning departments and natural resource agencies. The various differences I observed between the theory and practice of conservation biology and
ecology in my professional and academic pursuits were a fundamental inspiration for this project. I wanted to create something practical and functional that I could give to my community and to the pertinent resource agencies that is based on modern scientific analysis for use in the formation of planning strategies for regional plant conservation.

Chapter 1 provides the background information and literature review for this thesis project. It begins by providing a working definition of biodiversity because it is a fundamental concept to both ecology and conservation biology and the basis of the project. The next section of this chapter discusses the history, uses, and current developments of biodiversity hotspot science because this discipline and approach provide the primary framework of this analysis. The California Floristic Province is one of the currently recognized global biodiversity hotspots (Williams et al. 2011). After the discussion on hotspot science, Chapter 1 provides some of the reasons the California Floristic Province is a global biodiversity hotspot and introduces several of its unique characteristics and attributes. Chapter 1 concludes with an introduction to our study site, San Luis Obispo County. The last section of Chapter 1 discusses the natural history, geology, and introduces the floristic diversity of San Luis Obispo County.

Chapter 2 addresses and explains the more technical aspects of this work. The Chapter begins by presenting the four research questions we sought to answer with our analysis. The next section of the chapter discusses the methods we used to answer these research questions. It is broken up into several components that more or less parallel the timeline and trajectory that the research was conducted. We explain that the dataset used
for this research was distribution data for the rare flora of San Luis Obispo County and that these data were collected from the Hoover Herbarium at California Polytechnic State University San Luis Obispo. We discuss the process of how we digitized the collection location data into GIS, how we designed our model to identify the plant biodiversity hotspots, and the other technical aspects of the mapping procedures associated with the project. After the methods, Chapter 2 presents our results. We successfully identified seven plant biodiversity hotspot areas in San Luis Obispo County and the various attributes of the hotspots are discussed individually. The chapter concludes with a thorough discussion of our results. The discussion states that our model was based on species richness, rarity, and endemism; while more traditional hotspot models are based on species richness, endemism, and degree of threat. We discuss some of the differences between these two approaches and why ours utilized rarity instead of degree of threat. We also discuss the significance of the scale we used for the analysis, which is a county scale. Chapter 2 concludes with an examination of how our results could potentially be used to form long-term regional conservation strategies.
I. BACKGROUND AND LITERATURE REVIEW

This chapter presents the background information associated with this project and includes a thorough literature review of the body of existing work associated with our research. The chapter is divided into the following sections: biodiversity, hotspot science, the California Floristic Province, and San Luis Obispo County, which is our study site. Noticeably, the material presented in this chapter is initially quite broad and then progressively narrows in scope to a local county scale. We presented the material in this way intentionally because the scale of biodiversity analyses is a prominent theme that permeates this work.

BIODIVERSITY

While seemingly fundamental to the study of biology, the term biodiversity was coined fairly recently and became popularized within the scientific literature about 20 years ago (Harper and Hawksworth 1994). Its literal meaning- the diversity of life, is relatively simple in comparison to what the word has come to represent; the whole of biological complexity spanning from the level of individual genes across a myriad of scales up to the level of ecosystems and the abiotic processes associated with them (Freeman 2008; Melchias 2001; Ferrier 2002). As a result of this broad definition, it is paramount to define the particular scale at which biodiversity is being addressed. Biodiversity measures and analyses are typically conducted at the genetic, species, or ecosystem-level of organization.
Biodiversity has incredible value to humanity because it is fundamental to our understanding of the totality of life on Earth and to our abilities to find solutions to some of the most challenging global problems we currently face; such as overpopulation, global climate change, and the perceived extinction crisis (Raven et al. 2011 and Thomas et al. 2004). Yet, it is estimated that more than 86% of terrestrial species and 91% of aquatic species have not yet been described by science and are awaiting discovery (Mora et al. 2011). We value biodiversity for numerous reasons that are often grouped into several interrelated categories. These include: ethical reasons such as intrinsic worth, notions of environmental stewardship, spirituality, and esthetics; direct and indirect economic values that range from food sources, medicines, and natural resources like timber, natural gas, and minerals, to furnishing humanity with a healthy environment, clean air and water, and sustained economic productivity; and essential ecosystem services such as pollination, perpetuation of nutrient cycling, decomposition and detoxification of waste products and pollutants, and ongoing maintenance of critical environmental thresholds such as flood protection, disease prevention, pest control, and climate regulation (Ehrlich and Ehrlich 1992; Duffy 2009; Farber et al. 2002; Boyd and Banzhaf 2007; Groot et al. 2002). For these reasons, biodiversity became a focus for global conservation where the underlying goal was to identify geographic regions that harbor high amounts of biodiversity in order to protect and preserve them as a means of offsetting the rate of species extinctions and habitat loss worldwide (Melchias 2001).
HOTSPOT SCIENCE

Biodiversity concepts continued to provide a practical framework for conservation planning and prioritization and these efforts ultimately led to a seminal publication that identified 25 global biodiversity hotspots (Myers et al. 2000). This map is presented as Figure 1. The hotspots were defined as geographic areas that have high species richness, exceptionally high concentrations of endemic species, which also face an alarming degree of threat from habitat loss (Myers 1988). It is important to recognize that hotspot science is based upon species distribution datasets and that these data are the fundamental source of all hotspot models. Similarly, the distributions and status of plant species have been and continue to be the primary baseline indicators for hotspot science as opposed to some other taxonomic group. This is because plant species distributions are the most known and have been well documented historically (Myers 1988; Myers 1990; Myers et al. 2000; Mittermeier et al. 2001). The global biodiversity hotspot analyses have been periodically refined and now 35 total hotspots are recognized worldwide (Williams et al. 2011). Hotspot science has had a tremendous impact on conservation biology, governmental policies, and land use planning since its inception and it has generated more than $750 million for global conservation efforts since its development. This the most significant sum ever allocated towards a single conservation strategy (Myers 2003).
Figure 1. Myers 25 Global Biodiversity Hotspots. This map first appeared in the journal Nature in the year 2000. The publication of this article brought worldwide attention to biodiversity analyses and hotspot science, which forever changed how we approach and formulate global resource conservation strategies (Myers et al. 2000).
CALIFORNIA FLORISTIC PROVINCE

One of the global biodiversity hotspots identified by Myers that continues to satisfy the existing hotspot criteria is the California Floristic Province (CA-FP or Province). After the initial hotspot publication, which emphasized biodiversity hotspots within tropical forest ecosystems (Myers 1988), the researchers expanded their criteria and required that hotspots have a more substantial proportion of endemic plant species. They required that the hotspots consist of at least 0.5% of all plant species known to science, or at minimum 1,500 endemic vascular plant species (Myers 1990; Zachos and Habel 2011). With this new requirement several hotspots from Mediterranean eco-regions were added to the global biodiversity hotspot list, including the CA-FP. The Province is considered one of the most genetically complex eco-regions in the world and it is the largest geographic subdivision recognized in California (Calsbeek et al. 2003 and Baldwin et al. 2012). The CA-FP currently ranks 20th among the recognized global biodiversity hotspots in terms of total numbers of endemic plant and vertebrate genera. It has 52 endemic plant and four endemic vertebrate genera (Mittermeier et al. 2004 and Williams et al. 2011). Its original geographic extent is estimated to be 293,804 square kilometers (113,438 square miles) in size. Of this approximately 73,451 square kilometers (28,359 square miles or roughly 25%) of the original vegetation remains in what is considered a relatively undisturbed condition. The CA-FP biodiversity hotspot includes: approximately 7,030 vascular plant species total; of these 2,124 are considered endemics. The CA-FP also has four endemic and threatened birds, five endemic and threatened mammals, and eight endemic and threatened amphibians that collectively contribute to its status as a global biodiversity hotspot. Two species are thought to have
gone extinct within this hotspot since the year 1500 (Conservation International 2012 and Mittermeier et al. 2004).

The CA-FP comprises about 70% of the state of California. It extends beyond the California boundaries north into southwestern Oregon, slightly east into the western-most corner of Nevada, and south into northern Baja. The Province occupies all of what is referred to as ‘cismontane’ California, which is the entire geographic region that occurs west of the crests of the Sierra Nevada and Cascade mountain ranges, north of the crests of the Transverse Ranges, and west over the Peninsular Ranges. Two other floristic provinces occur to the east, outside the boundary of the CA-FP; the Great Basin Province (GB-FP) and the Desert Province (D-FP) and these two regions collectively occupy what is referred to as ‘transmontane’ California. The GB-FP is located within the northeastern two-thirds of California, east of the crest of the Sierra Nevadas and the D-FP occurs within the southeastern third of the state (Baldwin et al. 2012; Holland and Keil 1995; Raven and Axelrod 1978). Within California exclusively, the Province is further subdivided into six distinct geographic regions, 17 sub-regions, and 18 districts that compose a complete hierarchical system that is widely used by scientists and researchers to communicate about the diverse vegetation and geography within this massive state (Baldwin et al. 2012).

SAN LUIS OBISPO COUNTY

Our study site, San Luis Obispo County (SLO Co. or County) is located within the CA-FP biodiversity hotspot. A map of the County of San Luis Obispo within the
context of the CA-FP is presented as Figure 2 below. It occurs within both the Central Western (CW) and Great Valley (GV) California geographic regions and includes portions of both the outer and inner South Coast Ranges (SCoR) district as well as portions of the San Joaquin Valley (SnJV) district (Baldwin et al. 2012). The County is approximately 9,365 square kilometers (3,616 square miles) in size and has about 161 kilometers (100 miles) of coastline. SLO Co. is bordered by Kings and Monterey counties to the north, Kern County to the east, Santa Barbara County to the South, and the Pacific Ocean to the west. The highest elevation in the County is approximately 1,556 meters (5,106 feet) and it occurs at the top of Caliente Peak, which is located in the southeastern corner.

In general, SLO Co. has a Mediterranean climate, where most of the rainfall occurs during the winter months and the summer months are warm and dry. However, the western portions of the County are strongly influenced by the Pacific Ocean and the eastern portions exhibit more desert-like climatic cycles. On average SLO Co. receives about 50 centimeters (22 inches) of precipitation annually (Holland and Keil 1995). However, the annual amount of rainfall it receives is highly variable from year to year. Approximately 269,637 people live within the County and like the global population, this number is increasing (United States Census Bureau 2010).

SLO Co. has a dynamic geologic history consisting of 15 distinct stratigraphic units known to occur within it (Chipping 1987 and Jennings et al. 2010). The County has an abundance of serpentine rock outcrops and other ultramafic formations.
Figure 2. San Luis Obispo County Within the Context of the California Floristic Province. The red star indicates the approximate central location of the County within the Province. (*Image source unresolved- personal communications and lecture materials from Dr. Ritter and Dr. Keil).
These formations have had a dramatic edaphic effect on the plant assemblages associated with them. The serpentinite formations within SLO Co. support numerous rare and endemic plant species and novel plant communities (Kruckeberg 1984; Holland and Keil 1995; Harrison and Inouye 2002; and Barbour et al. 2007). Three different fault zones occur within SLO Co.; the San Simeon Fault, the Los Osos Fault, and the infamous San Andreas Fault, which is why it is still considered a seismically active region (San Luis Obispo Planning and Building Department 2012). Another distinct geologic feature within SLO Co. that is associated with seismic activity is the morros. The morros, also called the seven (occasionally nine) sisters are a linear chain of volcanic mountains located inland from Morro Bay that trend in a southeastern direction. The morros are another example of the County’s distinctive geology that characterizes the region (Dickerson 1990).

The County has several mountain ranges that provide a considerable amount of topographic variation and facilitate the many microclimates that exist throughout it. In general, all of the County’s mountain ranges trend in a northwest to southeast direction. The largest mountain range in SLO Co. is the Santa Lucia Range which is located primarily in the western half of the County. The San Luis Range is much smaller, generally located southwest of the City of San Luis Obispo. The more inland mountain ranges include the La Panza Range, the Caliente Range, and the Temblor Range. The La Panza Range is the most centrally located, situated northeast of the unincorporated community of Pozo. Southeast of the La Panzas is the Caliente Range and it is more or less adjacent to the eastern half of Route 166, until it flattens out into the Cuyama Valley.
State Route 166 is also the southern boundary of SLO Co. The most interior mountain range in the County is the Temblor Range which is located intermittently within the northeastern boundaries of SLO Co. Like its many mountain ranges, the County has an abundance of lakes and drainages. The largest river in SLO Co. is the Salinas, more or less bisecting the County from north to south until it is diverted at Santa Margarita Lake. The County has several large-sized coastal streams that flow west from the interior uplands and outlet directly into the Pacific Ocean. The Santa Maria/Cuyama River flows east to west and parallels Route 166 along the southern boundary of SLO Co. There are numerous other smaller waterways throughout the County that create a matrix of watersheds throughout the landscape. One of the other most prominent natural features within SLO Co. is Soda Lake. This lake is an endorheic, or closed alkaline lake, that is situated in the middle of the Carrizo Plain. This lake is a dry, lowland enclosure between the Temblors and the La Panza and Caliente Ranges. Surface waters from the adjacent mountains flow into the Carrizo Plain and because it does not have an outlet, the waters accumulate within Soda Lake until they eventually evaporate and the salty sediments remain (Hoover 1970 and Holland and Keil 1995). A map from Hoover (1970) of the County that illustrates the approximate locations of the major mountain ranges and streams is presented as Figure 3.
Figure 3. Hoover (1970) Map of San Luis Obispo County.
The combined edaphic, topographic, and climatic heterogeneity found in SLO Co. has given rise to a more diverse and speciose regional flora than the County’s size suggests. A topographic map of SLO Co. is provided as Figure 4 to illustrate the amount of relief over the terrain and heterogeneity that occurs throughout the County. Most generally speaking, the combined influences of climate, geology, and topography are responsible for the amount of plant diversity observed throughout SLO Co. (Hoover 1970; Holland and Keil 1995; Ritter 2006; and Raven and Axelrod 1978).

Approximately 2,889 plant taxa occur within SLO Co. (Calflora Database 2012). Of these, 1,850 are considered native plant taxa; meaning that they existed in California before European contact, which is generally thought to have occurred in the late 1700s (Ritter 2006 and Ritter 2012). The County has 214 special status plant taxa that are afforded protection by the various resource agencies and 25 are endemic solely to the County. It ranks seventh in the state in terms of the number of special status plant taxa per county (CNPS 2012a). A diverse and unusual variety of plant communities occur in SLO Co. The following generalized plant communities occur within the County, but this list is by no means an exhaustive vegetation classification: beach strand, coastal dune, coastal salt marsh, dune scrub, coastal scrub, maritime chaparral, coastal prairie, freshwater marsh, riparian woodland, chaparral, oak woodland, non-native and perennial grasslands, closed-cone coniferous forest, mixed evergreen forest, desert scrub, desert woodland, alkali sink, vernal pool, saltbush scrub, and urban/ruderal/developed (Ritter 2006; Holland and Keil 1995; Hoover 1970; Barbour et al. 2007; and Sawyer et al. 2009).
The California Department of Fish and Game (CDFG) recognize 13 designated rare vegetation communities within SLO Co. Yet the amount of plant diversity and distinct vegetative assemblages contained within this distance far surpasses reasonable expectation because there are numerous other places throughout California where one could conduct the same length transect and only encounter a few limited types of vegetation. According to Hoover, regarding the flora of SLO Co., “…diversity is the rule…The difference in environmental conditions is greater than this distance would suggest. It would be hard to find a more marked contrast than that between the cool damp north coast and the intensely hot and arid Cuyama Valley” (Hoover 1970). An aerial photograph flown in 2009 is presented as Figure 5 to illustrate the extent and variety of the vegetation communities within SLO Co.
II. HERBARIUM, GIS, MODELING, AND MAPPING PLANT BIODIVERSITY HOTSPOTS IN SAN LUIS OBISPO COUNTY

This chapter presents the various technical aspects of this work. First, it presents the four research questions we addressed. It explains the methodologies we used starting in the Herbarium, during the digitization phase of the project, how we designed the model to identify the plant biodiversity hotspots, and while mapping. After the methods, this chapter presents our results. The results section is followed by a discussion where we emphasize how our analysis varies from other hotspot studies and reiterates the significance and novelty of using a county scale. The chapter closes with an explanation of how we hope to use our results in collaboration with other local and regional resource entities to develop long-term resource conservation strategies.

RESEARCH QUESTIONS

Here we address four primary questions that are pertinent to biodiversity hotspot modeling: 1) Where are the plant biodiversity hotspots in SLO Co.; 2) Can we use the geographic information system (GIS)-based model we developed to detect them; 3) Is hotspot science methodology applicable at the county scale; and 4) Can it be used to develop regional resource conservation strategies?

METHODS

Herbarium

We queried three scientific databases to obtain comprehensive lists of all the special status plant species considered to occur within San Luis Obispo County by the
pertinent resource agencies. These include: the California Native Plant Society’s (CNPS) Online Inventory of Rare and Endangered Plants (CNPS 2012a), the CDFG California Natural Diversity Database (CNDDB) RareFind (CDFG 2003), and the United States Fish and Wildlife Service’s (USFWS) Information, Planning, and Conservation (IPaC) Online System (USFWS 2012). The results of these various scientific database queries are presented as Appendix A. Then we compiled the scientific database query results into a single table that includes general information about the nomenclature, regulatory status, distributions, habitat requirements, and phenology of the special status plants that occur in SLO Co. (Appendix B).

Recent nomenclatural changes became a source of confusion because the resource agencies have not yet fully accepted the treatments published within the new edition of the Jepson Manual because several of the taxa are no longer recognized as distinct entities, which could potentially result in them not being recognized as having special status. The release of the new Jepson Manual has initiated a statewide status review of all the special status plants in California and the process is likely to going to take multiple years to complete (CNPS 2012b and Baldwin et al. 2012). CNPS has begun the status review process, but each species must be evaluated on a case-by-case basis. We have attempted to the maximum extent feasible to stay up to date on the status review as this information becomes available. CNPS in particular, may continue to recognize certain taxa under the former first edition treatments (Hickman 1993) and it is the lead agency spearheading the statewide status review. In order to address these issues, we use the
name given to the taxon that is afforded special regulatory status and have included the new names as well, if applicable.

We collected distribution data for the County’s rare flora from the Hoover Herbarium (OBI) at the California State Polytechnic University, San Luis Obispo (Cal Poly) and utilized all of the available specimens for these special status plants within the OBI collections. We entered the accession number, collector(s), geographic location information, and collection date from each herbarium specimen label into a database and also took a digital photograph of each specimen. Several taxa did not have any collections within the herbarium and a few others were checked out on loan to other institutions or independent researchers. We were able to collect data for 177 of the 214 special status taxa (83%) and compiled the distribution information from 1599 total available specimens. The minimum number of specimens digitized for any taxon was one; several taxa had only one or two specimens. The maximum number of specimens digitized for any taxon was 41 specimens. The 37 taxa that are not represented comprise approximately 17% of the County’s rare flora. The family name, scientific name, common name, and regulatory status of each of the 37 taxa not included in the study are presented in Appendix C.

**Weighted Value Scheme**

Some of the taxa included in the study are rarer than others and are therefore afforded a greater level of protection from the resource agencies. For example, in the CNPS listing system a California Rare Plant Rank (CRPR) List 4 species is not nearly as
rare as a List 1B species. Taxa may be recognized by multiple resource agencies simultaneously. Marsh sandwort (*Arenaria paludicola*) for example is a CRPR List 1B.1 taxon, is federally endangered, and is listed as endangered by the state of California. We wanted to account for this inherent variability of status in our study and wanted to integrate rarity into the biodiversity hotspot model. To do so we created a weighted value scheme for the data and assigned a particular score to each taxon according to the various levels of special status that it has been assigned. If a taxon is listed by multiple agencies the total score given to it in the weighted value scheme is the sum of all the point values. According to the scheme state and/or federally listed taxa are given five points. If a taxon is endemic to SLO Co.; meaning that its distribution is confined to a reduced geographical area and it only occurs within the County, that taxon was given three additional points. Plant species designated as CRPR List 1B taxa were given four points, List 2 taxa were given three, List 3 were given two, and List 4 were given one point. The weighted value scheme we used is summarized below in Table 1.
Table 1. Biodiversity Hotspot Weighted Value Scheme. The various point values are allocated to each special status taxon individually for every level of status it is afforded.

<table>
<thead>
<tr>
<th>Status</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>State/Federally- Listed CR, CT, CE and FT, FE</td>
<td>5</td>
</tr>
<tr>
<td>Endemic to San Luis Obispo County (Occurs only within boundaries of County)</td>
<td>3</td>
</tr>
<tr>
<td>CRPR 1B Plants rare, threatened or endangered in CA and elsewhere</td>
<td>4</td>
</tr>
<tr>
<td>CRPR 2 Plants rare, threatened or endangered in CA but more elsewhere</td>
<td>3</td>
</tr>
<tr>
<td>CRPR 3 Plants about which more information is required, A review list</td>
<td>2</td>
</tr>
<tr>
<td>CRPR 4 Plants of limited distribution, A Watch List</td>
<td>1</td>
</tr>
</tbody>
</table>

GIS and Digitizing

We entered and managed the data with Geographic Information System (GIS) software by Environmental Systems Research Institute (ESRI) Inc., in ArcMap - ArcGIS Desktop Version 10 (ESRI 2011). We digitized, or digitally mapped, the geographic locations of all the herbarium specimens as stated on the herbarium labels by hand. We digitized the geographic locations as individual polygons and assembled these data into a single shapefile layer, titled specimens. As mentioned earlier, this information was previously compiled into a database for use during the digitization phase of the project. We used several background reference layers to assist in the mapping and to maximize the accuracy of the polygon placement in GIS. These include several data layers acquired from ESRI online: an aerial photograph flown in 2009, United States Geological Survey (USGS) Topographic Map, and Bing Road Map; and several data
layers obtained from the County and/or City of San Luis Obispo: County boundary, SLO Co. Public Lands Parcels layer, County Parcels layer, County Streams layer, County Roads layer, and SLO Co. Serpentine Soils layer. We also used *Durham’s Place-Names of California’s Central Coast* to assist in identification of historical places and other more cryptic geographical inferences encountered within the herbarium data (Durham 2000).

**Building the Model**

Once all the herbarium specimen location polygons were digitized, we used ModelBuilder, which is an analysis application in ArcMap to construct an automated model that was used to systematically organize the specimen data to identify and quantify the resultant plant biodiversity hotspots. Two basic spatial analyst tools were used to build the model; dissolve and union. The dissolve tool aggregates features based on specified attributes. With our data it was used to take multiple herbarium records of a single taxon and merge them, or ‘dissolve’ them into a single layer for that taxon. The union tool computes a geometric ‘union’ of the input features and overwrites them as a new output feature class from the areas of polygon overlap based on the original input features. In other words, if there are two different polygon layers for two different taxa, taxon A and taxon B, respectively; the union tool identifies the areas where the taxa A and B polygons overlap. After recognition of the overlap, the union tool merges those polygons and then designates them as a new and unique output, feature class C in this scenario. Feature class C now includes the entire area previously mapped for the former taxa A and B, including the areas where those polygons overlap. In addition to these basic applications, the model was designed to integrate the weighted value scheme into
the analysis. As built, the model functions as an iterative process that systematically integrates the weighted value scheme to sum all values within areas of polygon overlap and this is how the model calculates and locates the biodiversity hotspots. A diagram of the complete model is presented in Figure 6. It takes approximately 18 seconds to run the model and obtain the results. When categorizing the results, we used the ESRI Natural Breaks default, which is five classes of diversity. We illustrated the classes of diversity on a primary color scale with the red class having the highest diversity and the darker green class having the lowest diversity. Once we ran the analysis and finalized the results, we constructed the plant biodiversity hotspot map for the County.

RESULTS

The model successfully identified seven plant biodiversity hotspots within the County (Figure 7). The hotspots have a cumulative weighted value of 40 to 108 points. Specifically, the red hotspot regions have a cumulative weighted value of 63 to 108 points and the orange hotspot regions have a cumulative weighted value of 40 to 63 points. The plant biodiversity hotspots were named by location or according to some other associated and characteristic geologic feature. In order from the most diverse to the least diverse, the plant biodiversity hotspots include the following: San Luis Obispo Region, Arroyo de La Cruz, Morro Bay Area, Big Coreopsis Hill, Red Hill Mesa, Indian Knob, and Carpenter Canyon. A summary of our results is presented in Table 2 below, which includes the total number of taxa within each identified hotspot and the vegetation community types present within each hotspot. The hotspots are discussed individually with greater detail below.
Figure 6. Diagram of the Plant Biodiversity Hotspot GIS Model.
Figure 7. Plant Biodiversity Hotspots within San Luis Obispo County.
Table 2. Results Summary – Plant Biodiversity Hotspots Identified in San Luis Obispo County. The names, number of taxa, and community types present at each of the resultant hotspots are listed in the order from most diverse to least diverse.

<table>
<thead>
<tr>
<th>Name of Hotspot</th>
<th>Number of Taxa</th>
<th>Community Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Luis Obispo Region</td>
<td>32</td>
<td>Serpentine chaparral, oak woodland, riparian, and serpentine perennial grassland</td>
</tr>
<tr>
<td>Arroyo de La Cruz</td>
<td>28</td>
<td>Maritime chaparral, coastal bluff grassland, and riparian</td>
</tr>
<tr>
<td>Morro Bay Area</td>
<td>23</td>
<td>Sand dunes, salt marsh, coastal scrub, and coastal dune scrub</td>
</tr>
<tr>
<td>Big Coreopsis Hill</td>
<td>20</td>
<td>Sand dunes and coastal dune scrub</td>
</tr>
<tr>
<td>Red Hill Mesa</td>
<td>13</td>
<td>Annual grassland, vernal pools, and oak woodland</td>
</tr>
<tr>
<td>Indian Knob</td>
<td>9</td>
<td>Annual grassland, oak woodland, chaparral, coastal scrub, and riparian</td>
</tr>
<tr>
<td>Carpenter Canyon</td>
<td>6</td>
<td>Oak woodland, chaparral, and coastal scrub</td>
</tr>
</tbody>
</table>

**San Luis Obispo Region Hotspot**

The San Luis Obispo Region hotspot is the most diverse hotspot identified in the study. A total of 32 special status taxa occur within this hotspot. Table 3 provides the scientific name, common name, and regulatory status of the special status taxa that comprise the San Luis Obispo Region Hotspot. Please note: for sake of clarity and to avoid taxonomic confusion, the names utilized in each of the individual hotspot tables presented within the Results Section follow the taxonomy used by CNPS in the Online Inventory of Rare and Endangered Plants (CNPS 2012a). The vegetation communities present within the hotspot include serpentine and non-serpentine chaparral, oak woodland, riparian, coastal scrub, serpentine perennial grassland, and non-native grassland. All of the individual polygon areas within the collective San Luis Obispo Region hotspot are located on the west side of Interstate Highway 101 and the majority
occurs on serpentinite substrates. From the north to the south they include a small area on West Cuesta Ridge, Poly Canyon- which is part of the Cal Poly campus, areas associated with O’Conner Way, Laguna Lake Park, and the ridge-tops between Perfumo Canyon and See Canyon. The hotspot is named after the City of San Luis Obispo, which is located in close proximity to the various areas identified in this hotspot region. The San Luis Obispo Region hotspot is the most centrally located hotspot within the County. The total hotspot area detected in the analysis is approximately 241 hectares (595 acres, about one square mile). Figure 8 is a map of the San Luis Obispo Region Plant Biodiversity Hotspot at a higher resolution.
Table 3. San Luis Obispo Region – Plant Biodiversity Hotspot. Summary of special status taxa that comprise the hotspot. The scientific and common names; federal, state, and CRPR status; and if the taxon is endemic is included. Please refer to Appendix B for specific status code information and abbreviations.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agrostis hooveri</em>&lt;br&gt;Hoover’s bent grass</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Arctostaphylos cruzensis</em>&lt;br&gt;Arroyo de la Cruz manzanita</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Arctostaphylos morroensis</em>&lt;br&gt;Morro manzanita</td>
<td>FT</td>
<td>NA</td>
<td>1B.1</td>
<td>Y</td>
</tr>
<tr>
<td><em>Arctostaphylos obispoensis</em>&lt;br&gt;bishop manzanita</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Arctostaphylos pechoensis</em>&lt;br&gt;pecho manzanita</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Arctostaphylos pilosula</em>&lt;br&gt;Santa Margarita manzanita</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Calandrinia breweri</em>&lt;br&gt;Brewer’s calandrinia</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Calochortus clavatus</em> var. <em>clavatus</em>&lt;br&gt;club-haired mariposa lily</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Calochortus obispoensis</em>&lt;br&gt;San Luis mariposa lily</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Calochortus simulans</em>&lt;br&gt;La Panza mariposa lily</td>
<td>NA</td>
<td>NA</td>
<td>1B.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Calystegia subcaudalis</em> ssp. <em>episcopalis</em>&lt;br&gt;Cambría morning-glory</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Carex obispoensis</em>&lt;br&gt;San Luis Obispo sedge</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><em>Castilleja densiflora</em> ssp. <em>obispoensis</em> San Luis Obispo owl’s clover</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Centromadia parryi</em> ssp. <em>congdonii</em> Congdon’s tarplant</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Chlorogallum pomeridianum</em> var. <em>minus</em> dwarf soapplant</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Chorizanthe brewerii</em> Brewer’s spineflower</td>
<td>NA</td>
<td>NA</td>
<td>1B.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Chorizanthe palmeri</em> Palmer’s spineflower</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Cirsium fontinale</em> var. <em>obispoense</em> San Luis Obispo fountain thistle</td>
<td>FE</td>
<td>CE</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Delphinium parryi</em> ssp. <em>eastwoodiae</em> Eastwood’s larkspur</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Dudleya abramsii</em> ssp. <em>bettinae</em> Betty’s dudleya</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Dudleya abramsii</em> ssp. <em>marina</em> mouse-gray dudleya</td>
<td>NA</td>
<td>NA</td>
<td>1B.3</td>
<td>Y</td>
</tr>
<tr>
<td><em>Eleocharis parvula</em> small spikerush</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Layia jonesii</em> Jones’ layia</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Lomatium parvifolium</em> small-flowered leptosiphon</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Monardella palmeri</em> Palmer’s monardella</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Perideridia pringlei</em> adobe yampah</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><em>Pinus radiata</em> Monterey pine</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td><em>Sanicula hoffmannii</em> Hoffmann’s sanicle</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Sanicula maritima</em> adobe sanicle</td>
<td>NA</td>
<td>CR</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td><em>Senecio aphanactis</em> San Gabriel ragwort</td>
<td>NA</td>
<td>NA</td>
<td>2.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Sidalcea hickmanii</em> ssp. <em>anomala</em> Cuesta Pass checkerbloom</td>
<td>NA</td>
<td>CR</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>Streptanthus albidus</em> ssp. <em>peramoenus</em> most beautiful jewel-flower</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
</tbody>
</table>
Figure 8. San Luis Obispo Region Plant Biodiversity Hotspot.
**Arroyo de La Cruz Hotspot**

Arroyo de La Cruz is the next most diverse hotspot identified in the study and 28 special status taxa occur within it. However, as indicated by the abundant area of red coloration in the hotspot, it has a higher weighted value than the other hotspots, which are predominantly orange in appearance. This is because the species composition of this hotspot is composed of more rare and endemic taxa. Table 4 below provides the scientific name, common name, and regulatory status of the special status taxa that comprise the Arroyo de La Cruz Hotspot. The vegetation communities that compose this hotspot include maritime chaparral, coastal bluff grassland, and riparian. Arroyo de La Cruz is an intermittent stream carries flows from the Santa Lucia Range and empties into the Pacific Ocean on the west side of State Highway 1 and it is the most prominent feature that this hotspot was named after. The Arroyo de La Cruz hotspot occurs in the northwestern corner of the County. The total hotspot area detected in the analysis is approximately 637 hectares (1,575 acres or about 2.5 square miles) in size. Figure 9 is a map of the Arroyo de La Cruz Plant Biodiversity Hotspot at a higher resolution.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Allium hickmanii</em> Hickman’s onion</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Arctostaphylos cruzensis</em> Arroyo de La Cruz manzanita</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Arctostaphylos hookeri ssp. hearstiorum Hearst’s manzanita</td>
<td>NA</td>
<td>CE</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Astragalus nuttallii var. nuttallii ocean bluff milk-vetch</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Baccharis plummerae ssp. glabrata San Simeon baccharis</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Bloomeria humilis dwarf goldenstar</td>
<td>NA</td>
<td>CR</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Calandrinia breweri Brewer’s calandrinia</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Calochortus clavatus var. recurvifolius Arroyo de La Cruz mariposa lily</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Calochortus uniflorus large-flowered mariposa lily</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Calystegia subacaulis ssp. episcopalis Cambria morning-glory</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Carex obispoensis San Luis Obispo sedge</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Castilleja ambiguus ssp. insalutata no common name</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Castilleja densiflora ssp. obispoensis San Luis Obispo owl’s clover</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Ceanothus hearstiorum Hearst’s ceanothus</td>
<td>NA</td>
<td>CR</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Ceanothus maritimus maritime ceanothus</td>
<td>NA</td>
<td>CR</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
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<tr>
<td>-----------------------------</td>
<td>----------------</td>
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<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Chorizanthe palmeri</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Palmer’s spineflower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cirsium occidentale var. compactum</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>compact cobwebby thistle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corethrogyne leucophylla</td>
<td>NA</td>
<td>NA</td>
<td>3.2</td>
<td>N</td>
</tr>
<tr>
<td>branching beach aster</td>
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<td></td>
</tr>
<tr>
<td>Erigeron sanctarum</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>saint’s daisy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lasthenia californica ssp.</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>macrantha perennial goldfields</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lomatium parvifolium</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>small-leaved lomatium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lotus formosissimus</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
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<tr>
<td>harlequin lotus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microseris paludosa</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>marsh microseris</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Monolopia gracilens</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>woodland woolythreads</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedicularis dudleyi</td>
<td>NA</td>
<td>CR</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Dudley’s lousewort</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perideridia gairdneri</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>ssp. gairdneri</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gairdner’s yampah</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sanicula hoffmanii</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td>Hoffmann’s sanicle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanicula maritima</td>
<td>NA</td>
<td>CR</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>adobe sanicle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 9. Arroyo de La Cruz Plant Biodiversity Hotspot.
**Morro Bay Area Hotspot**

After Arroyo de La Cruz, the Morro Bay Area is the next most diverse hotspot. A total of 23 special status taxa occur within the Morro Bay Area. Table 5 provides the scientific name, common name, and regulatory status of the special status taxa that comprise the Morro Bay Area Hotspot. There are three separate regions within this hotspot; a small polygon at the Sweet Springs Nature Preserve, the Morro Bay Sandspit, and another polygon that is located within Montaña de Oro State Park. The vegetation communities associated with this hotspot are sand dunes, salt marsh, coastal scrub, and coastal dune scrub. Morro Bay is a large and relatively pristine estuary. As such, it is subject to regular tidal influences and it is a highly dynamic wetland system where both fresh and salt waters mix and interact. Morro Bay is characteristic of this hotspot and is the feature attributed to this hotspot name. The Morro Bay Region hotspot is located in the western portion of the County, right along the coast. The total area detected in the analysis for the Morro Bay Area hotspot is approximately 437 hectares (1,079 acres or approximately 1.7 square miles). Figure 10 is a map of the Morro Bay Area Plant Biodiversity Hotspot at a higher resolution.

Table 5. Morro Bay Area – Plant Biodiversity Hotspot. Summary of special status taxa that comprise the hotspot. The scientific and common names; federal, state, and CRPR status; and if the taxon is endemic is included. Please refer to Appendix B for specific status code information and abbreviations.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abronia maritima red sand-verbena</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Arctostaphylos morroensis Morro manzanita</td>
<td>FT</td>
<td>NA</td>
<td>1B.1</td>
<td>Y</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>-------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Arctostaphylos pechoensis pecho manzanita</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Calandrinia breweri Brewer's calandrinia</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Ceanothus cuneatus var. fascicularis Lompoc ceanothus</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Chenopodium littoreum coastal goosefoot</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Chloropyron maritimum ssp. maritimum salt marsh bird’s-beak</td>
<td>FE</td>
<td>CE</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Cicuta maculata var. bolanderi Bolander’s water-hemlock</td>
<td>NA</td>
<td>NA</td>
<td>2.1</td>
<td>N</td>
</tr>
<tr>
<td>Dithyrea maritima beach spectaclepod</td>
<td>NA</td>
<td>CT</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Eriodictyon altissimum Indian Knob mountainbalm</td>
<td>FE</td>
<td>CE</td>
<td>1B.1</td>
<td>Y</td>
</tr>
<tr>
<td>Erigeron blochmaniae Blochman’s leafy daisy</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Erigeron sanctarum saint’s daisy</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Erysimum suffrutescens suffrutescent wallflower</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Horkelia cuneata var. sericea Kellogg’s horkelia</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Juncus acutus ssp. leopoldii southwestern spiny rush</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Lasthenia glabrata ssp. coulteri Coulter’s goldfields</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Malacothrix incana dunedelion</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td>Mucronea californica California spineflower</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Poa diaboli Diablo Canyon blue grass</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Prunus fasciculata var. punctata sand almond</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td>Senecio aphanactis San Gabriel ragwort</td>
<td>NA</td>
<td>NA</td>
<td>2.2</td>
<td>N</td>
</tr>
<tr>
<td>Senecio blochmaniae Blochman’s ragwort</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Suaeda californica California seablite</td>
<td>FE</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
</tbody>
</table>
Figure 10: Morro Bay Area Plant Biodiversity Hotspot.
**Big Coreopsis Hill Hotspot**

Big Coreopsis Hill is the next most diverse hotspot in the study and it has a total of 20 special status taxa within it. **Table 6** below provides the scientific name, common name, and regulatory status of the special status taxa that comprise the Big Coreopsis Hill Hotspot. The vegetation communities that occur within this hotspot are sand dunes and coastal dune scrub. The Big Coreopsis hotspot is located in the southwestern portion of the County, just slightly inland from the coast. Several separate polygons comprise the total hotspot area, which is approximately 42 hectares (104 acres or 0.2 square mile) in size. **Figure 11** is a map of the Big Coreopsis Hill Plant Biodiversity Hotspot at a higher resolution.

Table 6. Big Coreopsis Hill – Plant Biodiversity Hotspot. Summary of special status taxa that comprise the hotspot. The scientific and common names; federal, state, and CRPR status; and if the taxon is endemic is included. Please refer to Appendix B for specific status code information and abbreviations.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abronia maritima red sand-verbena</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Astragalus nuttallii var. nuttallii ocean bluff milk-vetch</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Chenopodium littoreum coastal goosefoot</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Cirsium occidentale var. compactum compact cobwebby thistle</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Cirsium rhothophilum surf thistle</td>
<td>NA</td>
<td>CT</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><em>Cirsium scariosum</em> var. <em>loncholepis</em> La Graciosa thistle</td>
<td>FE</td>
<td>CT</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td><em>Corethrogynne leucophylla</em> branching beach aster</td>
<td>NA</td>
<td>NA</td>
<td>3.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Delphinium gypsophilum</em> ssp. <em>gypsophilum</em> gypsum-loving larkspur</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Dithyrea maritima</em> beach spectaclepod</td>
<td>NA</td>
<td>CT</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td><em>Erigeron blochmaniae</em> Blochman’s leafy daisy</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Horkelia cuneata</em> var. <em>sericea</em> Kellogg’s horkelia</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td><em>Leptodactylon californicum</em> ssp. <em>tomentosum</em> fuzzy prickly-phlox</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Lupinus nipomensis</em> Nipomo Mesa lupine</td>
<td>FE</td>
<td>CE</td>
<td>1B.1</td>
<td>Y</td>
</tr>
<tr>
<td><em>Malacothrix incana</em> dunedelion</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td><em>Monardella undulata</em> curly-leaved monardella</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Mucronea californica</em> California spineflower</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Nasturtium gambelii</em> Gambel’s water cress</td>
<td>FE</td>
<td>CT</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td><em>Phacelia ramosissima</em> var. <em>australitoralis</em> south coast branching phacelia</td>
<td>NA</td>
<td>NA</td>
<td>3.2</td>
<td>N</td>
</tr>
<tr>
<td><em>Prunus fasciculata</em> var. <em>punctata</em> sand almond</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><em>Senecio blochmaniae</em></td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Blochman’s ragwort</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 11. Big Coreopsis Hill Plant Biodiversity Hotspot.
Red Hill Mesa Hotspot

The Red Hill Mesa hotspot is one of the smallest hotspots identified in the study and it has 13 special status taxa within it. Table 7 below provides the scientific name, common name, and regulatory status of the special status taxa that comprise the Red Hill Hotspot. The vegetation communities that occur within this hotspot are annual grassland, vernal pools, and oak woodland. The soils on the mesa are a unique type of well-drained clays that give them a characteristic red appearance. This hotspot occurs in the eastern portion of the County and it’s located near the intersection of State Highway 58 and Red Hill Road. The Red Hill Mesa hotspot is approximately five hectares (12 acres or 0.02 square mile) in size. Figure 12 is a map of the Red Hill Mesa Plant Biodiversity Hotspot at a higher resolution.

Table 7. Red Hill Mesa – Plant Biodiversity Hotspot. Summary of special status taxa that comprise the hotspot. The scientific and common names; federal, state, and CRPR status; and if the taxon is endemic is included. Please refer to Appendix B for specific status code information and abbreviations.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthomintha obovata ssp. cordata heart-leaved thorn-mint</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Amsinckia douglasiana Douglas’ fiddleneck</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Calycadenia villosa dwarf calycadenia</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Castilleja densiflora ssp. obispoensis San Luis Obispo owl’s clover</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Caulanthus lemmonnii</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Lemmon’s jewelflower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorogalum purpureum var. reductum Camatta Canyon amole</td>
<td>FT</td>
<td>CR</td>
<td>1B.1</td>
<td>Y</td>
</tr>
<tr>
<td>Eschscholzia rhombipetala diamond-petaled California poppy</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Galium andrewsii ssp. gatense phlox-leaved serpentine bedstraw</td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td>Juncus luciensis Santa Lucia dwarf rush</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Layia heterotricha pale-yellow layia</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Lessingia tenuis spring lessingia</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
<tr>
<td>Madia radiata showy golden madia</td>
<td>NA</td>
<td>NA</td>
<td>1B.1</td>
<td>N</td>
</tr>
<tr>
<td>Malacothamnus jonesii</td>
<td>NA</td>
<td>NA</td>
<td>4.3</td>
<td>N</td>
</tr>
</tbody>
</table>
Figure 12. Red Hill Mesa Plant Biodiversity Hotspot.
**Indian Knob Hotspot**

The Indian Knob hotspot is the next most diverse hotspot after Red Hill Mesa and 9 special status taxa occur within it. Like the Arroyo de La Cruz hotspot, Indian Knob has a portion of it that appears red; meaning that the taxa at this hotspot sum to a higher weighted value than the others that appear orange. **Table 8** below provides the scientific name, common name, and regulatory status of the special status taxa that comprise the Indian Knob Hotspot. The vegetation communities at this hotspot include annual grassland, oak woodland, chaparral, coastal scrub, and riparian. However, chaparral communities dominate the landscape at Indian Knob. Indian Knob is a prominent mountain peak in the southeastern portion of the San Luis Range and it occurs south of the City of San Luis Obispo. It’s located on the east side of Interstate Highway 101 and this hotspot is named after this feature. The total hotspot area is approximately 162 hectares (401 acres or 0.6 square mile) in size. **Figure 13** is a map of the Indian Knob Plant Biodiversity Hotspot at a higher resolution.

---

**Table 8.** Indian Knob – Plant Biodiversity Hotspot. Summary of special status taxa that comprise the hotspot. The scientific and common names; federal, state, and CRPR status; and if the taxon is endemic is included. Please refer to Appendix B for specific status code information and abbreviations.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
</table>
| *Agrostis hooveri*  
Hoover’s bent grass | NA             | NA           | 1B.2        | N       |
| *Arctostaphylos pilosula*  
Santa Margarita manzanita | NA             | NA           | 1B.2        | N       |
| *Calochortus obispoensis*  
San Luis mariposa lily | NA             | NA           | 1B.2        | Y       |
<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
</table>
| *Castilleja densiflora ssp. obispoensis*  
San Luis Obispo owl's clover | NA            | NA           | 1B.2        | Y       |
| *Clarkia speciosa ssp. immaculata*  
Pismo clarkia | FE            | CR           | 1B.1        | Y       |
| *Eriodictyon altissimum*  
Indian Knob mountainbalm | FE            | CE           | 1B.1        | Y       |
| *Leptodactylon californicum ssp. tomentosum*  
fuzzy prickly-phlox | NA            | NA           | 4.2         | N       |
| *Lupinus ludovicianus*  
San Luis Obispo County lupine | NA            | NA           | 1B.2        | Y       |
| *Scrophularia atrata*  
black-flowered figwort | NA            | NA           | 1B.2        | N       |
Figure 13. Indian Knob Plant Biodiversity Hotspot.
Carpenter Canyon Hotspot

The final hotspot detected in the study is Carpenter Canyon. Six special status taxa occur within it and it is also the smallest sized hotspot identified. Table 9 below provides the scientific name, common name, and regulatory status of the special status taxa that comprise the Carpenter Canyon Hotspot. The vegetation communities present at the Carpenter Canyon hotspot are oak woodland, chaparral, and coastal scrub. Carpenter Canyon is not only the name of the major canyon in this region, but it is also the name of the portion of State Highway 227 south of the intersection of Edna Road and Price Canyon Road. This hotspot is named for the road and after the canyon associated with this area. The Carpenter Canyon hotspot is located in the southwestern portion of the County. This hotspot occurs along the west side of Carpenter Canyon Road and it is approximately five hectares (12 acres or 0.02 square mile) in size. Figure 14 is a map of the Carpenter Canyon Plant Biodiversity Hotspot at a higher resolution.

Table 9. Carpenter Canyon – Plant Biodiversity Hotspot. Summary of special status taxa that comprise the hotspot. The scientific and common names; federal, state, and CRPR status; and if the taxon is endemic is included. Please refer to Appendix B for specific status code information and abbreviations.

<table>
<thead>
<tr>
<th>Scientific Name/Common Name</th>
<th>Federal Status</th>
<th>State Status</th>
<th>CRPR Status</th>
<th>Endemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrostis hooveri</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Hoover’s bent grass</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Arctostaphylos pilosula</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Santa Margarita manzanita</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>N</td>
</tr>
<tr>
<td>Calochortus obispoensis</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>San Luis mariposa lily</td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td>Scientific Name/Common Name</td>
<td>Federal Status</td>
<td>State Status</td>
<td>CRPR Status</td>
<td>Endemic</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><em>Clarkia speciosa ssp. immaculate</em></td>
<td>FE</td>
<td>CR</td>
<td>1B.1</td>
<td>Y</td>
</tr>
<tr>
<td><em>Pismo clarkia</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lupinus ludovicianus</em></td>
<td>NA</td>
<td>NA</td>
<td>1B.2</td>
<td>Y</td>
</tr>
<tr>
<td><em>San Luis Obispo County lupine</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Mucronea californica</em></td>
<td>NA</td>
<td>NA</td>
<td>4.2</td>
<td>N</td>
</tr>
<tr>
<td><em>California spineflower</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 14. Carpenter Canyon Plant Biodiversity hotspot.
DISCUSSION

Our analysis was successful at identifying plant biodiversity hotspots in SLO Co. Seven hotspot areas were detected with the GIS model that we designed. The hotspot areas we identified have high levels of species richness, rarity, and endemism at a county scale. While the use of GIS technology is advancement because it greatly increases our capacity to identify, quantify, and store information about biodiversity, it is also a deviation from the original biodiversity hotspot methodologies (Myers et al. 2000). However, the fundamental application of this conceptual framework produced substantive results at the county scale for use to develop localized resource conservation strategies.

As mentioned, the most frequently used indicators for identifying biodiversity hotspots are species richness, endemism, and degree of threat (Zachos and Habel 2011; Dunstan et al. 2012; Gould 2000). This study strayed slightly from these traditional indicators. Our study used distribution data for the rare flora of SLO Co. as a proxy for plant species richness as opposed to complete or exhaustive data for all plant species known to occur within the County. Time, labor intensity, and budgetary constraints were certainly factors that influenced this decision; but more importantly, the prevalence of non-native species can skew the results of plant biodiversity hotspot models. Hotspots models based too heavily on species richness can actually have low levels of species rarity and endemism because the composition can be largely comprised of non-native and invasive species. Orme et al. (2005) found that global avian biodiversity hotspots based on species richness were not congruent with endemism or threat. Newer hotspot analyses
are beginning to emphasize biodiversity models that select conservation areas for both patterns of diversity and the evolutionary processes required to sustain them. Such criteria as evolutionarily significant units (ESU) and other genetic diversity indicators are being afforded much greater emphasis in recent hotspot analyses (Morowitz 2002; Cowling et al. 2003; Vandergast et al. 2008; Hughes et al. 2008).

Our model is based on 1) species richness, 2) rarity, and 3) endemism. Unlike traditional biodiversity models, degree of threat is not addressed. We are aware of the global mass extinction event that is currently underway, the exponential growth in population that humans are experiencing, and various scenarios regarding species homogenization and global climate change (Malcolm et al. 2006; Loarie et al. 2008; Midgley et al. 2002; Schwartz et al. 2006; Keinan and Clark 2012; and Poh et al. 2004). Therefore our model assumes a constant, inherent, and uniform degree of threat throughout the County. We did not have (what we considered) an appropriate framework to accurately assess degree of threat without additional input from other regional planning and resource entities. Integration of degree of threat into our model is a component that would require further studies.

We are interested in conservation at the county scale for several reasons. Foremost, the county is the scale that a significant proportion of conservation activities actually occur; such as land acquisition for reserve establishment, mitigation banking, land use designation and zoning, General Plan development and amendments, and conservation easements. Most land management decisions occur at smaller spatial scales
than the scales of most existing biodiversity models (Dunk et al. 2006). Likewise, regional conservation planning decisions, like the actual locations of new biodiversity reserves, tend to occur at finer spatial scales (Ferrier 2002 and Ferrier et al. 2004). County jurisdictions are typically one of the most influential and authoritative entities responsible for determinations associated with which lands are developed and which are preserved. With the onslaught of budgetary crises in the U.S. and particularly within California, the frequency and scope of discretionary permits issued by county jurisdictions is increasing. For example, the number of multi-family housing construction permits issued from Los Angeles County increased 116% in less than a year (LAEDC 2012). In the central Puget Sound region the number of building permits issued increased 34% from 2009 to 2010 (PST 2012). Federally mandated initiatives associated with economic stimulus programs have increased the number of large-scale construction undertakings occurring at county scales. These types of projects are typically related to renewable energy, like wind and solar development; infrastructure replacement projects, like bridges and highways; and utility upgrades for power from electricity and natural gas. At present at least 16 solar energy project are undergoing review in California counties (CEC 2012). Given these dynamics, we intend to engage the County with our results so that biodiversity conservation will receive consideration during its land use planning permit review processes.

Though the body of literature associated with biodiversity hotspots has had a significant influence on development of conservation strategies globally, at national scales, and within the scientific community; primarily by shifting the focus from single
species conservation approaches to ecosystems conservation, these ideas are still largely under utilized by local and regional governments (Probst and Crow 1991; Burton et al. 1992; and Franklin 1993). Few studies have attempted to quantify the amount of consideration biodiversity conservation receives at county scales. Miller et al. (2008) evaluated staff from planning departments at three metropolitan regions in the U.S. and determined that five percent or less of staff time was given to activities related to biodiversity conservation and 14-20% of the respondents admittedly spent no time at all considering biodiversity-related conservation endeavors. Certainly, biodiversity conservation is pertinent to these jurisdictions and land use planning tools designed to achieve these goals exist. These tools and layers of analysis can be integrated into the planning processes and procedures used at the county and at other regional scales.

We intend to continue to refine this analysis and to use our results to identify under collected regions within the County because we recognize the inherent bias associated with models derived from herbaria collections. Potential sources of such bias include roadside affinity, collector tendencies, and access restrictions (Kadmon et al. 2004). Roadside bias is a result of the locations of existing roads. It tends to influence where botanists collect because they can easily access areas that are within close proximity to or adjacent to roads. Collector bias results from the fact that certain collectors just like particular areas or groups of plants. Botanists tend to return to the same collection sites year after year and this can influence the overall distribution of herbaria collections. Another form of bias is the result of restricted access. Botanists are not always permitted to collect in certain areas like private properties or military lands.
For these reasons, bias is something to consider when interpreting the results of analyses derived from herbaria. Having generated this map, we will gain a greater sense of the locations of under-collected or unsurveyed regions in our County. We also aim to promote and participate in future studies that utilize herbarium datasets because we acknowledge and value their role in biodiversity conservation and informatics.

CONCLUSION

Chapter 1 provided the background information and a literature review of the body of work associated with biodiversity hotspot analyses. It presented our study site, San Luis Obispo County, which is novel because most hotspot analyses are conducted at much larger spatial scales. Our study site occurs within one of the world’s currently recognized global biodiversity hotspots, the California Floristic Province. Chapter 2 explains the methods we used; including an explanation of our dataset, how we designed our GIS model, how we digitized our data, and ultimately how we created our final map. Our analysis was successful and seven plant biodiversity hotspots were detected. This study provides support and substantive evidence that biodiversity hotspot techniques are applicable to smaller spatial scales. We would like to create working partnerships with the local and regional entities responsible for land use planning and natural resource management in our area so that our data will be considered in these processes because we think biodiversity conservation is a legitimate and worthy approach. We understand the implications of poor planning decisions, untethered habitat loss, and recognize that extinction is forever. However idealistic, we anticipate the future where science can
inform policy to develop long-term resource conservation planning strategies to conserve biodiversity at all scales.
LITERATURE CITED


CNPS. 2012b. Personal communications. Aaron Simms, CNPS Rare Plant Botanist. Sacramento, California.


APPENDIX A

SCIENTIFIC DATABASE QUERY RESULTS
This resource list is to be used for planning purposes only — it is not an official species-list.

Endangered Species Act species-list information for your project is available online and listed below for the following FWS Field Offices:

VENTURA FISH AND WILDLIFE OFFICE
2493 PORTOLA ROAD, SUITE B
VENTURA, CA 93003
(805) 644-1766

Endangered Species Act species-list information for your project is NOT available online for the following FWS Field Offices:

SACRAMENTO FISH AND WILDLIFE OFFICE
FEDERAL BUILDING
2800 COTTAGE WAY, ROOM W-2605
SACRAMENTO, CA 95825
(916) 414-6600

Project Name:
KH Thesis

Project Counties:
San Luis Obispo, CA

Project Type:
Vegetation Management
**Endangered Species Act Species-list**

There are a total of 37 species in your species-list

Species that may be affected by your project: [View all critical habitat on one map](#)

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<th>Link</th>
<th>Office</th>
</tr>
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</tr>
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</tr>
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<td>species info</td>
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</tr>
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## Natural Resources of Concern

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### Natural Resources of Concern

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### Insects

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## Natural Resources of Concern

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**FWS National Wildlife Refuges**

There are 2 refuges in your refuge list

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**FWS Migratory Birds**

Not yet available through IPaC.

**FWS Delineated Wetlands**

Not yet available through IPaC.
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| *Chlorogalum purpureum var. reductum*  
Camatta Canyon amole | PMLIL0G052 | Threatened | Rare | G2T1 | S1 | 1B.1 |
| *Chloropyron maritimum ssp. maritimum*  
salt marsh bird's-beak | PDSCR0J0C2 | Endangered | Endangered | G4?T1 | S1 | 1B.2 |
| *Chorizanthe breweri*  
Brewer's spineflower | PDPGN04050 | | | G2 | S2.2 | 1B.3 |
| *Chorizanthe pungens var. pungens*  
Monterey spineflower | PDPGN040M2 | Threatened | | G2T2 | S2 | 1B.2 |
| *Chorizanthe rectispina*  
straight-awned spineflower | PDPGN040N0 | | | G1 | S1.2 | 1B.3 |
| *Cirsium fontinale var. obispoense*  
Chorro Creek bog thistle | PDAST2E162 | Endangered | Endangered | G2T2 | S2 | 1B.2 |
| *Cirsium occidentale var. compactum*  
compact cobwebby thistle | PDAST2E1Z1 | | | G3G4T2 | S2.1 | 1B.2 |
| *Cirsium occidentale var. lucianum*  
Cuesta Ridge thistle | PDAST2E1Z6 | Threatened | | G3G4T2 | S2 | 1B.2 |
| *Cirsium rhophophilum*  
surf thistle | PDAST2E2J0 | Threatened | | G1 | S1 | 1B.2 |
| *Cirsium scariosum var. loncholepis*  
La Graciosa thistle | PDAST2E1N0 | Endangered | Threatened | G5T1 | S1 | 1B.1 |
| *Cladium californicum*  
California saw-grass | PMCYP04010 | | | G4 | S2.2 | 2.2 |
| *Cladonia firma*  
firm cup lichen | NLT0008460 | | | G4 | S1.1 | |
| *Clarkia speciosa ssp. immaculata*  
Pismo clarkia | PDONA05111 | Endangered | Rare | G4T1 | S1 | 1B.1 |
| *Deinandra halliana*  
Hall's tarplant | PDAST4R0C0 | | | G2 | S2 | 1B.1 |
| *Deinandra increcens ssp. foliosa*  
leafy tarplant | PDAST4R0U4 | | | G4G5T2 | S2.2 | 1B.2 |
| *Delphinium parryi ssp. blochmaniae*  
dune larkspur | PDRAN0B1B1 | | | G4T2 | S2.2 | 1B.2 |
| *Delphinium parryi ssp. eastwoodiae*  
Eastwood's larkspur | PDRAN0B1B2 | | | G4T2 | S2 | 1B.2 |
| *Delphinium recurvatum*  
recurved larkspur | PDRAN0B1J0 | | | G3 | S3 | 1B.2 |
| *Delphinium umbraculorum*  
umbrella larkspur | PDRAN0B1W0 | | | G2G3 | S2S3.3 | 1B.3 |
| *Dithyrea maritima*  
beach spectaclepod | PDBRA10020 | Threatened | | G2 | S2.1 | 1B.1 |
| *Dudleya abramsii ssp. bettinae*  
Betty's dudleya | PDCRA04011 | | | G3T1 | S1.2 | 1B.2 |
| *Dudleya abramsii ssp. murina*  
mouse-gray dudleya | PDCRA04012 | | | G3T2 | S2.3 | 1B.3 |
| *Dudleya blochmaniae ssp. blochmaniae*  
Blochman's dudleya | PDCRA04051 | | | G2T2 | S2.1 | 1B.1 |
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<td><strong>Calochortus clavatus var. clavatus</strong></td>
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<td><strong>Calochortus clavatus var. recurvifolius</strong></td>
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<td>S1</td>
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<td>S3.3</td>
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<td><strong>Malacothamnus niveus</strong></td>
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<td>4.3</td>
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<td><strong>Malacothamnus palmeri var. involucratus</strong></td>
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<td><strong>Malacothamnus palmeri var. palmeri</strong></td>
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<td><strong>Malacothrix phaeocarpa</strong></td>
<td>Dusky-fruited malacothrix</td>
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<td>4.3</td>
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<td><strong>Malacothrix saxatilis var. arachnoidea</strong></td>
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<td>G5T2</td>
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<td><strong>Micropus amphibolus</strong></td>
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<td><strong>Microseris paludosa</strong></td>
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<td><strong>Mimulus subsecundus</strong></td>
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<td><strong>Monardella antonina ssp. benitensis</strong></td>
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<td><strong>Monardella palmeri</strong></td>
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<td>Monolopia congonii</td>
<td>San Joaquin woollythreads</td>
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<td>Monolopia gracilens</td>
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<td>Nasturtium gambei</td>
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<td>Navarretia fossalis</td>
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<td>Nemacladus secundiflorus var. robbinsii</td>
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<td>Gairdner's yampah</td>
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<td>S3.3</td>
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<td>Diablo Canyon blue grass</td>
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<td>Prunus fasciculata var. punctata</td>
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<td>Pseudognaphalium leucocephalum</td>
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<td>most beautiful jewel-flower</td>
<td>Brassicaceae annual herb</td>
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<td>Mason's neststraw</td>
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<td>California seablite</td>
<td>Chenopodiaceae perennial evergreen shrub</td>
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<td>Suaeda taxifolia</td>
<td>woolly seablite</td>
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<td>Symphyotrichum defoliatum</td>
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<td>Vortriede's spineflower</td>
<td>Polygonaceae annual herb</td>
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<td>Toxicoscordion fontana</td>
<td>marsh zigadenus</td>
<td>Melanthiaceae perennial bulbiferous herb</td>
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<td>Triteleia ixioides ssp. cookii</td>
<td>Cook's triteleia</td>
<td>Themidaceae perennial bulbiferous herb</td>
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<td>S.2.3</td>
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<td>Tropidocarpum capparideum</td>
<td>caper-fruited tropidocarpum</td>
<td>Brassicaceae annual herb</td>
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**Suggested Citation**
APPENDIX B

SPECIAL STATUS PLANT SPECIES IN
SAN LUIS OBISPO COUNTY
<table>
<thead>
<tr>
<th>Scientific Name/ Common Name/ Family (Jepson Manual-1)</th>
<th>Federal/State/ CRPR Status (Jepson Manual-1)</th>
<th>County Distribution</th>
<th>Habitat Requirements</th>
<th>Phenology</th>
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<tbody>
<tr>
<td><em>Abies bracteata</em> bristlecone fir Pinaceae</td>
<td>--/--/1B.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in rocky areas within broadleaved upland forest, chaparral, and lower montane coniferous forest.</td>
<td>Evergreen Tree</td>
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<tr>
<td><em>Acanthomintha obovata</em> ssp. <em>cordata</em> heart-leaved thorn-mint Lamiaceae</td>
<td>--/--/4.2</td>
<td>Los Angeles, Monterey, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs on clay substrates within opening in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland.</td>
<td>April-July</td>
</tr>
<tr>
<td><em>Acanthomintha obovata</em> ssp. <em>obovata</em> San Benito thorn-mint Lamiaceae</td>
<td>--/--/4.2</td>
<td>Fresno, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on heavy clay, alkaline soils, and serpentinite substrates within chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>April-July</td>
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<tr>
<td><em>Agrostis hooveri</em> Hoover’s bent grass Poaceae</td>
<td>--/--/1B.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Usually occurs on sandy soils within closed-cone coniferous forest, chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>April-July</td>
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<tr>
<td><em>Allium hickmanii</em> Hickman’s onion Liliaceae</td>
<td>--/--/1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in closed-cone coniferous forest, maritime chaparral, coastal prairie, coastal scrub, and valley and foothill grassland.</td>
<td>March-May</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-1)</td>
<td>County Distribution</td>
<td>Habitat Requirements</td>
<td>Phenology</td>
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<tr>
<td><em>Allium howellii</em> var. <em>clokeyi</em> Mt. Pinos onion Liliaceae</td>
<td>--/-/-1B.3</td>
<td>Kern, Los Angeles?*, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs in Great Basin scrub and pinyon and juniper woodland.</td>
<td>April-June</td>
</tr>
<tr>
<td>Amsinckia douglasiana Douglas’ fiddleneck Boraginaceae</td>
<td>--/-/-4.2</td>
<td>Kern, Monterey, Santa Barbara, San Benito, San Luis Obispo, and Ventura.</td>
<td>Occurs on Monterey shale substrates and dry regions within cismontane woodland and valley and foothill grassland.</td>
<td>March-May</td>
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<tr>
<td>Amsinckia furcata forked fiddleneck Boraginaceae</td>
<td>--/-/-4.2</td>
<td>Fresno, Kings, Kern, Merced, San Benito, and San Luis Obispo.</td>
<td>Occurs in cismontane woodland and valley and foothill grassland.</td>
<td>February-May</td>
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<tr>
<td><em>Antirrhinum ovatum</em> oval-leaved snapdragon Scrophulariaceae</td>
<td>--/-/-4.2</td>
<td>Fresno, Kern, Monterey, Santa Barbara, San Benito, San Luis Obispo, and Ventura.</td>
<td>Occurs on clay or gypsum substrates and often in alkaline soils within chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland.</td>
<td>May-November</td>
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<tr>
<td>Arctostaphylos crustacea ssp. subcordata Santa Cruz Island manzanita Ericaceae</td>
<td>--/-/-4.2</td>
<td>Los Angeles, Santa Barbara, Santa Cruz Island, San Luis Obispo?, and Santa Rosa Island.</td>
<td>Occurs on rocky substrates within closed-cone coniferous forest and chaparral.</td>
<td>January-April</td>
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<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-2)</td>
<td>County Distribution</td>
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<tr>
<td><em>Arctostaphylos cruzensis</em> Arroyo de la Cruz manzanita Ericaceae</td>
<td>--/-/1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on sandy substrates within broadleafed upland forest, coastal bluff scrub, closed-cone coniferous forest, chaparral, coastal scrub, and valley and foothill grassland.</td>
<td>December-March</td>
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<tr>
<td><em>Arctostaphylos hookeri</em> ssp. <em>hearstiorum</em> Hearst's manzanita Ericaceae</td>
<td>--/CE/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on sandy substrates within maritime chaparral, coastal prairie, coastal scrub, and valley and foothill grassland.</td>
<td>February-April</td>
</tr>
<tr>
<td><em>Arctostaphylos hooveri</em> Hoover's manzanita Ericaceae</td>
<td>--/--4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in broadleafed upland forest, rocky areas within chaparral, cismontane woodland, and lower montane coniferous forest.</td>
<td>February-June</td>
</tr>
<tr>
<td><em>Arctostaphylos luciana</em> Santa Lucia manzanita Ericaceae</td>
<td>--/-/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on shale substrates within chaparral and cismontane woodland.</td>
<td>December-March</td>
</tr>
<tr>
<td><em>Arctostaphylos montereyensis</em> Toro manzanita Ericaceae</td>
<td>--/-/1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on sandy substrates within maritime chaparral, cismontane woodland, and coastal scrub.</td>
<td>February-March</td>
</tr>
<tr>
<td><em>Arctostaphylos morroensis</em> Morro manzanita Ericaceae</td>
<td>FT/--/1B.1</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on Baywood fine sand substrates within maritime chaparral, cismontane woodland, pre-Flandrian coastal dunes, and coastal scrub.</td>
<td>December-March</td>
</tr>
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</tr>
<tr>
<td><em>Arctostaphylos obispoensis</em> Bishop manzanita Ericaceae</td>
<td>4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on serpentinite and rocky substrates within closed-cone coniferous forest, chaparral, and cismontane woodland.</td>
<td>February-June</td>
</tr>
<tr>
<td><em>Arctostaphylos osoensis</em> Oso manzanita Ericaceae</td>
<td>1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on dacite porphyry buttes within chaparral and cismontane woodland.</td>
<td>February-March</td>
</tr>
<tr>
<td><em>Arctostaphylos pechoensis</em> Pecho manzanita Ericaceae</td>
<td>1B.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs on siliceous shale substrates within closed-cone coniferous forest, chaparral, and coastal scrub.</td>
<td>November-March</td>
</tr>
<tr>
<td><em>Arctostaphylos pilosula</em> Santa Margarita manzanita Ericaceae</td>
<td>1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Sometimes occurs on sandstone substrates within broadleafed upland forest, closed-cone coniferous forest, chaparral, and cismontane woodland.</td>
<td>December-May</td>
</tr>
<tr>
<td><em>Arctostaphylos rudis</em> sand mesa manzanita Ericaceae</td>
<td>1B.2</td>
<td>Santa Barbara and San Luis Obispo</td>
<td>Occurs on sandy substrates within maritime chaparral and coastal scrub.</td>
<td>November-February</td>
</tr>
<tr>
<td><em>Arctostaphylos tomentosa</em> ssp. <em>daciticola</em> dacite manzanita Ericaceae</td>
<td>1B.1</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on dacite porphyry buttes within chaparral and cismontane woodland.</td>
<td>March-May</td>
</tr>
<tr>
<td><em>Arenaria paludicola</em> marsh sandwort Caryophyllaceae</td>
<td>FE/CE/1B.1</td>
<td>Los Angeles, San Bernardino*, Santa Cruz*, San Francisco*, and San Luis Obispo.</td>
<td>Occurs on sandy substrates and in openings within freshwater or brackish marshes and swamps.</td>
<td>May-August</td>
</tr>
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<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
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</tr>
</tbody>
</table>
| Arrostocapsa insignis  
Indian Valley spineflower  
Polygonaceae | --/-/-1B.2 | Monterey and San Luis Obispo. | Occurs on sandy substrates within cismontane woodland. | May-September |
| Aspidotis carlotta-halliae  
Carlotta Hall’s lace fern  
Pteridaceae | --/-/-4.2 | Alameda, Monterey, Marin, San Benito, and San Luis Obispo. | Generally occurs on serpentinite substrates within chaparral and cismontane woodland. | January-December |
| Astragalus didymocarpus var. milesianus  
Miles’ milk-vetch  
Fabaceae | --/-/-1B.2 | Santa Barbara, San Luis Obispo, and Ventura. | Occurs on clay substrates within coastal scrub. | March-June |
| Astragalus macrodon  
Salinas milk-vetch  
Fabaceae | --/-/-4.3 | Kern, Monterey, San Benito, San Luis Obispo, and Ventura. | Occurs on sandstone, shale, or serpentinite substrates within openings in chaparral, cismontane woodland, and valley and foothill grassland. | April-July |
| Astragalus nuttallii var. nuttallii  
ocean bluff milk-vetch  
<table>
<thead>
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<tr>
<td><em>Atriplex cordulata</em> heartscale Chenopodiaceae</td>
<td>--/-/-1B.2</td>
<td>Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, San Joaquin*, San Luis Obispo, Solano, Stanislaus*, Tulare, and Yolo*.</td>
<td>Occurs on saline or alkaline substrates within chenopod scrub, meadows and seeps, and sandy regions within valley and foothill grassland.</td>
<td>April-October</td>
</tr>
<tr>
<td><em>Atriplex cordulata</em> var. cordulata heartscale</td>
<td>--/-/-1B.2</td>
<td>Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Merced, Monterey, San Joaquin?, San Luis Obispo, Solano, and Stanislaus.</td>
<td>Occurs on alkaline, often clay substrates within chenopod scrub, valley and foothill grassland, and vernal pools.</td>
<td>March-October</td>
</tr>
<tr>
<td><em>Atriplex cordulata</em> var. erecticaulis earlimart orach</td>
<td>--/-/-1B.2</td>
<td>Fresno, Kings, Kern, Merced, and San Luis Obispo.</td>
<td>Occurs on alkaline substrates within chenopod scrub, valley and foothill grasslands, and vernal pools.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Atriplex coronata</em> var. coronata crownscale Chenopodiaceae</td>
<td>--/-/-4.2</td>
<td>Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Merced, Monterey, San Joaquin?, San Luis Obispo, Solano, and Stanislaus.</td>
<td>Occurs on alkaline, often clay substrates within chenopod scrub, valley and foothill grassland, and vernal pools.</td>
<td>March-October</td>
</tr>
<tr>
<td><em>Atriplex vallicola</em> Lost Hills crownscale Chenopodiaceae</td>
<td>--/-/-1B.2</td>
<td>Anacapa Island, Los Angeles, Orange, Santa Barbara, San Bernardino, San Clemente Island, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, San Miguel Island, Santa Rosa Island, and Ventura.</td>
<td>Occurs on alkaline or clay substrates within coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.</td>
<td>March-October</td>
</tr>
<tr>
<td><em>Atriplex coulteri</em> Coulter’s saltbush Chenopodiaceae</td>
<td>--/-/-1B.2</td>
<td>Anacapa Island, Los Angeles, Orange, Santa Barbara, San Bernardino, San Clemente Island, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, San Miguel Island, Santa Rosa Island, and Ventura.</td>
<td>Occurs on alkaline or clay substrates within coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.</td>
<td>March-October</td>
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</tr>
<tr>
<td>Atriplex joaquiniana San Joaquin spearscale Chenopodiaceae</td>
<td>--/--/1B.2</td>
<td>Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Santa Clara*, San Joaquin*, San Luis Obispo?, Solano, Tulare?*, and Yolo.</td>
<td>Occurs on alkaline substrates within Chenopod scrub, meadows and seeps, playas, and valley and foothill grassland.</td>
<td>April-October</td>
</tr>
<tr>
<td>Atriplex serenana var. davidsonii Davidson’s saltscale Chenopodiaceae</td>
<td>--/--/1B.2</td>
<td>Los Angeles?<em>, Orange, Riverside, Santa Barbara</em>, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, Santa Rosa Island, and Ventura.</td>
<td>Occurs on alkaline substrates within coastal bluff scrub and coastal scrub.</td>
<td>April-October</td>
</tr>
<tr>
<td>Baccharis plummerae ssp. glabrata San Simeon baccharis Asteraceae</td>
<td>--/--/1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs within Coastal scrub.</td>
<td>June</td>
</tr>
<tr>
<td>Baccharis plummerae ssp. plummerae Plummer’s baccharis Asteraceae</td>
<td>--/--/4.3</td>
<td>Anacapa Island, Los Angeles, Santa Barbara, Santa Cruz Island, San Luis Obispo, and Ventura.</td>
<td>Occurs on rocky substrates within broadleafed upland forest, chaparral, cismontane woodland, and coastal scrub.</td>
<td>May-October</td>
</tr>
<tr>
<td>Bloomeria humilis dwarf goldenstar Asteraceae</td>
<td>--/CR/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs within coastal bluff scrub, chaparral, and valley and foothill grassland.</td>
<td>June</td>
</tr>
<tr>
<td>Calandrinia breweri Brewer’s calandrinia Portulacaceae</td>
<td>--/--/4.2</td>
<td>Contra Costa, Los Angeles, Mendocino, Monterey, Mariposa, Marin, Napa, Orange, Riverside, Santa Barbara, San Bernardino, Santa Clara, Santa Cruz, Santa Cruz Island, San Diego, Shasta, San Luis Obispo, San Mateo, Sonoma, Santa Rosa Island, and Ventura.</td>
<td>Occurs on sandy or loamy substrates in disturbed sites within chaparral and coastal scrub.</td>
<td>March-June</td>
</tr>
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</tr>
<tr>
<td><em>Calochortus catalinae</em> Catalina mariposa lily Liliaceae</td>
<td>--/--/4.2</td>
<td>Los Angeles, Orange, Santa Barbara, San Bernardino, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, Santa Rosa Island, and Ventura.</td>
<td>Occurs in chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland.</td>
<td>February-June</td>
</tr>
<tr>
<td><em>Calochortus clavatus</em> var. <em>clavatus</em> club-haired mariposa lily Liliaceae</td>
<td>--/--/4.3</td>
<td>Los Angeles, Santa Barbara, San Benito, San Luis Obispo, and Ventura.</td>
<td>Usually occurs on serpentine, clay, and/or rocky substrates within chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland.</td>
<td>May-June</td>
</tr>
<tr>
<td><em>Calochortus clavatus</em> var. <em>recurvifolius</em> Arroyo de la Cruz mariposa lily Liliaceae</td>
<td>--/--/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs in coastal bluff scrub, maritime chaparral, coastal prairie, and lower montane coniferous forest.</td>
<td>June-July</td>
</tr>
<tr>
<td><em>Calochortus fimbriatus</em> late-flowered mariposa lily Liliaceae</td>
<td>--/--/1B.2</td>
<td>Kern, Los Angeles, Monterey, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Often occurs on serpentine substrates within chaparral, cismontane woodland and riparian woodland.</td>
<td>June-August</td>
</tr>
<tr>
<td><em>Calochortus obispoensis</em> San Luis mariposa lily Liliaceae</td>
<td>--/--/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Often occurs on serpentine substrates within chaparral, coastal scrub, and valley and foothill grassland.</td>
<td>May-July</td>
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</tr>
<tr>
<td>Calochortus palmeri var. palmeri Palmer’s mariposa-lily Liliaceae</td>
<td>--/-/-1B.2</td>
<td>Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Luis Obispo, and Ventura.</td>
<td>Occurs in mesic areas within chaparral, lower montane coniferous forest, and meadows and seeps.</td>
<td>April-July</td>
</tr>
<tr>
<td>Calochortus simulans San Luis Obispo mariposa-lily Liliaceae</td>
<td>--/-/-1B.3</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs on sandy, often granitic, and sometimes serpentine substrates within chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
<tr>
<td>Calochortus uniflorus large-flowered mariposa-lily Liliaceae</td>
<td>--/-/-4.2</td>
<td>Contra Costa, Colusa, Lake, Mendocino, Monterey, Marin, Napa, Santa Cruz, San Luis Obispo, San Mateo, Sonoma, Tehama, and Trinity.</td>
<td>Occurs in coastal prairie, coastal scrub, meadows and seeps, and north coast coniferous forest.</td>
<td>April-June</td>
</tr>
<tr>
<td>Calycadenia villosa dwarf calycadenia Asteraceae</td>
<td>--/-/-1B.1</td>
<td>Fresno, Monterey, Santa Barbara, and San Luis Obispo.</td>
<td>Occurs on rocky substrates and fine soils within chaparral, cismontane woodland, meadows and seeps, and valley and foothill grassland.</td>
<td>May-October</td>
</tr>
<tr>
<td>Calyptridium parryi var. hesseeae Santa Cruz Mountains pussypaws Portulacaceae</td>
<td>--/-/-1B.1</td>
<td>Monterey, Santa Clara, Santa Cruz, San Luis Obispo, and Stanislaus.</td>
<td>Occurs on sandy or gravelly substrates and openings within chaparral and cismontane woodland.</td>
<td>May-August</td>
</tr>
<tr>
<td>Calystegia subcaulis ssp. episcopalis Cambria morning-glory Convolvulaceae</td>
<td>--/-/-4.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Usually occurs on clay substrates within chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland.</td>
<td>March-July</td>
</tr>
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<tr>
<td><em>Camissonia hardamiae</em> Hardham’s evening-primrose Onagraceae</td>
<td>--/-/-1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on sandy, decomposed carbonate substrates and disturbed or burned areas within chaparral and cismontane woodland.</td>
<td>March-May</td>
</tr>
<tr>
<td><em>Camissoniopsis hardhamiae</em> Hardham’s evening-primrose</td>
<td>--/-/-1B.2</td>
<td>Monterey, San Diego, and San Luis Obispo.</td>
<td>Often occurs in serpentine seeps, sometimes gabbro substrates, and often clay soils within closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
<tr>
<td><em>Carex obispoensis</em> San Luis Obispo sedge Cyperaceae</td>
<td>--/-/-1B.2</td>
<td>Alameda, Contra Costa, Del Norte, Humboldt, Mendocino, Marin, Napa, Santa Cruz, San Francisco?, San Luis Obispo, San Mateo, and Sonoma.</td>
<td>Occurs within coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grassland, and vernal pool margins.</td>
<td>March-August</td>
</tr>
<tr>
<td><em>Castilleja ambigua</em> ssp. <em>ambigua</em> Johnny-nip Scrophulariaceae</td>
<td>--/-/-4.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs within coastal prairie and coastal scrub.</td>
<td>May-August</td>
</tr>
<tr>
<td><em>Castilleja ambigua</em> ssp. <em>insalutata</em> pink Johnny-nip Scrophulariaceae</td>
<td>--/-/-1B.1</td>
<td></td>
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</tr>
<tr>
<td><em>Castilleja densiflora</em> ssp. <em>obispoensis</em> San Luis Obispo owl’s-clover Scrophulariaceae</td>
<td>--/-/-1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on serpentine substrates sometimes, within meadows and seeps and valley and foothill grassland.</td>
<td>March-May</td>
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<tr>
<td><strong>Castilleja plagiotoma</strong> Mojave paintbrush Scrophulariaceae</td>
<td>--/--/4.3</td>
<td>Kern, Los Angeles, San Bernardino, and San Luis Obispo.</td>
<td>Occurs on alluvial substrates within Great Basin scrub, Joshua tree woodland, lower montane coniferous forest, and pinyon and juniper woodland.</td>
<td>April-June</td>
</tr>
<tr>
<td><strong>Caulanthus californicus</strong> California jewel-flower Brassicaceae</td>
<td>FE/CE/1B.1</td>
<td>Fresno, Kings*, Kern, Santa Barbara, San Luis Obispo, and Tulare*.</td>
<td>Occurs on sandy substrates within chenopod scrub, pinyon and juniper woodland, and valley and foothill grassland.</td>
<td>February-May</td>
</tr>
<tr>
<td><strong>Caulanthus lemmonii</strong> Lemmon’s jewel-flower Brassicaceae</td>
<td>--/--/1B.2</td>
<td>Alameda*, Fresno, Kings, Kern, Merced, Monterey, Santa Barbara, San Benito, San Joaquin, San Luis Obispo, Stanislaus, and Ventura.</td>
<td>Occurs in pinyon and juniper woodland and valley and foothill grassland.</td>
<td>March-May</td>
</tr>
<tr>
<td><strong>Ceanothus cuneatus var. fascicularis</strong> Lompoc ceanothus Rhamnaceae</td>
<td>--/--/4.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs on sandy substrates within chaparral.</td>
<td>February-April</td>
</tr>
<tr>
<td><strong>Ceanothus rigidus</strong> California-lilac</td>
<td>--/--/4.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ceanothus hearstiorum</strong> Hearst’s ceanothus Rhamnaceae</td>
<td>--/CR/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs in maritime chaparral, coastal prairie, and coastal scrub.</td>
<td>March-April</td>
</tr>
<tr>
<td><strong>Ceanothus maritimus</strong> maritime ceanothus Rhamnaceae</td>
<td>--/CR/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on clay substrates within coastal bluff scrub, maritime chaparral, and valley and foothill grassland.</td>
<td>January-April</td>
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<tr>
<td><em>Centromadia parryi</em> ssp. <em>parryi</em> pappose tarplant Asteraceae</td>
<td>--/-/-1B.2</td>
<td>Butte, Colusa, Glenn, Lake, Napa, San Luis Obispo, San Mateo, Solano, and Sonoma.</td>
<td>Often occurs on alkaline substrates within chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, and vernaly mesic regions within valley and foothill grassland.</td>
<td>May-November</td>
</tr>
<tr>
<td><em>Chenopodium littoreum</em> coastal goosefoot Chenopodiaceae</td>
<td>--/-/-1B.2</td>
<td>Los Angeles, Santa Barbara, and San Luis Obispo.</td>
<td>Occurs in coastal dunes.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Chlorogalum pomeridianum</em> var. <em>minus</em> dwarf soaprooot Liliaceae</td>
<td>--/-/-1B.2</td>
<td>Colusa, Lake, San Luis Obispo, Sonoma, and Tehama.</td>
<td>Occurs on serpentine substrates within chaparral.</td>
<td>May-August</td>
</tr>
<tr>
<td><em>Chlorogalum purpureum</em> var. <em>purpureum</em> Santa Lucia purple amole Liliaceae</td>
<td>FT/-/-1B.1</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on gravelly or clay substrates within chaparral, cismontane woodland and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
<tr>
<td><em>Chlorogalum purpureum</em> var. <em>reductum</em> Camatta Canyon amole Liliaceae</td>
<td>FT/CR/1B.1</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs in cismontane woodland and valley and foothill grassland.</td>
<td>April-May</td>
</tr>
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<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
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</tr>
<tr>
<td><em>Chorizanthe breweri</em> Brewer’s spineflower Polygonaceae</td>
<td>--/-/-1B.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on serpentine, rocky, or gravelly substrates within closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Chorizanthe douglasii</em> Douglas’ spineflower Polygonaceae</td>
<td>--/-/-4.3</td>
<td>Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on sandy or gravelly substrates within chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest.</td>
<td>April-July</td>
</tr>
<tr>
<td><em>Chorizanthe palmeri</em> Palmer’s spineflower Polygonaceae</td>
<td>--/-/-4.2</td>
<td>Monterey, Santa Barbara, San Benito?, and San Luis Obispo.</td>
<td>Occurs on rocky or serpentine substrates within chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Chorizanthe pungens</em> var. <em>pungens</em> Monterey spineflower Polygonaceae</td>
<td>FT/-/-1B.2</td>
<td>Monterey, Santa Cruz, and San Luis Obispo*.</td>
<td>Occurs on sandy substrates within maritime chaparral, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Chorizanthe rectispina</em> Straight-awned spineflower Polygonaceae</td>
<td>--/-/-1B.3</td>
<td>Monterey, Santa Barbara, and San Luis Obispo.</td>
<td>Occurs in chaparral, cismontane woodland, and coastal scrub.</td>
<td>April-July</td>
</tr>
<tr>
<td><em>Chorizanthe ventricosa</em> potbellied spineflower Polygonaceae</td>
<td>--/-/-4.3</td>
<td>Fresno, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on serpentine substrates within cismontane woodland and valley and foothill grassland.</td>
<td>May-September</td>
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<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
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<tr>
<td><em>Cicuta maculata</em> var. <em>bolanderi</em> Bolander’s water-hemlock Apiaceae</td>
<td>--/--/2.1</td>
<td>Contra Costa, Los Angeles*, Marin, Sacramento, Santa Barbara*, San Luis Obispo*, and Solano.</td>
<td>Occurs in freshwater or brackish marshes and swamps.</td>
<td>July-September</td>
</tr>
<tr>
<td><em>Cirsium fontinale</em> var. <em>obispoense</em> San Luis Obispo fountain thistle Asteraceae</td>
<td>FE/CE/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on serpentine seeps and drainages within chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland.</td>
<td>February-September</td>
</tr>
<tr>
<td><em>Cirsium occidentale</em> var. <em>compactum</em> compact cobwebby thistle Asteraceae</td>
<td>--/--/1B.2</td>
<td>Monterey?, San Francisco*, and San Luis Obispo.</td>
<td>Occurs in chaparral, coastal dunes, coastal prairie, and coastal scrub.</td>
<td>April-June</td>
</tr>
<tr>
<td><em>Cirsium occidentale</em> var. <em>lucianum</em> Cuesta Ridge thistle Asteraceae</td>
<td>--/--/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on serpentine substrates, often on rocky slopes, along disturbed roadsides, and within openings in chaparral.</td>
<td>April-June</td>
</tr>
<tr>
<td><em>Cirsium rhodophillum</em> surf thistle Asteraceae</td>
<td>--/CT/1B.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs in coastal bluff scrub and coastal dunes.</td>
<td>April-June</td>
</tr>
<tr>
<td><em>Cirsium scariosum</em> var. <em>loncholepis</em> La Grociosa thistle Asteraceae</td>
<td>FE/CT/1B.1</td>
<td>Monterey, Santa Barbara, and San Luis Obispo.</td>
<td>Occurs in mesic, sandy areas within cismontane woodland, coastal dunes, coastal scrub, brackish marshes and swamps, and valley and foothill grassland.</td>
<td>May-August</td>
</tr>
<tr>
<td><em>Cladium californicum</em> California sawgrass Cyperaceae</td>
<td>--/--/2.2</td>
<td>Inyo, Los Angeles*, Riverside, Santa Barbara, San Bernardino, and San Luis Obispo.</td>
<td>Occurs in meadows and seeps and alkaline or freshwater marshes and swamps.</td>
<td>June-September</td>
</tr>
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<tr>
<td><em>Clarkia speciosa</em> ssp. <em>immaculata</em> Pismo clarkia Onagraceae</td>
<td>FE/CR/1B.1</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on sandy substrates along margins and openings within chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>May-July</td>
</tr>
<tr>
<td><em>Clinopodium mimuloides</em> monkey-flower savory Lamiaceae</td>
<td>--/--/4.2</td>
<td>Los Angeles, Monterey, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs along streambanks and in mesic areas within chaparral and north coast coniferous forest.</td>
<td>June-October</td>
</tr>
<tr>
<td><em>Convolvulus simulans</em> small-flowered morning-glory Convolvulaceae</td>
<td>--/--/4.2</td>
<td>Contra Costa, Fresno, Kern, Los Angeles, Orange, Riverside, Santa Barbara, San Benito, San Clemente Island, Santa Catalina Island, Santa Cruz Island, San Diego, San Joaquin, San Luis Obispo, and Stanislaus.</td>
<td>Occurs on clay substrates and on serpentine seeps within openings in chaparral, coastal scrub, and valley and foothill grassland.</td>
<td>March-July</td>
</tr>
<tr>
<td><em>Corethrogyne leucophylla</em> branching beach aster Asteraceae</td>
<td>--/--/3.2</td>
<td>Monterey, Santa Cruz, San Luis Obispo, and San Mateo.</td>
<td>Occurs in closed-cone coniferous forest and coastal dunes.</td>
<td>May-December</td>
</tr>
<tr>
<td><em>Corethrogyne filaginifolia</em> California aster</td>
<td>none</td>
<td></td>
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<tr>
<td><em>Deinandra halliana</em> Hall’s tarplant Asteraceae</td>
<td>--/--/1B.1</td>
<td>Fresno, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on clay substrates, chenopod scrub, and cismontane woodland, and valley and foothill grassland.</td>
<td>April-May</td>
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<tr>
<td>Deinandra increscens ssp. foliosa leafy tarplant Asteraceae</td>
<td>--/-/-1B.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs on sandy substrates within valley and foothill grassland.</td>
<td>June-September</td>
</tr>
<tr>
<td>Deinandra paniculata paniculate tarplant</td>
<td>--/-/4.2</td>
<td></td>
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</tr>
<tr>
<td>Delphinium gypsophilum ssp. gysophilum gypsum-loving larkspur Ranunculaceae</td>
<td>--/-/4.2</td>
<td>Alameda, Fresno, Kings, Kern, Madera, Merced, Monterey, San Benito, San Joaquin, San Luis Obispo, Stanislaus, and Ventura.</td>
<td>Occurs in chenopod scrub, cismontane woodland, and valley and foothill grassland.</td>
<td>February-May</td>
</tr>
<tr>
<td>Delphinium gypsophilum gypsum-loving larkspur</td>
<td>--/-/4.2</td>
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<tr>
<td>Delphinium gypsophilum ssp. parviflorum small-flowered gypsum-loving larkspur Ranunculaceae</td>
<td>--/-/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in cismontane woodland and valley and foothill grassland.</td>
<td>March-June</td>
</tr>
<tr>
<td>Delphinium gypsophilum gypsum-loving larkspur</td>
<td>--/-/4.2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Delphinium parryi ssp. blochmaniae dune larkspur Ranunculaceae</td>
<td>--/-/1B.2</td>
<td>Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs in maritime chaparral and coastal dunes.</td>
<td>April-May</td>
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</tr>
<tr>
<td><strong>Delphinium parryi ssp. eastwoodiae</strong> Eastwood’s larkspur Ranunculaceae</td>
<td>--/--/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on serpentine substrates in coastal areas within openings in chaparral and valley and foothill grassland.</td>
<td>February-March</td>
</tr>
<tr>
<td><strong>Delphinium recurvatum</strong> recurved larkspur Ranunculaceae</td>
<td>--/--/1B.2</td>
<td>Alameda, Butte*, Contra Costa, Colusa*, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, Sutter, and Tulare.</td>
<td>Occurs on alkaline substrates within Chenopod scrub, cismontane woodland, and valley and foothill grassland.</td>
<td>March-June</td>
</tr>
<tr>
<td><strong>Delphinium umbraculorum</strong> umbrella larkspur Ranunculaceae</td>
<td>--/--/1B.2</td>
<td>Monterey, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs in cismontane woodland.</td>
<td>April-June</td>
</tr>
<tr>
<td><strong>Dithyrea maritima</strong> beach spectaclepod Brassicaceae</td>
<td>--/CT/1B.1</td>
<td>Los Angeles*, Santa Barbara, Santa Catalina Island*, San Luis Obispo, San Miguel Island, San Nicolas Island, and Ventura.</td>
<td>Occurs in coastal dunes and sandy substrates within coastal scrub.</td>
<td>March-May</td>
</tr>
<tr>
<td><strong>Dudleya abramsii ssp. bettinae</strong> Betty’s dudleya Crassulaceae</td>
<td>--/--/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on serpentine or rocky substrates within chaparral, coastal scrub, and valley and foothill grassland.</td>
<td>May-July</td>
</tr>
<tr>
<td><strong>Dudleya abramsii ssp. murina</strong> mouse-gray dudleya Crassulaceae</td>
<td>--/--/1B.3</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on serpentine substrates within chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>May-June</td>
</tr>
<tr>
<td><strong>Dudleya blochmaniae ssp. blochmaniae</strong> Blochman’s dudleya Crassulaceae</td>
<td>--/--/1B.1</td>
<td>Los Angeles, Orange, Santa Barbara, San Diego, San Luis Obispo, and Ventura.</td>
<td>Occurs on rocky, often clay, or serpentine substrates within coastal bluff scrub, chaparral, coastal scrub, and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
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</tr>
</tbody>
</table>
| **Eleocharis parvula**  
small spikerush  
Cyperaceae | --/--/4.3 | Butte, Contra Costa, Glenn, Humboldt, Mono, Napa, Orange, Plumas, Siskiyou, San Luis Obispo, Sonoma, and Ventura. | Occurs in marshes and swamps. | April-September |
| **Entosthodon kochii**  
Koch’s cord moss  
Funariaceae | --/--/1B.3 | Mendocino, Mariposa, Marin, and San Luis Obispo. | Occurs on soils within cismontane woodland. | Moss |
| **Eremalche kernensis**  
Kern mallow  
Malvaceae | FE/--/1B.1 | Kern, San Luis Obispo, and Tulare. | Occurs in chenopod scrub and valley and foothill grassland. | March-May |
| **Eriastrum hooveri**  
Hoover’s eriastrum  
Polemoniaceae | --/--/4.2 | Fresno, Kings, Kern, Los Angeles, Santa Barbara, San Benito, and San Luis Obispo. | Sometimes occurs on gravelly substrates within chenopod scrub, pinyon and juniper woodland, and valley and foothill grassland. | March-July |
| **Eriastrum luteum**  
yellow-flowered eriastrum  
Polemoniaceae | --/--/1B.2 | Monterey and San Luis Obispo. | Occurs on sandy or gravelly substrates within broadleafed upland forest, chaparral, and cismontane woodland. | May-June |
| **Erigeron blockmaniae**  
Blochman’s leafy daisy  
Asteraceae | --/--/1B.2 | Santa Barbara and San Luis Obispo. | Occurs in coastal dunes and coastal scrub. | June-August |
| **Erigeron sanctarum**  
saint’s daisy  
Asteraceae | --/--/4.2 | Santa Barbara, Santa Cruz Island, San Luis Obispo, and Santa Rosa Island. | Occurs in chaparral, cismontane woodland, and coastal scrub. | March-July |
| **Eriodictyon altissimum**  
Indian Knob mountainbalm  
Hydrophyllaceae | FE/CE/1B.1 | Endemic to San Luis Obispo. | Occurs on sandstone substrates within maritime chaparral, cismontane woodland, and coastal scrub. | March-June |
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<tr>
<td><em>Eriogonum elegans</em> elegant wild buckwheat Polygonaceae</td>
<td>--/--/4.3</td>
<td>Monterey, Santa Barbara, San Benito, San Luis Obispo, and Ventura.</td>
<td>Usually occurs on sandy or gravelly substrates, often in washes, and sometimes roadsides within cismontane woodland and valley and foothill grassland.</td>
<td>May-November</td>
</tr>
<tr>
<td><em>Eriogonum gossypinum</em> cottony buckwheat Polygonaceae</td>
<td>--/--/4.2</td>
<td>Fresno, Kings, Kern, and San Luis Obispo.</td>
<td>Occurs on clay substrates within chenopod scrub and valley and foothill grassland.</td>
<td>March-September</td>
</tr>
<tr>
<td><em>Eriogonum nudum</em> var. <em>indictum</em> protruding buckwheat Polygonaceae</td>
<td>--/--/4.2</td>
<td>Fresno, Kern, Merced, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on clay or serpentine substrates within chaparral, chenopod scrub, and cismontane woodland.</td>
<td>May-December</td>
</tr>
<tr>
<td><em>Eriogonum temblorense</em> Temblor buckwheat Polygonaceae</td>
<td>--/--/1B.2</td>
<td>Fresno, Kern, Monterey, and San Luis Obispo.</td>
<td>Occurs on clay or sandstone substrates within valley and foothill grassland.</td>
<td>April-September</td>
</tr>
<tr>
<td><em>Eryngium aristulatum</em> var. <em>hooveri</em> Hoover’s button-celery Apiaceae</td>
<td>--/--/1B.1</td>
<td>Alameda, San Benito, Santa Clara*, San Diego, and San Luis Obispo.</td>
<td>Occurs in vernal pools.</td>
<td>July-August</td>
</tr>
<tr>
<td><em>Eryngium spinosepalum</em> spiny-sepaled button-celery Apiaceae</td>
<td>--/--/1B.2</td>
<td>Fresno, Kern, Madera, Merced, San Luis Obispo, Stanislaus, Tulare, and Tuolumne.</td>
<td>Occurs in valley and foothill grassland and vernal pools.</td>
<td>April-May</td>
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<tr>
<td><em>Erysimum capitatum</em> var. <em>lompocense</em> San Luis Obispo wallflower Brassicaceae</td>
<td>none</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs on sandy substrates within chaparral and coastal scrub.</td>
<td>February-May</td>
</tr>
<tr>
<td><em>Erysimum capitatum</em> var. <em>capitatum</em> western wallflower</td>
<td>--/--/4.2</td>
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</tr>
<tr>
<td><em>Eschscholzia hypecoides</em> San Benito poppy Papaveraceae</td>
<td>--/--/4.3</td>
<td>Fresno, Imperial, Mendocino, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on serpentine or clay substrates within chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>March-June</td>
</tr>
<tr>
<td><em>Eschscholzia rhombipetala</em> diamond-petaled California poppy Papaveraceae</td>
<td>--/--/1B.1</td>
<td>Alameda, Contra Costa*, Colusa*, San Joaquin, San Luis Obispo, and Stanislaus*.</td>
<td>Occurs on alkaline or clay substrates within valley and foothill grassland.</td>
<td>March-April</td>
</tr>
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<tr>
<td><strong>Fritillaria ojaiensis</strong> Ojai fritillary Liliaceae</td>
<td>--/-/1B.2</td>
<td>Monterey?, Santa Barbara, San Luis Obispo?, and Ventura.</td>
<td>Occurs on rocky substrates and mesic areas within broadleaved upland forest, chaparral, and lower montane coniferous forest.</td>
<td>February-May</td>
</tr>
<tr>
<td><strong>Fritillaria viridea</strong> San Benito fritillary Liliaceae</td>
<td>--/-/1B.2</td>
<td>Fresno, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs on serpentine substrates within chaparral.</td>
<td>March-May</td>
</tr>
<tr>
<td><strong>Galium andresii</strong> ssp. <strong>gatense</strong> phlox-leaf serpentine bedstraw Rubiaceae</td>
<td>--/-/4.2</td>
<td>Alameda, Contra Costa, Colusa, Fresno, Los Angeles, Monterey, San Benito, Santa Clara, and San Luis Obispo.</td>
<td>Occurs on serpentine or rocky substrates within chaparral, cismontane woodland, and lower montane coniferous forest.</td>
<td>April-July</td>
</tr>
<tr>
<td><strong>Galium californicum</strong> ssp. <strong>luciense</strong> Cone Peak bedstraw Rubiaceae</td>
<td>--/-/1B.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in broadleaved upland forest, chaparral, cismontane woodland, and lower montane coniferous forest.</td>
<td>March-September</td>
</tr>
<tr>
<td><strong>Galium cliftonsmithii</strong> Santa Barbara bedstraw Rubiaceae</td>
<td>--/-/4.3</td>
<td>Los Angeles, Monterey, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs in cismontane woodland.</td>
<td>May-July</td>
</tr>
<tr>
<td><strong>Galium hardamiae</strong> Hardham’s bedstraw Rubiaceae</td>
<td>--/-/1B.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on serpentine substrates within closed-cone coniferous forest and chaparral.</td>
<td>April-October</td>
</tr>
<tr>
<td><strong>Gilia latiflora</strong> ssp. <strong>cuyamensis</strong> Cuyama gilia Polemoniaceae</td>
<td>--/-/4.3</td>
<td>Kern, Los Angeles, Santa Barbara, San Luis Obispo?, and Ventura.</td>
<td>Occurs on sandy substrates within pinyon and juniper woodland.</td>
<td>April-June</td>
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<tr>
<td><strong>Gilia leptantha</strong> ssp. pinetorum pine gilia Polemoniaceae</td>
<td>--/--/4.3</td>
<td>Kern, Santa Barbara, San Luis Obispo, and Ventura.</td>
<td>Occurs on rocky or sandy substrates within lower montane coniferous forest.</td>
<td>May-July</td>
</tr>
<tr>
<td><strong>Gilia tenuiflora</strong> ssp. amplifaucalis trumpet-throated gilia Polemoniaceae</td>
<td>--/--/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on sandy substrates within cismontane woodland and valley and foothill grassland.</td>
<td>March-April</td>
</tr>
<tr>
<td><strong>Grindelia hirsutula</strong> var. maritima San Francisco gumplant Asteraceae</td>
<td>--/--/3.2</td>
<td>Monterey?, Marin, Santa Cruz?, San Francisco, San Luis Obispo, and San Mateo.</td>
<td>Occurs on sandy or serpentinite substrates within coastal bluff scrub, coastal scrub, and valley and foothill grassland.</td>
<td>June-September</td>
</tr>
<tr>
<td><strong>Hesperoevax caulescens</strong> hogwallow starfish Asteraceae</td>
<td>--/--/4.2</td>
<td>Alameda, Amador, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Monterey, Napa*, Sacramento, San Diego*, San Joaquin, San Luis Obispo, Solano, Stanislaus, Sutter, Tehama, and Yolo.</td>
<td>Occurs on mesic areas and clay substrates within valley and foothill grassland and in shallow vernal pools.</td>
<td>March-June</td>
</tr>
<tr>
<td><strong>Horkelia cuneata</strong> ssp. puberula mesa horkelia Rosaceae</td>
<td>--/--/1B.1</td>
<td>Los Angeles, Orange, Riverside*, Santa Barbara, San Bernardino, San Diego*, San Luis Obispo, and Ventura.</td>
<td>Occurs on sandy or gravelly substrates within maritime chaparral, cismontane woodland, and coastal scrub.</td>
<td>February-September</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
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</tr>
<tr>
<td><strong>Horkelia cuneata ssp. sericea</strong> Kellogg’s horkelia</td>
<td>--/--/1B.1</td>
<td>Alameda*, Monterey,</td>
<td>Occurs on sandy or</td>
<td>April-</td>
</tr>
<tr>
<td><strong>Rosaceae</strong></td>
<td></td>
<td>Marin*, Santa</td>
<td>gravelly substrates</td>
<td>September</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barbara, Santa Cruz,</td>
<td>and in openings</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>San Francisco*, San</td>
<td>within closed-cone</td>
<td></td>
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<td></td>
<td></td>
<td>Luis Obispo, and San</td>
<td>coniferous forest,</td>
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<tr>
<td></td>
<td></td>
<td>Mateo.</td>
<td>maritime chaparral,</td>
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<td></td>
<td></td>
<td></td>
<td>coastal dunes, and</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>coastal scrub.</td>
<td></td>
</tr>
<tr>
<td><strong>Horkelia yadonii</strong> Santa Lucia horkeliaRosaceae</td>
<td>--/--/4.2</td>
<td>Monterey, Santa</td>
<td>Occurs on granitic</td>
<td>April-July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barbara, and San</td>
<td>or sandy substrates</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Luis Obispo.</td>
<td>within broadleafed</td>
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<td></td>
<td></td>
<td></td>
<td>upland forest,</td>
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<td></td>
<td></td>
<td></td>
<td>chaparral, cismonte</td>
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<td></td>
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<td></td>
<td>ane woodland,</td>
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<td></td>
<td></td>
<td></td>
<td>meadows and seeps,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>and riparian woodland.</td>
<td></td>
</tr>
<tr>
<td><strong>Juncus acutus ssp. leopoldii</strong> southwestern spiny</td>
<td>--/--/4.2</td>
<td>Imperial?, Los</td>
<td>Occurs in mesic</td>
<td>March-June</td>
</tr>
<tr>
<td><strong>Juncaceae</strong></td>
<td></td>
<td>Angeles, Orange,</td>
<td>areas within</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Santa Barbara, San</td>
<td>coastal dunes,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Diego, San Luis</td>
<td>alkaline meadows and</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Obispo, and Ventura.</td>
<td>seeps, and coastal</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>salt marshes and</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>swamps.</td>
<td></td>
</tr>
<tr>
<td><strong>Juncus luciensis</strong> Santa Lucia dwarf rush Juncaceae</td>
<td>--/--/1B.2</td>
<td>Lassen, Monterey,</td>
<td>Occurs in chaparral,</td>
<td>April-July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modoc, Napa, Nevada,</td>
<td>Great Basin scrub,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Placer, Plumas,</td>
<td>lower montane</td>
<td></td>
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<td></td>
<td></td>
<td>Riverside, Santa</td>
<td>coniferous forest,</td>
<td></td>
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<td></td>
<td></td>
<td>Barbara, San Benito,</td>
<td>meadows and seeps,</td>
<td></td>
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<td></td>
<td></td>
<td>San Diego, Shasta,</td>
<td>and vernal pools.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>and San Luis Obispo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lasthenia californica ssp. macrantha</strong> perennial</td>
<td>--/--/1B.2</td>
<td>Mendocino, Marin,</td>
<td>Occurs in coastal</td>
<td>January-</td>
</tr>
<tr>
<td><strong>goldfields Asteraceae</strong></td>
<td></td>
<td>San Luis Obispo, San</td>
<td>bluff scrub, coastal</td>
<td>November-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mateo, and Sonoma.</td>
<td>dunes, and coastal</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>scrub.</td>
<td></td>
</tr>
<tr>
<td><strong>Lasthenia ferrisiae</strong> Ferris’ goldfields Asteraceae</td>
<td>--/--/4.2</td>
<td>Alameda, Butte,</td>
<td>Occurs in alkaline or</td>
<td>February-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contra Costa, Colusa,</td>
<td>clay vernal pools.</td>
<td>May</td>
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<tr>
<td></td>
<td></td>
<td>Fresno, Kings, Kern,</td>
<td></td>
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<td></td>
<td></td>
<td>Merced, Monterey,</td>
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<td></td>
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<td>Sacramento, San</td>
<td></td>
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<td></td>
<td></td>
<td>Benito, San Joaquin,</td>
<td></td>
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<td></td>
<td></td>
<td>San Luis Obispo,</td>
<td></td>
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<td></td>
<td></td>
<td>Solano, Stanislaus,</td>
<td></td>
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<td></td>
<td></td>
<td>Tulare, Ventura, and</td>
<td></td>
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<td></td>
<td></td>
<td>Yolo.</td>
<td></td>
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</tr>
<tr>
<td>Lasthenia glabrata ssp. coulteri Coulter’s goldfields Asteraceae</td>
<td>--/--/1B.1</td>
<td>Colusa, Kern*, Los Angeles*, Merced, Orange, Riverside, Santa Barbara, San Bernardino*, San Diego, San Luis Obispo, Santa Rosa Island, Tehama, Tulare?, Ventura, and Yolo.</td>
<td>Occurs in coastal salt marshes and swamps, playas, and vernal pools.</td>
<td>February-June</td>
</tr>
<tr>
<td>Lasthenia leptalea Salinas Valley goldfields Asteraceae</td>
<td>--/--/4.3</td>
<td>Kern, Monterey, and San Luis Obispo.</td>
<td>Occurs in cismontane woodland and valley and foothill grassland.</td>
<td>February-April</td>
</tr>
<tr>
<td>Layia heterotricha pale-yellow layia Asteraceae</td>
<td>--/--/1B.1</td>
<td>Fresno, Kings*, Kern*, Los Angeles, Monterey, Santa Barbara, San Benito*, San Luis Obispo*, and Ventura.</td>
<td>Occurs on alkaline or clay substrates within cismontane woodland, coastal scrub, pinyon and juniper woodland, and valley and foothill grassland.</td>
<td>March-June</td>
</tr>
<tr>
<td>Layia jonesii Jones’ layia Asteraceae</td>
<td>--/--/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on clay or serpentinite substrates within chaparral and valley and foothill grassland.</td>
<td>March-May</td>
</tr>
<tr>
<td>Layia munzii Munz’ s tidy-tips Asteraceae</td>
<td>--/--/1B.2</td>
<td>Fresno, Kern, and San Luis Obispo.</td>
<td>Occurs in chenopod scrub and on alkaline or clay soils within valley and foothill grassland.</td>
<td>March-April</td>
</tr>
<tr>
<td>Lepidium jaredii ssp. album Panoche pepper-grass Brassicaceae</td>
<td>--/--/1B.2</td>
<td>Fresno, San Benito, and San Luis Obispo.</td>
<td>Occurs on steep slopes and clay substrates within valley and foothill grassland.</td>
<td>February-June</td>
</tr>
<tr>
<td>Lepidium jaredii Jared’s pepper-grass</td>
<td>--/--/1B.2</td>
<td></td>
<td></td>
<td></td>
</tr>
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</tr>
<tr>
<td><em>Lepidium jaredii</em> ssp. <em>jaredii</em> Jared’s pepper-grass Brassicaceae</td>
<td>--/--/1B.2</td>
<td>Kern and San Luis Obispo.</td>
<td>Occurs on alkaline or adobe substrates within valley and foothill grassland.</td>
<td>March-May</td>
</tr>
<tr>
<td><em>Lepidium jaredii</em> Jared’s pepper-grass</td>
<td>--/--/1B.2</td>
<td>Kern and San Luis Obispo.</td>
<td>Occurs in coastal dunes.</td>
<td>March-August</td>
</tr>
<tr>
<td><em>Leptodactylon californicum</em> ssp. <em>tomentosum</em> fuzzy prickly-phlox Polemoniaceae</td>
<td>--/--/4.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Linanthus californicus</em> linanthus</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leptosiphon grandiflorus</em> large-flowered leptosiphon Polemoniaceae</td>
<td>--/--/4.2</td>
<td>Alameda, Kern, Madera, Merced, Monterey, Marin, Santa Barbara*, Santa Clara, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, and Sonoma.</td>
<td>Usually occurs on sandy substrates within coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, coastal scrub, and valley and foothill grassland.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Lessingia tenuis</em> spring lessingia Asteraceae</td>
<td>--/--/4.3</td>
<td>Alameda, Kern, Monterey, Santa Barbara, San Benito, Santa Clara, San Luis Obispo, Stanislaus, and Ventura.</td>
<td>Occurs in openings within chaparral, cismontane woodland, and lower montane coniferous forest.</td>
<td>May-July</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
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</tr>
<tr>
<td><em>Lilium humboldtii</em> ssp. <em>ocellatum</em> ocellated Humboldt lily Liliaceae</td>
<td>--/-/4.2</td>
<td>Anacapa Island, Los Angeles, Orange, Riverside, Santa Barbara, San Bernardino, Santa Cruz Island, San Diego, San Luis Obispo, Santa Rosa Island, and Ventura.</td>
<td>Occurs in openings within chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland.</td>
<td>March-August</td>
</tr>
<tr>
<td><em>Lomatium parvifolium</em> small-leaved lomatium Apiaceae</td>
<td>--/-/4.2</td>
<td>Monterey, Santa Cruz, and San Luis Obispo.</td>
<td>Occurs on serpentinite substrates within closed-cone coniferous forest, chaparral, coastal scrub, and riparian woodland.</td>
<td>January-June</td>
</tr>
<tr>
<td><em>Lotus formosissimus</em> harlequin lotus Fabaceae</td>
<td>--/-/4.2</td>
<td>Del Norte, Humboldt, Mendocino, Monterey, Marin, San Benito, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, and Sonoma.</td>
<td>Occurs in wetlands and on roadsides within broadleafed upland forest, coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal prairie, coastal scrub, meadows and seeps, marshes and swamps, and north coast coniferous forest, and valley and foothill grassland.</td>
<td>March-July</td>
</tr>
<tr>
<td><em>Hosackia gracilis</em> harlequin lotus</td>
<td>--/-/4.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in broadleafed upland forest and lower montane coniferous forest.</td>
<td>May-June</td>
</tr>
<tr>
<td><em>Lupinus cervinus</em> Santa Lucia lupine Fabaceae</td>
<td>--/-/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on sandstone or sandy substrates within chaparral and cismontane woodland.</td>
<td>April-July</td>
</tr>
<tr>
<td><em>Lupinus ludovicianus</em> San Luis Obispo County lupine Fabaceae</td>
<td>--/-/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on coastal dunes.</td>
<td>December-May</td>
</tr>
<tr>
<td><em>Lupinus nipomensis</em> Nipomo Mesa lupine Fabaceae</td>
<td>FE/CE/1B.1</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on coastal dunes.</td>
<td>December-May</td>
</tr>
<tr>
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<tr>
<td><em>Malacothamnus gracilis</em> slender bush-mallow Malvaceae</td>
<td>--/--/4.3</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs in chaparral.</td>
<td>June-October</td>
</tr>
<tr>
<td><em>Malacothamnus jonesii</em> Jones’ bush-mallow Malvaceae</td>
<td>--/--/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in chaparral and cismontane woodland.</td>
<td>May-July</td>
</tr>
<tr>
<td><em>Malacothamnus niveus</em> San Luis Obispo County bush-mallow Malvaceae</td>
<td>--/--/4.3</td>
<td>Monterey, Santa Barbara, and San Luis Obispo.</td>
<td>Occurs in chaparral.</td>
<td>May-July</td>
</tr>
<tr>
<td><em>Malacothamnus jonesii</em> Jone’s bush-mallow Malvaceae</td>
<td>--/--/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in chaparral.</td>
<td>May-July</td>
</tr>
<tr>
<td><em>Malacothamnus palmeri</em> var. <em>involucratus</em> Carmel Valley bush-mallow Malvaceae</td>
<td>--/--/1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in chaparral, cismontane woodland, and coastal scrub.</td>
<td>May-October</td>
</tr>
<tr>
<td><em>Malacothamnus palmeri</em> var. <em>palmeri</em> Santa Lucia bush-mallow Malvaceae</td>
<td>--/--/1B.2</td>
<td>Monterey? and San Luis Obispo.</td>
<td>Occurs on rocky substrates within chaparral.</td>
<td>May-July</td>
</tr>
<tr>
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<td>Federal/State/ CRPR Status (Jepson Manual-2)</td>
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<td>Phenology</td>
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</tr>
<tr>
<td><em>Malacothrix phaeocarpa</em> dusky-fruited malacothrix Asteraceae</td>
<td>--/--/4.3</td>
<td>Monterey, Santa Barbara, Santa Clara, and San Luis Obispo.</td>
<td>Occurs in openings and burned or disturbed areas within closed-cone coniferous forest and chaparral.</td>
<td>April-June</td>
</tr>
<tr>
<td><em>Malacothrix saxatilis</em> var. arachnoidea Carmel Valley malacothrix Asteraceae</td>
<td>--/--/1B.2</td>
<td>Monterey, Santa Barbara, San Benito, and San Luis Obispo.</td>
<td>Occurs on rocky substrates within chaparral and in coastal scrub.</td>
<td>March-December</td>
</tr>
<tr>
<td><em>Micropus amphibolus</em> Mt. Diablo cottonweed Asteraceae</td>
<td>--/--/3.2</td>
<td>Alameda, Contra Costa, Colusa, Lake, Monterey, Marin, Napa, Santa Barbara, Santa Clara, Santa Cruz, San Joaquin, San Luis Obispo, Solano, and Sonoma.</td>
<td>Occurs on rocky substrates within broadleafed upland forest, chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>March-May</td>
</tr>
<tr>
<td><em>Microseris paludosa</em> marsh microseris Asteraceae</td>
<td>--/--/1B.2</td>
<td>Mendocino, Monterey, Marin, San Benito, Santa Cruz, San Francisco*, San Luis Obispo, San Mateo*, and Sonoma.</td>
<td>Occurs in closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland.</td>
<td>April-July</td>
</tr>
<tr>
<td><em>Mimulus subsecundus</em> one-sided monkeyflower Scrophulariaceae</td>
<td>--/--/4.3</td>
<td>Fresno, Monterey, San Benito, and San Luis Obispo.</td>
<td>Occurs in lower montane coniferous forest.</td>
<td>May-July</td>
</tr>
<tr>
<td><em>Mimulus fremontii</em> var. fremontii monkeyflower</td>
<td>none</td>
<td></td>
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<tr>
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<tr>
<td>Monardella antonina ssp. benitensis</td>
<td>--/-/4.3</td>
<td>Monterey, San Benito, and San Luis Obispo.</td>
<td>Usually occurs on serpentine substrates within chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland.</td>
<td>June-July</td>
</tr>
<tr>
<td>San Benito monardella Lamiaceae</td>
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<tr>
<td>Monardella villosa ssp. villosa coyote-mint</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monardella frutescens</td>
<td>--/-/1B.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs on coastal dunes and sandy substrates within coastal scrub.</td>
<td>May-September</td>
</tr>
<tr>
<td>San Luis Obispo monardella Lamiaceae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monardella undulata ssp. undulata</td>
<td>--/-/1B.2</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on serpentine substrates within chaparral and cismontane woodland.</td>
<td>June-August</td>
</tr>
<tr>
<td>San Luis Obispo monardella</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monardella palmeri Palmer’s monardella Lamiaceae</td>
<td>--/-/1B.2</td>
<td>Monterey, Marin, Santa Barbara, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, and Sonoma.</td>
<td>Occurs on sandy substrates within closed-cone coniferous forest, chaparral, coastal dunes, coastal prairie, coastal scrub, and on ponderosa pine sandhills within lower montane coniferous forest.</td>
<td>May-September</td>
</tr>
<tr>
<td>Monardella undulata curly-leaved monardella Lamiaceae</td>
<td>--/-/4.2</td>
<td>Monterey, Marin, Santa Barbara, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, and Sonoma.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monardella sinuata ssp. sinuata monardella</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-1)</td>
<td>County Distribution</td>
<td>Habitat Requirements</td>
<td>Phenology</td>
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</tr>
<tr>
<td><em>Monardella crispa</em> crisp monardella Lamiales</td>
<td>--/--/1B.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs in coastal dunes and coastal scrub.</td>
<td>April-August</td>
</tr>
<tr>
<td><em>Monardella undulata</em> ssp. crispa crisp monardella</td>
<td>--/--/1B.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Monolopia congdonii</em> San Joaquin woollythreads Asteraceae</td>
<td>FE/--/1B.2</td>
<td>Fresno, Kings, Kern, Santa Barbara, San Benito, San Luis Obispo, and Tulare*.</td>
<td>Occurs in chenopod scrub and sandy substrates within valley and foothill grassland.</td>
<td>February-May</td>
</tr>
<tr>
<td><em>Monolopia gracilens</em> woodland woollythreads Asteraceae</td>
<td>--/--/1B.2</td>
<td>Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz, San Luis Obispo, and San Mateo.</td>
<td>Occurs on serpentine substrates within openings in broadleaved upland forest, chaparral, and north coast coniferous forest, and in cismontane woodland, and valley and foothill grassland.</td>
<td>February-July</td>
</tr>
<tr>
<td><em>Mucronea californica</em> California spineflower Polygonaceae</td>
<td>--/--/4.2</td>
<td>Kern, Los Angeles, Monterey, Riverside, Santa Barbara, San Bernardino, San Diego, San Luis Obispo, and Ventura.</td>
<td>Occurs on sandy substrates within chaparral, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland.</td>
<td>March-August</td>
</tr>
<tr>
<td><em>Nasturtium gambelii</em> Gambel’s water cress Brassicaceae</td>
<td>FE/CT/1B.1</td>
<td>Los Angeles, Orange, Santa Barbara, San Bernardino*, San Diego, and San Luis Obispo.</td>
<td>Occurs in freshwater or brackish marshes and swamps.</td>
<td>April-October</td>
</tr>
<tr>
<td><em>Navarretia fossalis</em> Moran’s nosegay Polemoniaceae</td>
<td>FT/--/1B.1</td>
<td>Los Angeles, Riverside, San Diego, and San Luis Obispo.</td>
<td>Occurs in chenopod scrub, assorted shallow freshwater marshes and swamps, playas, and vernal pools.</td>
<td>April-June</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-1)</td>
<td>County Distribution</td>
<td>Habitat Requirements</td>
<td>Phenology</td>
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</tr>
<tr>
<td><strong>Navarretia nigelliformis</strong> ssp. <em>radians</em> shining navarretia Polemoniaceae</td>
<td>--/--/1B.2</td>
<td>Alameda, Contra Costa, Fresno, Merced, Monterey, San Benito, San Joaquin, and San Luis Obispo.</td>
<td>Occurs in cismontane woodland, valley and foothill grassland, and vernal pools.</td>
<td>April-July</td>
</tr>
<tr>
<td><strong>Navarretia prostrata</strong> prostrate vernal pool navarretia Polemoniaceae</td>
<td>--/--/1B.1</td>
<td>Alameda, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, San Bernardino?*, San Benito, San Diego, and San Luis Obispo.</td>
<td>Occurs in mesic areas within coastal scrub, meadows and seeps, alkaline valley and foothill grassland, and vernal pools.</td>
<td>April-July</td>
</tr>
<tr>
<td><strong>Nemacladus secundiflorus</strong> var. <em>robbinsii</em> nemacladus Campanulaceae</td>
<td>--/--/1B.2</td>
<td>Los Angeles, Santa Barbara, San Benito, San Luis Obispo, and Ventura.</td>
<td>Occurs in openings within chaparral and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
<tr>
<td><strong>Nemacladus secundiflorus</strong> var. <em>secundiflorus</em> large-flowered nemacladus Campanulaceae</td>
<td>--/--/4.3</td>
<td>Kern, Monterey, San Luis Obispo, and Tulare.</td>
<td>Occurs on gravelly substrates and openings within chaparral and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
<tr>
<td><strong>Orobanche parishii</strong> ssp. <em>brachyloba</em> short-lobed broomrape Orobanchaceae</td>
<td>--/--/4.2</td>
<td>Los Angeles, Santa Barbara, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, San Miguel Island, San Nicolas Island, Santa Rosa Island, and Ventura.</td>
<td>Occurs on sandy substrates within coastal bluff scrub, coastal dunes, and coastal scrub.</td>
<td>April-October</td>
</tr>
<tr>
<td><strong>Pedicularis dudleyi</strong> Dudley’s lousewort Scrophulariaceae</td>
<td>--/CR/1B.2</td>
<td>Monterey, Santa Cruz*, San Luis Obispo, and San Mateo.</td>
<td>Occurs in maritime chaparral, cismontane woodland, north coast coniferous forest, and valley and foothill grassland.</td>
<td>April-June</td>
</tr>
<tr>
<td><strong>Pentachaeta fragilis</strong> fragile pentachaeta Asteraceae</td>
<td>--/--/4.3</td>
<td>Kern, Madera, Merced, Monterey, Santa Barbara, San Luis Obispo, Tuolumne, and Ventura.</td>
<td>Often occurs in openings within chaparral and sandy substrates within lower montane coniferous forest.</td>
<td>March-June</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-1)</td>
<td>County Distribution</td>
<td>Habitat Requirements</td>
<td>Phenology</td>
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</tr>
<tr>
<td><em>Perideridia pringlei</em> adobe yampah Apiaceae</td>
<td>--/--/4.3</td>
<td>Kern, Los Angeles, Monterey, Santa Barbara, San Luis Obispo, Tulare, and Ventura.</td>
<td>Occurs on serpentine and often clay substrates within chaparral, cismontane woodland, coastal scrub, and pinyon and juniper woodland.</td>
<td>April-July</td>
</tr>
<tr>
<td><em>Phacelia ramosissima</em> var. <em>australitoralis</em> south coast branching phacelia Boraginaceae <em>Phacelia ramosissima</em> phacelia</td>
<td>--/--/3.2</td>
<td>Los Angeles, Monterey?*, Orange, Santa Barbara, San Diego, San Luis Obispo?, and Ventura.</td>
<td>Occurs on sandy, sometimes rocky substrates within chaparral, coastal dunes, coastal scrub, and coastal salt marshes and swamps.</td>
<td>March-August</td>
</tr>
<tr>
<td><em>Pinus radiata</em> Monterey pine Pinaceae</td>
<td>--/--/1B.1</td>
<td>Monterey, Santa Cruz, San Luis Obispo, and San Mateo.</td>
<td>Occurs in closed-cone coniferous forest and cismontane woodland.</td>
<td>Evergreen Tree</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-1)</td>
<td>County Distribution</td>
<td>Habitat Requirements</td>
<td>Phenology</td>
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<td>------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| **Piperia michaelii**  
Michael’s rein orchid  
Orchidaceae | --/--/4.2 | Alameda, Amador, Butte, Contra Costa, Fresno, Humboldt, Los Angeles*, Monterey, Marin, Santa Barbara, San Benito, Santa Clara, Santa Cruz, Santa Cruz Island, San Francisco, San Luis Obispo, San Mateo, Stanislaus, Tulare, Tuolumne, Ventura*, and Yuba. | Occurs in coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest. | April-August |
| **Plagiobothrys chorisianus**  
var. hickmanii  
Hickman’s popcorn-flower  
Boraginaceae | --/--/4.2 | Monterey, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, and San Mateo?. | Occurs in closed-cone coniferous forest, chaparral, coastal scrub, marshes and swamps, and vernal pools. | April-June |
| **Plagiobothrys uncinatus**  
hooked popcorn flower  
Boraginaceae | --/--/1B.2 | Monterey, San Benito, Santa Clara, San Luis Obispo, and Stanislaus. | Occurs on sandy substrates within chaparral, cismontane woodland, and valley and foothill grassland. | April-May |
| **Poa diaboli**  
Diablo Canyon bluegrass  
Poaceae | --/--/1B.2 | Endemic to San Luis Obispo. | Occurs on shale substrates and sometimes burned areas within closed-cone coniferous forest, mesic areas within chaparral, cismontane woodland, and coastal scrub. | March-April |
| **Prunus fasciculata**  
var. punctata  
sand almond  
Rosaceae | --/--/4.3 | Santa Barbara and San Luis Obispo. | Occurs on sandy substrates within maritime chaparral, cismontane woodland, coastal dunes, and coastal scrub. | March-April |
<table>
<thead>
<tr>
<th>Scientific Name/ Common Name/ Family (Jepson Manual-1)</th>
<th>Federal/State/ CRPR Status (Jepson Manual-1)</th>
<th>County Distribution</th>
<th>Habitat Requirements</th>
<th>Phenology</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pseudognaphalium leucocephalum</em> white rabbit-tobacco Asteraceae</td>
<td>--/--/2.2</td>
<td>Los Angeles (LAX), Orange (ORA), Riverside (RIV), Santa Barbara (SBA), San Diego (SDG), San Luis Obispo (SLO), Ventura Los Angeles, Orange, Riverside, Santa Barbara, San Diego, San Luis Obispo, and Ventura.</td>
<td>Occurs on sandy or gravely substrates within chaparral, cismontane woodland, coastal scrub, and riparian woodland.</td>
<td>July-December</td>
</tr>
<tr>
<td><em>Ribes sericeum</em> Santa Lucia gooseberry Grossulariaceae</td>
<td>--/--/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in broadleafed upland forest, coastal bluff scrub, and north coast coniferous forest.</td>
<td>February-April</td>
</tr>
<tr>
<td><em>Sanicula hoffmanii</em> Hoffmann's sanicle Apiaceae</td>
<td>--/--/4.3</td>
<td>Monterey, Santa Barbara, Santa Cruz, Santa Cruz Island, San Luis Obispo, San Mateo, and Santa Rosa Island.</td>
<td>Often occurs on serpentinite or clay substrates within broadleafed upland forest, chaparral, and coastal scrub.</td>
<td>March-May</td>
</tr>
<tr>
<td><em>Sanicula maritima</em> adobe sanicle Apiaceae</td>
<td>--/CR/1B.1</td>
<td>Alameda*, Monterey, San Francisco*, and San Luis Obispo.</td>
<td>Occurs on clay and serpentinite substrates within chaparral, coastal prairie, meadows and seeps, and valley and foothill grassland.</td>
<td>February-May</td>
</tr>
</tbody>
</table>
| *Scrophularia atrata* black-flowered figwort Scrophulariaceae | --/--/1B.2 | Santa Barbara and San Luis Obispo. | Closed-cone coniferous forest  
• Chaparral  
• Coastal dunes  
• Coastal scrub  
• Riparian scrub  
Occurs in closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub, and riparian scrub. | March-July |
<table>
<thead>
<tr>
<th>Scientific Name/ Common Name/ Family (Jepson Manual-1)</th>
<th>Federal/State/ CRPR Status (Jepson Manual-1)</th>
<th>County Distribution</th>
<th>Habitat Requirements</th>
<th>Phenology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senecio aphanactis chaparral ragwort Asteraceae</td>
<td>--/--/2.2</td>
<td>Alameda, Contra Costa, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, Santa Barbara, Santa Clara, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, Solano, Santa Rosa Island, and Ventura.</td>
<td>Sometimes occurs on alkaline substrates within chaparral, cismontane woodland, and coastal scrub.</td>
<td>January-April</td>
</tr>
<tr>
<td>Senecio astephanus San Gabriel ragwort Asteraceae</td>
<td>--/--/4.3</td>
<td>Kern, Los Angeles, Monterey, Santa Barbara, San Bernardino, San Diego, and San Luis Obispo.</td>
<td>Occurs on rocky slopes within coastal bluff scrub and chaparral.</td>
<td>May-July</td>
</tr>
<tr>
<td>Senecio blochmaniae Blochman’s ragwort Asteraceae</td>
<td>--/--/4.2</td>
<td>Santa Barbara and San Luis Obispo.</td>
<td>Occurs in coastal dunes.</td>
<td>May-October</td>
</tr>
<tr>
<td>Sidalcea hickmanii ssp. anomala Cuesta Pass checkerbloom Malvaceae</td>
<td>--/CR/1B.2</td>
<td>Endemic to San Luis Obispo.</td>
<td>Occurs on rocky or serpentinite substrates within closed-cone coniferous forest and chaparral.</td>
<td>May-June</td>
</tr>
<tr>
<td>Sidalcea hickmanii ssp. parishii Parish’s checkerbloom Malvaceae</td>
<td>--/CR/1B.2</td>
<td>Santa Barbara, San Bernardino, and San Luis Obispo.</td>
<td>Occurs in chaparral, cismontane woodland, and lower montane coniferous forest.</td>
<td>June-August</td>
</tr>
<tr>
<td>Stebbinsoseris decipiens Santa Cruz microseris Asteraceae</td>
<td>--/--/1B.2</td>
<td>Monterey, Marin, Santa Cruz, San Francisco, San Luis Obispo, and San Mateo.</td>
<td>Occurs in open areas and sometimes serpentinite substrates within broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland.</td>
<td>April-May</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family (Jepson Manual-1)</td>
<td>Federal/State/ CRPR Status (Jepson Manual-1)</td>
<td>County Distribution</td>
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</tr>
<tr>
<td>Streptanthus albidus ssp. peramoenus</td>
<td>--/-/-/1B.2</td>
<td>Alameda, Contra Costa, Monterey, Santa Clara, and San Luis Obispo.</td>
<td>Occurs on serpentine substrates within chaparral, cismontane woodland, and valley and foothill grassland.</td>
<td>March-October</td>
</tr>
<tr>
<td>Streptanthus glandulosus ssp. glandulosus jewelflower</td>
<td></td>
<td>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stylocline masonii Mason’s neststraw Asteraceae</td>
<td>--/-/-/1B.1</td>
<td>Kern, Los Angeles, Monterey, and San Luis Obispo.</td>
<td>Occurs on sandy substrates within chenopod scrub and pinyon and juniper woodland.</td>
<td>March-May</td>
</tr>
<tr>
<td>Suaeda taxifolia woolly seablite Chenopodiaceae</td>
<td>--/-/-/4.2</td>
<td>Anacapa Island, Los Angeles, Orange, Santa Barbara, Santa Barbara Island, San Clemente Island, Santa Catalina Island, Santa Cruz Island, San Diego, San Luis Obispo, San Nicolas Island, Santa Rosa Island, and Ventura.</td>
<td>Occurs on coastal bluff scrub, coastal dunes, and along the margins of coastal salt marshes and swamps.</td>
<td>January-December</td>
</tr>
<tr>
<td>Symphyotrichum defoliatum San Bernardino aster Asteraceae</td>
<td>--/-/-/1B.2</td>
<td>Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and San Luis Obispo?.</td>
<td>Occurs near ditches, streams, and springs within cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and vernally mesic areas within valley and foothill grassland.</td>
<td>July-November</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/ Family</td>
<td>Federal/State/ CRPR Status</td>
<td>County Distribution</td>
<td>Habitat Requirements</td>
<td>Phenology</td>
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</tr>
<tr>
<td>Systenotheca vortriedei Vortriede’s spineflower Polygonaceae</td>
<td>--/--/4.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs on sandy or serpentinite substrates within chaparral and cismontane woodland.</td>
<td>May-September</td>
</tr>
<tr>
<td>Toxicoscordion fontanum marsh zigadenus Melanthiaceae</td>
<td>--/--/4.2</td>
<td>Lake, Mendocino, Monterey, Marin, Napa, San Benito, Santa Cruz, San Luis Obispo, San Mateo, and Sonoma.</td>
<td>Occurs on vernally mesic areas and often serpentinite substrates within chaparral, cismontane woodland, lower montane coniferous forest, meadows and seeps, and marshes and swamps.</td>
<td>April-July</td>
</tr>
<tr>
<td>Trifolium hydrophilum saline clover Fabaceae</td>
<td>--/--/1B.2</td>
<td>Alameda, Contra Costa, Colusa?, Lake, Monterey, Napa, Sacramento, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Solano, Sonoma, and Yolo.</td>
<td>Occurs in marshes and swamps, mesic or alkaline areas within valley and foothill grassland, and vernal pools.</td>
<td>April-June</td>
</tr>
<tr>
<td>Triteleia ixiodes ssp. cookii Cook’s triteleia Liliaceae</td>
<td>--/--/1B.3</td>
<td>Monterey and San Luis Obispo.</td>
<td>Occurs in serpentine seeps within closed-cone coniferous forest and cismontane woodland.</td>
<td>May-June</td>
</tr>
</tbody>
</table>
STATUS CODES

FEDERAL: United States Fish and Wildlife Service
FE   Federally Listed Endangered
FT   Federally Listed Threatened

STATE: California Department of Fish and Game
CE   California Listed Endangered
CT   California Listed Threatened
CR   California Listed Rare

CRPR: California Rare Plant Rank (California Native Plant Society)
1B   Plants Rare, Threatened, or Endangered in California and Elsewhere
2    Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3    Plants About Which We Need More Information - A Review List
4    Plants of Limited Distribution - A Watch List

Threat Ranks
- 0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
- 0.2-Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
- 0.3-Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

?      Uncertain About Distribution or Identity
*     May be Extirpated

APPENDIX C

SPECIAL STATUS PLANT SPECIES NOT INCLUDED IN THE ANALYSIS
<table>
<thead>
<tr>
<th>Scientific Name/ Common Name/Family (Jepson Manual-1)</th>
<th>CRPR Status (Jepson Manual-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Allium howellii var. clokeyi</strong>&lt;br&gt; Mt. Pinos onion&lt;br&gt; Liliaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Arctostaphylos montereyensis</strong>&lt;br&gt; Toro manzanita&lt;br&gt; Ericaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Aspidotis carlotta-halliae</strong>&lt;br&gt; Carlotta Hall’s lace fern&lt;br&gt; Pteridaceae</td>
<td>--/--/4.2</td>
</tr>
<tr>
<td><strong>Atriplex cordulata</strong>&lt;br&gt; heartscape&lt;br&gt; Chenopodiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex cordulata var. cordulata</strong>&lt;br&gt; heartscale</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex cordulata var. erecticaulis</strong>&lt;br&gt; earlimart orach</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex coronata var. coronata</strong>&lt;br&gt; crownscale&lt;br&gt; Chenopodiaceae</td>
<td>--/--/4.2</td>
</tr>
<tr>
<td><strong>Atriplex coulteri</strong>&lt;br&gt; Coulter’s saltbush&lt;br&gt; Chenopodiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex joaquiniana</strong>&lt;br&gt; San Joaquin spearscale&lt;br&gt; Chenopodiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex serenana var. davidsonii</strong>&lt;br&gt; Davidson’s saltscale&lt;br&gt; Chenopodiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex vallicola</strong>&lt;br&gt; Lost Hills crownscale&lt;br&gt; Chenopodiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Atriplex coronata var. vallicola</strong>&lt;br&gt; Lost Hills crownscale</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Calytridium parryi var. hesseae</strong>&lt;br&gt; Santa Cruz Mountains pussypaws&lt;br&gt; Portulacaceae</td>
<td>--/--/1B.1</td>
</tr>
<tr>
<td><strong>Castilleja ambigua ssp. ambigu</strong>&lt;br&gt; Johnny-nip&lt;br&gt; Scrophulariaceae</td>
<td>--/--/4.2</td>
</tr>
<tr>
<td><strong>Centromadia parryi ssp. parryi</strong>&lt;br&gt; pappose tarplant&lt;br&gt; Asteraceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/Family (Jepson Manual-1)</td>
<td>CRPR Status (Jepson Manual-2)</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td><em>Chorizanthe pungens</em> var. <em>pungens</em> Monterey spineflower Polygonaceae</td>
<td>FT/-/-1B.2</td>
</tr>
<tr>
<td><em>Cladium californicum</em> California sawgrass Cyperaceae</td>
<td>--/-/-2.2</td>
</tr>
<tr>
<td><em>Eriastrum hooveri</em> Hoover’s eriastrum Polemoniaceae</td>
<td>--/-/-4.2</td>
</tr>
<tr>
<td><em>Eriogonum nudum</em> var. <em>indictum</em> protruding buckwheat Polygonaceae</td>
<td>--/-/-4.2</td>
</tr>
<tr>
<td><em>Fritillaria viridea</em> San Benito fritillary Liliaceae</td>
<td>--/-/-1B.2</td>
</tr>
<tr>
<td><em>Gilia leptantha</em> ssp. <em>pinetorum</em> pine gilia Polemoniaceae</td>
<td>--/-/-4.3</td>
</tr>
<tr>
<td><em>Lepidium jaredii</em> ssp. <em>album</em> Panoche pepper-grass Brassicaceae</td>
<td>--/-/-1B.2</td>
</tr>
<tr>
<td><em>Lepidium jaredii</em> Jared’s pepper-grass</td>
<td>--/-/-1B.2</td>
</tr>
<tr>
<td><em>Leptosiphon grandiflorus</em> large-flowered leptosiphon Polemoniaceae</td>
<td>--/-/-4.2</td>
</tr>
<tr>
<td><em>Lilium humboldtii</em> ssp. <em>ocellatum</em> ocellated Humboldt lily Liliaceae</td>
<td>--/-/-4.2</td>
</tr>
<tr>
<td><em>Malacothamnus davidsonii</em> Davidson’s bush-mallow Malvaceae</td>
<td>--/-/-1B.2</td>
</tr>
<tr>
<td><em>Malacothamnus palmeri</em> var. <em>involucratus</em> Carmel Valley bush-mallow Malvaceae</td>
<td>--/-/-1B.2</td>
</tr>
<tr>
<td><em>Malacothrix saxatilis</em> var. <em>arachnoidea</em> Carmel Valley malacothrix Asteraceae</td>
<td>--/-/-1B.2</td>
</tr>
<tr>
<td><em>Micropus amphibolus</em> Mt. Diablo cottonweed Asteraceae</td>
<td>--/-/-3.2</td>
</tr>
<tr>
<td><em>Monardella antonina</em> ssp. <em>benitensis</em> San Benito monardella Lamiaceae</td>
<td>--/-/-4.3</td>
</tr>
<tr>
<td>Scientific Name/ Common Name/Family (Jepson Manual-1)</td>
<td>CRPR Status (Jepson Manual-1)</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td><strong>Monardella villosa</strong> ssp. <em>villosa</em> coyote-mint</td>
<td>none</td>
</tr>
<tr>
<td><strong>Monardella crispa</strong> crisp monardella Lamiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Monardella undulata</strong> ssp. <em>crispa</em> crisp monardella</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Monardella frutescens</strong> San Luis Obispo monardella Lamiaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Monardella undulata</strong> ssp. <em>undulata</em> San Luis Obispo monardella</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Navarretia prostrata</strong> prostrate vernal pool navarretia Polemoniaceae</td>
<td>--/--/1B.1</td>
</tr>
<tr>
<td><strong>Nemacladus secundiflorus</strong> var. <em>robbinsii</em> nemacladus Campanulaceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Orobanche parishii</strong> ssp. <em>brachyloba</em> short-lobed broomrape Orobanchaceae</td>
<td>--/--/4.2</td>
</tr>
<tr>
<td><strong>Piperia leptopetala</strong> narrow-petaled rein orchid Orchidaceae</td>
<td>--/--/4.3</td>
</tr>
<tr>
<td><strong>Plagiobothrys chorisanus</strong> var. <em>hickmanii</em> Hickman’s popcorn-flower Boraginaceae</td>
<td>--/--/4.2</td>
</tr>
<tr>
<td><strong>Pseudognaphalium leucocephalum</strong> white rabbit-tobacco Asteraceae</td>
<td>--/--/2.2</td>
</tr>
<tr>
<td><strong>Stebbinsoseris decipiens</strong> Santa Cruz microseris Asteraceae</td>
<td>--/--/1B.2</td>
</tr>
<tr>
<td><strong>Toxicoscordion fontanum</strong> marsh zigadenus Melanthiaceae</td>
<td>--/--/4.2</td>
</tr>
<tr>
<td><strong>Trifolium hydrophilum</strong> saline clover Fabaceae</td>
<td>--/--/1B.2</td>
</tr>
</tbody>
</table>